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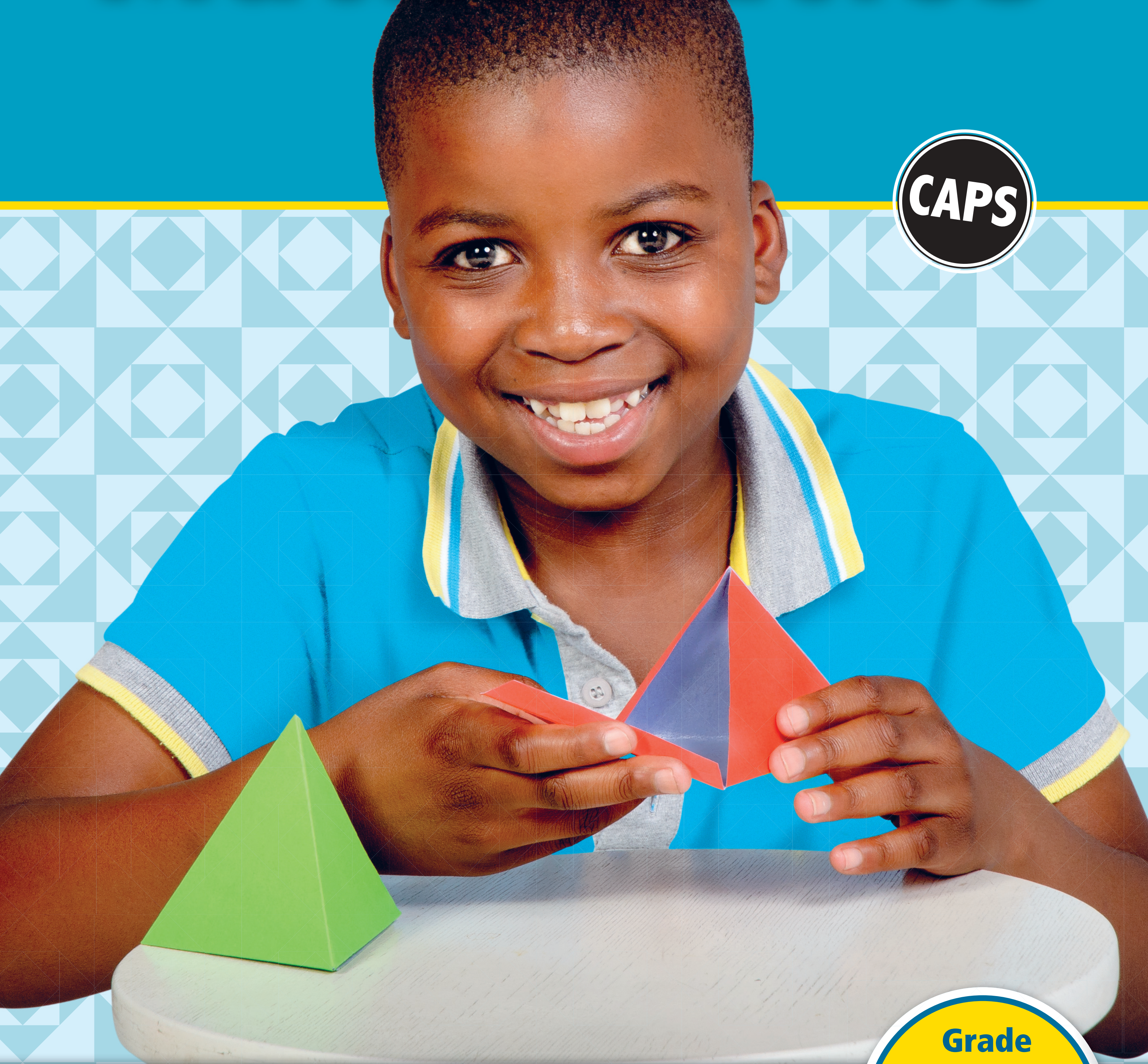
Mathematics



CAPS

Teacher's Guide

Grade 5

Zonia C Jooste • Karen Press • Moeneba Slamang
Lindi van Deventer

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Mathematics

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Contents

1. Introduction

The amended *National Curriculum and Assessment Policy Statements* for Grades R–12 came into effect in January 2012. They replaced the *National Curriculum Statements Grades R–9* (2002) and the *National Curriculum Statements Grades 10–12* (2004). The *National Curriculum and Assessment Policy Statement* (CAPS) for Intermediate Phase Mathematics (Grades 4–6) replaces the Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines that were used before then.

The instructional time for subjects in the Intermediate Phase is given in the table below.

Table 1 Instructional time for Intermediate Phase subjects

Subject	Time allocation per week (hours)
Home Language	6
First Additional Language	5
Mathematics	6
Science and Technology	3, 5
Social Sciences	3
Life Skills:	4
Creative Arts	1, 5
Physical Education	1, 5
Religion Studies	1

The Mathematics curriculum: aims and skills

The aims of the National Curriculum for Mathematics, as set out in the CAPS, are to develop the following qualities in learners:

- a critical awareness of how mathematical relationships are used in social, environmental, cultural and economic relations
- confidence and competence to deal with any mathematical situation without being hindered by a fear of mathematics
- a spirit of curiosity and a love for mathematics
- an appreciation of the beauty and elegance of mathematics
- recognition that mathematics is a creative part of human activity
- deep understanding of concepts needed to make sense of mathematics
- acquisition of specific knowledge and skills necessary for:
  - the application of mathematics to physical, social and mathematical problems
  - the study of related subject matter (e.g. other subjects)
  - the further study of mathematics.

The CAPS lists the following specific skills that learners must acquire to develop their essential mathematical skills:

- correct use of the language of mathematics
- ability to understand and use number vocabulary, number concept and calculation and application skills
- ability to listen, communicate, think, reason logically and apply the mathematical knowledge gained
- ability to investigate, analyse, represent and interpret information
- ability to pose and solve problems
- awareness of the important role that mathematics plays in real-life situations, including the personal development of the learner.

Problem-solving and mathematics

This Mathematics course is designed to encourage learner-centred and activity-based learning through problem-solving, an approach that should be applied throughout the course.

Problem-solving is one of the unique features of learning and teaching mathematics. Learners should be able to:

- make sense of problems
- analyse, synthesise (create), determine and execute solution strategies
- estimate, confirm (validate) and interpret the solutions appropriate to the context.

Problem-solving does not necessarily imply solving word problems. Word problems could be examples of extending problems that test learners' mathematical knowledge. These problems involve the use and validation of learned techniques in all the content areas of Intermediate Phase mathematics.

In a problem-solving situation, it may be highly unlikely that learners have had previous instruction on how to tackle the problems they are facing. Learners should invent their own solution strategies using different problem-solving procedures. There are no ready-made recipes or blueprints for searching for and finding problem-solving solutions.

Solutions and strategies are not as obvious in problem-solving situations as they are in word problems. In word problems, it is easy to identify which operations to apply to solve the problem. Problem-solving is not a topic that can be learned. It is a process in which learners can explore situations by applying different skills. Learners construct new meaning by building on previous knowledge and experiences in an active, cooperative environment.

Learners do not learn problem-solving techniques by memorising rules or consulting checklists. You should raise consistent awareness of the different techniques suitable for different problem-solving situations. You could give the problem as a homework task, group activity or introduction to new concepts (knowledge), or deal with it in an oral or written situation that applies to all learners without gender or culture bias. Throughout this course, learners are presented with different possible strategies for solving problems, and are encouraged to choose or develop strategies that work most effectively in given contexts.

Keep in mind that it is important to acknowledge that people are fundamentally different, and experience problem situations differently. Expect learners to apply a wide range of different methods and ideas in the problem-solving process.

Monitor learner groups carefully and encourage discussions and arguments while questioning learners about their progress. An important aspect of the learning of mathematics involves creative initiatives by learners to use the strategies and methods they know when they are confronted with new problems, and to experiment with different approaches to solving the problems.

Lead a class discussion on making mistakes, working well together, useful steps to keep in mind during a lesson, and enjoyment as an important part of mathematics activity. Discuss each aspect and ask learners questions such as: How do you feel when you have made a mistake? Why do you feel this way? Explain, for example, what it means to work towards a common goal. Take note of learners who seem reluctant to attempt problems that they find difficult, and help them to use their existing knowledge to solve new problems.

Inclusivity in the mathematics classroom

The ultimate aim of an inclusive school is to contribute towards the development of an inclusive society, where diversity is respected and used as a tool for building a stronger community.

Inclusive education is a process in which barriers to successful learning are identified and then removed for every learner. This starts at the school level, where the physical environment should be designed to accommodate learners who are challenged, where the school principal, the staff and the parents/guardians work together to create a good school ethos and where specialised equipment and/or personnel are provided for these learners.

You should highlight daily the aspects of mathematics that encourage cooperative learning and respect for diversity. Plan activities on an individual, pair or group basis so that you can meet the different needs of learners.

Homogeneous groups or pairs (in which all the learners have more or less the same level of skill and knowledge) are appropriate when the purpose of the group is to assist learners who have a common special educational need. Use homogeneous groups to cope with differentiated learning. For example, learners who have completed a class activity can be given an individual or group extension activity while you work with the rest of the class or with a group that needs more intensive input from you to help them understand and complete an activity. The intention is not for these groups to be fixed groups, but that learners move to different groups according to their needs and progress.

Heterogeneous groups have a number of advantages. These groups consist of learners with diverse backgrounds, gender, languages and abilities. Heterogeneous groups expose learners to new ideas, generate more discussion, and allow explanations to be given and received more frequently – this helps to increase understanding. Peer-tutoring, where two learners with different skills are paired, can be a mutually enriching experience.

Content areas in Intermediate Phase Mathematics

Mathematics in the Intermediate Phase covers five content areas:

- Numbers, operations and relationships
- Patterns, functions and algebra
- Space and shape (geometry)
- Measurement
- Data handling.

Each content area contributes towards the acquisition of specific skills. The table, Mathematics content knowledge, on page 9 in the CAPS document shows the general focus of the Mathematics content areas in curriculum as a whole, and the specific content focus in the Intermediate Phase.

Each content area is divided into topics. All the content areas must be taught every term. The tables for Time allocation per topic on pages 24 (Grade 4), 25 (Grade 5) and 26 (Grade 6) of the CAPS document set out the sequences of topics per term for each grade. This Mathematics course is structured to follow the sequences of topics set out in the CAPS table for each grade, term by term.

The full descriptions of concepts and skills for each content area, as well as additional teaching guidelines, are given in the detailed tables that follow these overview tables in the CAPS document. The Learner Book and Teacher's Guide for this course provide cross references to the relevant sections of these tables; this will help you to check that you are covering the required concepts and skills as you work through the units in the course.

The units in each term of this Mathematics course are clearly structured according to these content areas. At the same time, you will find that opportunities are provided in each content area to use concepts and skills relating to other content areas. For example, learners use concepts and contexts from Measurement, and Space and shape to solve problems in the Numbers, operations and relationships, and Patterns, functions and algebra content areas. In this way, learners are able to integrate the concepts, techniques and problem-solving strategies they learn across all content areas, and increase their awareness of mathematics as a coherent body of knowledge that covers a wide range of contexts and concepts.

Mental mathematics

Mental mathematics is a central part of the Intermediate Phase curriculum content. It should be part of the daily mathematics activity in the classroom throughout the year. In this Mathematics course most content units start with mental mathematics activities. These activities are designed to relate to the content that follows in the main unit, and also to revise skills and problem-solving strategies that learners have used earlier in the year. They are a vital part of the course, as they serve to keep learners actively thinking and talking about mathematics with you and with their peers, on a daily basis.

Weighting of content areas

Mathematics content areas are weighted for two purposes: firstly the weighting gives guidance on the amount of time needed to adequately cover the content in each content area; secondly the weighting gives teachers guidance on the spread of content in the examination (especially in the end-of-year summative assessment).

The weighting of the content is the same for each grade in the Intermediate Phase. The table on the next page shows the weightings, per grade.

Table 2 Weighting of content areas in Intermediate Phase Mathematics

	Weighting of content areas		
Content area	**Grade 4**	**Grade 5**	**Grade 6**
Numbers, operations and relationships*	50%	50%	50%
Patterns, functions and algebra	10%	10%	10%
Space and shape (geometry)	15%	15%	15%
Measurement	15%	15%	15%
Data handling	10%	10%	10%
Total	**100%**	**100%**	**100%**

*The weighting of the Numbers, operations and relationships content area has been increased to 50% for all three grades, in order to ensure that learners are sufficiently numerate when they enter the Senior Phase.

Progression in content areas across the Intermediate Phase

The Intermediate Phase Mathematics curriculum is structured to enable learners to develop their skills and knowledge in each content area in a careful progression from Grade 4 to Grade 6. A summary of this progression is provided on pages 11–22 of the CAPS document.

2. Planning and organising your mathematics teaching

The Teacher's Guide is an essential component of this series. It gives clear guidelines on how to teach the concepts the learners need to master and how to organise activities in the classroom. It contains a collection of photocopiable resources that are required for some of the activities in the Learner's Book. You can also use these resources to repeat activities at different times during the year, if you want to revise particular concepts and methods with learners.

The Learner's Book is structured according to the term-by-term sequence of topics for the grade set out in the CAPS document. Most units are preceded by a mental mathematics section that is integrated with the content to be covered in the unit that follows. You may want to do the mental mathematics activity at one time in the day and then proceed with the next unit later in the day. It is essential to keep to the rhythm of daily mental mathematics activities, so that learners continue to develop and consolidate their mathematical skills.

Resources in the classroom

In the Intermediate Phase learners move from work with concrete apparatus to focus more on written and oral work based on the content in the Learner's Book. However, it is still important that they use concrete apparatus such as flard cards, Dienes blocks and geometric shapes and objects to help them consolidate their understanding of place value, shape, space, pattern, division (sharing) and grouping, and other concepts that they will work with in this phase. The Teacher's Guide indicates what equipment will be useful for this purpose, in relation to each unit of the course.

Learners will also need to have access to instruments and equipment for practical activities in certain content areas, particularly the Measurement content area, where they need to use analogue and digital watches, stopwatches, scales and thermometers, as well as tape measures, trundle wheels, measuring jugs and spoons and droppers. Since much of this equipment is used in Grades 4, 5 and 6, you could arrange with teachers across the phase to have a collection of such equipment available for use by the learners in all three grades.

The photocopiable resources provided in this Teacher's Guide can be used throughout the year to repeat activities such as the mental mathematics games learners play, revising number concepts such as place value.

A teaching strategy that builds conceptual and social skills

The learning experiences in this course are designed for group work, pair work, individual work and for the whole class to do together. This cultivates an ethos of cooperation and working together. Letting learners work together is a very useful and successful teaching strategy. It helps them to develop social skills such as cooperating in teams, taking turns, showing respect and responsibility, as well as listening and communicating effectively through interactive learning.

Helping learners overcome barriers to learning mathematics

Learners who experience barriers to learning mathematics should be given many opportunities for activity-based learning, to help them overcome their barriers at the pace that works for them. They should be given more time to do practical examples, using concrete objects and practical experiences, than other learners.

Moving too soon to abstract work may make these learners feel frustrated, and they may then lose mathematical understanding and skills they have developed.

When organising daily classroom activities, allow more time for these learners to complete tasks, use their own strategies to develop their thinking skills, and do assessment activities. You may also need to reduce the number of activities you give to these learners, without leaving out any of the concepts and skills that need to be introduced and consolidated.

Revision work

The term-by-term content schedule for each grade includes periods set aside for revision work. During this period of the term you can repeat activities from units throughout the term, let learners play again the games they played during the Mental Maths units, or design new revision activities using the notes provided for each unit in this Teacher's Guide. Use the revision periods as a way to assess learners' readiness to complete formal assessment tasks for the term.

Assessment

The purpose of assessment is to inform you, the learners and their parents or guardians about their performance. Assessment also serves as a tool for you to reflect on and analyse your own teaching practice, as this has an influence on the learners' performance. You can use your assessment to see whether you need to provide more opportunities for some or all of the learners to develop a particular skill or master a concept in a given topic.

You should develop a well planned process to identify, record and interpret the performance of your learners throughout the year, using both informal and formal assessment methods. Keep a record of the learners' performance on assessment sheets, and summarise this information on a report form or card to give the learners and their parents or guardians at certain times of the year. You may photocopy the various assessment sheets provided in the back of this Teacher's Guide to use in your classroom.

Assessment methods

You can use various methods to assess the learners' progress during the year. Any assessment method involves four steps:

- generate and collect evidence of learners' achievement
- evaluate this evidence
- record your findings
- use this information to understand learners' development and help them improve the process of learning, and also to improve your teaching.

Before you undertake any assessment of learners' work, decide on a set of criteria or standards for what they should be able to understand and do, and base your assessment on these criteria. It is important that you give the learners clear instructions on what you expect of them, so that they can complete the assessment tasks correctly and honestly. Once an assessment task has been completed, discuss your assessment with the learners and give them feedback to help them increase their ability to do the task successfully.

Term-by-term assessment

The term-by-term content guidelines in the CAPS document specify which content areas are to be assessed in each term of the year. This Teacher's Guide includes assessment tasks for all content areas covered in each term. You may choose to do the assessment of a particular content section straight after that section has been completed, or to schedule the assessment at another time during the term. The assessment tasks are resources that you can use as part of your overall assessment plan for the year.

Self-assessment

Throughout the year the mental mathematics sections of the course include activities that learners must complete on a mental maths grid. This is a self-assessment tool that will enable the learners monitor their own achievements, and indicate where they feel they need help with a particular aspect of the content. You should use the completed grids as part of your own assessment of each learner's progress throughout the year.

Formal assessment requirements for Intermediate Phase Mathematics

The table below sets out the formal assessment requirements for Intermediate Phase Mathematics, as specified in the CAPS document.

Table 4 Minimum requirements for formal assessment: Intermediate Phase Mathematics

	Forms of assessment	Number of tasks per year	Minimum requirements per term				Weighting
			Term 1	Term 2	Term 3	Term 4	
School-based assessment (SBA)	Tests	3	1	1	1		**75%**
	Examination	1		1			
	Assignment	2	1			1	
	Investigation	1				1	
	Project	1			1		
	Total	**8**	**2**	**2**	**2**	**2**	
	To be completed before the final examination at the end of the year						
Final examination		1	End of the year				**25%**

Assessing learners who experience barriers to learning

Learners who experience barriers to learning should be given opportunities to demonstrate their competence in ways that suit their needs. You may have to consider using some or all of the following methods when assessing these learners:

- Allow these learners to use concrete apparatus for a longer time than other learners in the class.
- Break up assessment tasks (especially written tasks) into smaller sections for learners who have difficulty concentrating for long periods, or give them short breaks during the task.

- Learners who are easily distracted may need to do their assessment tasks in a separate venue.
- Use a variety of assessment methods, as some learners may not be able to demonstrate what they can do using certain types of assessment.
  For example, a learner may be able to explain a concept orally but have difficulty writing it down.

Reporting learners' performance

Reporting is the process of communicating learners' performance to the learners themselves, and to parents and guardians, schools and other stakeholders. You can use report cards, parent meetings, school visitation days, parent–teacher conferences, phone calls, letters and other appropriate methods to make your reports.

Records of learner performance should provide evidence of the learner's conceptual progression within a grade and her/his readiness to progress to the next grade.

Formal assessment is reported in all grades using percentages. The table below sets out the scale of achievement to be used for recording and reporting levels of competence in the Intermediate Phase. You should also use comments to describe learners' performance, as appropriate.

Table 5 Scale of achievement for the National Curriculum Statement Grades 4–6

Rating code	Description of competence	Percentage
7	Outstanding achievement	80–100
6	Meritorious achievement	70–79
5	Substantial achievement	60–69
4	Adequate achievement	50–59
3	Moderate achievement	40–49
2	Elementary achievement	30–39
1	Not achieved	0–29

Note: Let the learners fill in their answers for the Mental Maths activities on the Mental Maths grid (template supplied in the Resources section) to monitor their progress in mental calculations.

Lesson plans

Note: For all terms, time for Mental maths activities is included in the time for a unit.

Term 1			
Unit	**Title**	**LB pages**	**Time**
	Content area: Number, operations and relationships **Topic: Whole numbers: Revision of Grade 4 work**		5 hours
1	Rounding off to estimate	2–4	2 hours
2	Representing numbers and place value	4–5	1 hour
3	Comparing and ordering numbers	6	1 hour
4	Counting and calculating	7–8	1 hour
	Assessment		
	Content area: Patterns, functions and algebra **Topic: Number sentences**		**3 hours**
5	Number sentences 1	9–11	1 hour
6	Number sentences 2	12–13	1 hour
7	Balanced number sentences	13–14	1 hour
	Assessment		
	Content area: Number, operations and relationships **Topic: Whole numbers: Addition and subtraction**		**5 hours**
8	Shortcuts and inverse operations	15–16	1 hour
9	Number rules	17–18	1 hour
10	Using strategies to calculate smartly!	19–20	1 hour
11	Adding and subtracting four-digit numbers	20–21	1 hour
12	Problem-solving	22–23	1 hour
	Assessment		
	Content area: Patterns, functions and algebra **Topic: Numeric patterns**		**4 hours**
13	Numeric patterns	24–25	1 hour
14	Number sequences	26–27	1 hour
15	Extending numeric patterns	28–29	1 hour
16	Problem-solving with number sequences	29–31	1 hour
	Assessment		
	Content area: Number, operations and relationships **Topic: Whole numbers: Multiplication and division**		**6 hours**
17	Multiply and divide by multiples of 10	32–34	1 hour
18	Whole numbers multiplication and division	34–35	1 hour
19	Whole number multiples	36–37	1 hour
20	Rules of multiplication and division	37–39	1 hour
21	Estimate and divide with remainders	39–40	1 hour
22	Division strategies and problem-solving	41–42	1 hour
	Assessment		
	Content area: Measurement **Topic: Time**		**6 hours**

23	The history of time measuring instruments	43–46	2 hours
24	Revise a little	46–49	2 hours
25	Working with seconds	49–50	1 hour
26	Reading tables and calendars	51–52	1 hour
	Content area: Data handling **Topic: Collect and organise data**		**2 hours**
27	Tallies and tables	53–54	1 hour
28	Ordering groups of data	55–56	1 hour
	Topic: Represent data		4 hours
29	Pictographs	56–59	2 hours
30	Bar graphs	59–61	2 hours
	Topic: Analyse, interpret and report data		**4 hours**
31	Data in words, pictographs and bar graphs	62–65	1 hour
32	Pie charts	66–68	2 hours
33	The mode	68–71	1 hour
	Content area: Space and shape **Topic: Properties of 2-D shapes**		**7 hours**
34	Sides of shapes	72	1 hour
35	Recognising polygons	73–74	2 hours
36	Angles	75–77	2 hours
37	Squares and rectangles	78–79	2 hours
38	Building shapes	80	
	Content area: Measurement **Topic: Capacity and volume**		**5 hours**
39	Working with capacity	81–83	1 hour
40	Converting litres and millilitres	84	1 hour
41	Reading measuring jugs with gradation lines	85–86	1 hour
42	Comparing measurements	86–87	1 hour
43	Estimations and calculations with capacity and volume	87–88	1 hour

Term 2			
Unit	Title	LB pages	Time
	Content area: Number, operations and relationships **Topic: Whole numbers: Addition and subtraction**		**6 hours**
1	Place value, counting and representing numbers	90–91	1 hour
2	Round off to estimate and calculate	92–93	1 hour
3	Ancient addition and subtraction	94–95	1 hour
4	More addition and subtraction	95–97	1 hour
5	Place value and problem-solving	97–98	2 hours
	Assessment		
	Content area: Number, operations and relationships **Topic: Common fractions**		**5 hours**
6	Recognising and counting in fractions	99–101	1 hour
7	Representing and comparing fractions	101–103	1 hour
8	Fractions of whole numbers	104–105	1 hour
9	Equivalent fractions	105–107	1 hour
10	Problem-solving	108–109	1 hour
	Assessment		
	Content area: Measurement **Topic: Length**		**6 hours**
11	What is measurement?	110–112	1 hour
12	The smaller units of measurement	112–114	1 hour
13	The longer units of measurement	115–117	1 hour
14	Understanding the units of measurement	118	1 hour
15	Comparing and ordering lengths	119	1 hour
16	Calculations with measurement	120	1 hour
	Content area: Number, operations and relationships **Topic: Whole numbers: Multiplication**		**7 hours**
17	Multiples	121–122	1 hour
18	Multiples and factors	123–125	1 hour
19	Doubling to multiply by 25, 50 and 75	126–127	1 hour
20	Round off to estimate to calculate!	128–130	1 hour
21	Number rules	130–131	1 hour
22	Multiplication strategies	132–133	1 hour
23	Factors and problem-solving	133–134	1 hour
	Assessment		
	Content area: Space and shape **Topic: Properties of 3-D objects**		**5 hours**
24	Surfaces of objects	135–136	1 hour
25	Rectangular prisms and cubes	137–138	1 hour
26	Models and nets	139–142	3 hours
	Content area: Patterns, functions and algebra **Topic: Geometric patterns**		**5 hours**
27	Exploring, describing and creating patterns	143–145	1 hour

28	Growing patterns	144–145	1 hour
29	Investigating patterns to create rules	146–147	1 hour
30	Writing pattern rules	148–149	1 hour
31	Input and output numbers	150–151	1 hour
	Assessment		
	Content area: Space and shape **Topic: Symmetry**		**2 hours**
32	Symmetrical shapes	152–153	2 hours
	Content area: Numbers, operations and relationships **Topic: Whole numbers: Division**		
33	Basic division facts	154–155	1 hour
34	Equal sharing with remainders	156–157	1 hour
35	Dividing by multiples of 10, with and without remainders	157–158	1 hour
36	Dividing by multiples of 10 and equal sharing	159–160	1 hour
37	Rounding off to estimate division solutions	161–163	1 hour
38	Finding relationships	163–164	1 hour
39	Division strategies	165–166	2 hours
	Assessment		

Term 3			
Unit	Title	LB pages	Time
	Content area: Numbers, operations and relationships **Topic: Common fractions**		**5 hours**
1	Counting in fractions	168–169	1 hour
2	Equivalent fractions and fraction calculations	170–171	1 hour
3	Equal sharing	172–173	1 hour
4	Fraction calculations	174–175	1 hour
5	Fractions of whole numbers	175–176	1 hour
	Assessment		
	Content area: Measurement **Topic: Mass**		**5 hours**
6	Exploring mass	177–179	1 hour
7	Working with kilograms and grams	179–181	1 hour
8	Estimating with mass	181–182	1 hour
9	Mixed calculations with mass	182–183	1 hour
10	Mixed calculations	183–184	1 hour
	Content area: Numbers, operations and relationships **Topic: Whole numbers: Place value, addition and subtraction**		**6 hours**
11	Place values	185–187	1 hour
12	Addition and doubling	188–189	1 hour
13	Subtraction	190	1 hour
14	Problem-solving	191	1 hour
15	Addition and subtraction without carrying and decomposing	192	1 hour
16	Addition	193–194	1 hour
	Assessment		
	Content area: Space and shape **Topic: Viewing objects**		**3 hours**
17	Different views of objects	195–196	1 hour
18	More views	197–198	2 hours
	Content area: Space and shape **Topic: Properties of 2-D shapes**		**4 hours**
19	Describing and drawing shapes	199–201	2 hours
20	Shape games	201–202	2 hours
	Content area: Space and shape **Topic: Transformations**		**3 hours**
21	Translation (sliding)	203–204	1 hour
22	Reflection (flipping)	205–206	1 hour
23	Rotation (turning)	207–208	1 hour
	Content area: Measurement		**2 hours**
24	What is temperature?	209–213	1 hour
25	Working with temperature	214–216	1 hour

	Content area: Data handling **Topic: Collect, organise and represent data**		**9 hours**
26	Collecting and organising data	217–219	1 hour
27	Representing data	219–224	2 hours
28	Analysing data	224–233	6 hours
	Content area: Patterns, functions and algebra **Topic: Numeric patterns**		**5 hours**
29	Creating and extending number patterns	234–236	1 hour
30	Investigating and extending patterns	237–238	1 hour
31	Input and output numbers	239–240	1 hour
32	Number sequences in diagrams	241–242	1 hour
33	Finding rules	243–244	1 hour
	Assessment		
	Content area: Numbers, operations and relationships **Topic: Whole numbers: multiplication**		**7 hours**
34	Multiplication and area	245–247	1 hour
35	Using number rules in area models	247–248	1 hour
36	Multiplying three-digit numbers	249	1 hour
37	Rough answers	250–251	1 hour
38	Problem-solving	251–254	2 hours
39	Looking for relationships	255–256	1 hour
	Assessment		

Term 4

Unit	Title	LB pages	Time
	Content area: Numbers, operations and relationships **Topic: Whole numbers: place value, addition and subtraction**		**6 hours**
1	Place value and representing numbers	258–259	1 hour
2	Quick addition and subtraction	260–261	1 hour
3	Add and subtract four- and five-digit numbers	262–263	1 hour
4	Word problems	263–264	1 hour
5	Problem-solving	264–265	2 hours
	Assessment		
	Content area: Space and shape **Topic: Properties of 3-D objects**		**5 hours**
6	Describing and sorting 3-D objects	266–267	3 hours
7	Faces and nets of prisms	268–269	2 hours
	Content area: Numbers, operations and relationships **Topic: Common fractions**		**5 hours**
8	Revising fractions	270–271	30 minutes
9	Equivalent fractions	272–273	30 minutes
10	Fractions of whole numbers	273–274	1 hour
11	Fractions and mass	275–277	1 hour
12	Ratio and fractions	277–279	2 hours
	Assessment		
	Content area: Numbers, operations and relationships **Topic: Whole numbers: Division**		**7 hours**
13	Halving	280–281	1 hour
14	Multiples and powers of 10	281–282	1 hour
15	Division with and without remainders	282	1 hour
16	Sharing is caring	283–284	1 hour
17	Subtract to divide	284–285	1 hour
18	More division by two-digit numbers	285–286	1 hour
19	Practise what you have learnt about division	287	1 hour
	Assessment		
	Content area: Measurement **Topic: Area, perimeter and volume**		**7 hours**
20	The distance around shapes	288–290	2 hours
21	Perimeter	291–292	1 hour
22	Covering surfaces	293–296	2 hours
23	More about area and perimeter	296–297	1 hour
24	Volume and capacity	298–300	1 hour
	Assessment		
	Content area: Space and shape **Topic: Position and movement**		**2 hours**

25	Grid letters and numbers on a map	301–302	1 hour
26	Directions on a map	302–303	1 hour
	Content area: Space and shape **Topic: Transformations**		**4 hours**
27	Translations, reflections, rotations	304	2 hours
28	Tessellations	305–306	1 hour
29	Describing patterns	306–307	1 hour
	Content area: Patterns, functions and algebra **Topic: Geometric patterns**		**2 hours**
30	Writing rules for tile patterns	308–310	1 hour
31	More rules	310–312	1 hour
	Assessment		
	Content area: Patterns, functions and algebra **Topic: Number sentences**		**3 hours**
32	Number express	313–315	1 hour
33	Writing and solving number sentences	315–316	1 hour
34	Equations that balance	317–318	1 hour
	Assessment		
	Content area: Data handling **Topic: Probability**		**2 hours**
35	Events and outcomes	319–321	1 hour
36	Recording actual outcomes	321–322	1 hour

3. Unit-by-unit

Term 1

Whole numbers: counting, ordering, comparing, representing and place value

During the first week of Term 1, two hours should be spent on counting, ordering, comparing, representing numbers and place value. It is advised that learners use this time to revise work done in Grade 4. It is suggested that three of the eight hours for Mental Maths are used for revision during the first week. The revision activities include rounding off and estimation − important skills that learners need to apply throughout the year. Further revision will be done on place value, representing numbers, comparing and ordering numbers, counting and calculating. Learners will apply problem skills. Mental Maths will be implemented for about 10 minutes before the main lessons. Concepts practised and developed in Mental Maths will be in preparation for work to be done in the main lesson. An assessment task is provided at the end of the topic for learners to practise what they have learnt during the topic. The activities and assessment task should allow you to establish learners' existing level of knowledge and skill in the topics addressed.

Unit 1 Rounding off to estimate

MENTAL MATHS

- Tell the learners that they will round off numbers to the nearest 10, 100 and 1 000 and apply this knowledge to make estimations in the main lesson.
- Ask them if they can think of situations in real life where estimations are made, e.g. estimating the cost of food items, predicting the weather, and length and mass. They should realise that estimations are not wild guesses but rather a cognitive tool to give you a rough idea of the size of solutions or objects. Estimations are not always accurate, but they should be informed and justified.
- Ask the learners to study the prices of the toys. They should round off the prices in questions 1) and 2) to the nearest 10, 100 and 1 000.
- If there are learners who struggle with the concept, use the number line below for revising rounding off to the nearest 10 and then ask them to use this understanding to deduce understanding of rounding off to 100 and 1 000. Ask them which multiple of 10 is closest to the numbers you state. They have to find out that a number with a unit less than 5 is rounded off to the previous multiple while a number with a unit 5 or more than 5 is rounded off to the next multiple of 10.

Solutions

1. a)

Price	Nearest 10	Nearest 100
R95	R100	R100
R179	R180	R200
R205	R210	R200
R339	R340	R300
R269	R270	R300
R345	R350	R300
R785	R790	R800
R225	R230	R200

b)

Price	Nearest 100	Nearest 1 000
R3 395	R3 400	R3 000
R998	R1 000	R1 000
R959	R1 000	R1 000
R2 239	R2 200	R2 000
R5 699	R5 700	R6 000

Activity 1.1

- Tell the learners that they will use the prices of toys in Mental Maths to find out how many R100 notes they will need to buy a hamper of toys.
- Ask them what happens if they buy items with prices such as R9,99 in real life. How much change do they get? Here they round 'up' the numbers to the nearest 100. They will calculate the numbers that add up to powers of 10 (100 and 1 000 are powers of 10, i.e. $10^1 = 10$; $10^2 = 100$; $10^3 = 1\ 000$) by creating bonds of 100s and 1 000s. Encourage the learners to do this mentally. If not, allow them to use their own methods. They can build up the nearest 10 and then add the remaining multiples of 10 or 100 as in the solutions below.
- Then ask them to estimate the solutions to the addition and subtraction calculations by rounding off the numbers. Allow them to decide how they round off the numbers, i.e. to the nearest 10, 100 or 1 000. Ask them to calculate the actual answers (they can do this individually or as a class using their own strategies) and discuss whose estimates are closest to the accurate solutions. They practise the 'building up' and compensation number strategies.
- Next, they estimate the rough cost of the chops and chicken by rounding the cents to the nearest rand.

Solutions

1. a) Lego set @ R95 + doll @ R339 + laptop @ R345
   ≈ R100 + R400 + R400
   = R900
   = 9 R100 notes
   b) Pram @ R225 + cash register @ R269 + console @ R785
   ≈ R300 + R300 + R800
   = R1 400
   = 14 R100 notes
   c) WWE figure @ R179 + Lego set @R95 + Scrabble set @ R205
   ≈ R200 + R100 + R300
   = R600
   = 6 R100 notes
   d) Cash register @ R269 + pram @ R225 + doll @ R339
   ≈ R300 + R300 + R400
   = R1 000
   = 10 R100 notes
   e) Laptop @ R345 + console @ R785 + cash register @ R269
   ≈ R400 + R800 + R300
   = R1 500
   = 15 R100 notes
2. The learners also use the commutative property by switching or swapping numbers to add or subtract easier as in problems j), l) and n). You should also encourage learners to keep equal signs below each other in a calculation. This skill is important when solving equations in algebra in higher grades.

a)	95 + 5 = 100	100 − 5 = 95
b)	300 = 225 + 75	300 − 225 = 300 − 25 − 200 = 275 − 200 = 75
c)	179 + 1 + 20 = 200	200 − 179 = 200 − 20 + 1 = 179
d)	4 000 = 3 395 + 5 + 600 = 3 395 + 605 = 4 000	4 000 − 3 395 = 4 000 − 3 000 − 400 + 5 = 600 + 5 = 605
e)	205 + 5 + 90 = 300 205 + 95 = 300	300 − 205 = 300 − 200 − 5 = 95
f)	1 000 = 998 + 2	1 000 − 998 = 2
g)	339 + 1 + 60 = 400 339 + 61 = 400	400 − 339 = 400 − 340 + 1 = 61
h)	1 000 = 959 + 1 + 40 1 000 = 959 + 41	1 000 − 959 = 1 000 − 960 + 1 = 41
i)	269 + 1 + 30 = 300 269 + 31 = 300	300 − 269 = 300 − 270 + 1 = 31
j)	☐ + 2 239 = 3 000 2 239 + 1 + 760 = 3 000 2 239 + 761 = 3 000	3 000 − 2 239 = 3 000 − 2 000 − 240 + 1 = 760 + 1 = 761
k)	345 + 5 + 50 = 400 345 + 55 = 400	400 − 345 = 400 − 350 + 5 = 55
l)	5 699 + 1 + 300 = 6 000 5 699 + 301 = 6 000	6 000 − 5 699 = 6 000 − 700 + 1 = 301
m)	785 + ☐ = 800 785 + 5 + 10 = 800 785 + 15 = 800	800 − 785 = 800 − 780 − 5 = 15
n)	☐ + 1 499 = 2 000 1 499 + 1 + 500 = 2 000 1 499 + 501 = 2 000	2 000 − 1 499 = 2 000 − 1 500 + 1 = 501

3. Approximations:

	Nearest 10	**Nearest 100**
a)	1 000 + 2 200 = 3 200	1 000 + 2 240 = 3 240
b)	1 500 + 3 400 = 4 900	1 500 + 3 400 = 4 900
c)	5 700 – 960 = 4 740	5 700 – 1 000 = 4 700
d)	3 400 – 1 000 = 2 400	3 400 – 1 000 = 2 400
e)	5 700 + 1 500 = 7 200	5 700 + 1 500 = 7 200

Accurate answers:

a) 998 + 2 + 2 239 + 1 − 3 − 6
= 1 000 + 2 240 − 3
= 3 237

b) 1 499 + 1 + 3 395 + 5
= 1 500 + 3 400 − 6
= 4 894

c) 5 699 + 1 − 900 − 59 + 1
= 5 700 − 900 − 60
= 4 740

d) 3 400 − 1 000 − 5 − 2
= 2 400 − 3
= 2 397

e) 5 700 + 1 500 − 2
= 7 200 − 2
= 7 198

4. R61 + R61 or 2 × R61 = 120 + 2 = R122
5. R30 × 4 = R120

Problem-solving and investigation

The learners estimate the heights indicated by the letters in each picture of the well-known buildings. In the Social Science lesson they can learn more about these buildings or they could search the internet for information. They use the indicated heights to estimate the unknown heights.

Solutions

1. A: 60 m; B: 20 m
2. A: 125 m; B: 60 m
3. A: 40 m; B: 25 m; C: 10 m

Unit 2 Representing numbers and place value

MENTAL MATHS

- Let the learners use flard cards to create the numbers in Mental Maths. If they do not already have sets of flard cards, use the template in the Photocopiable Resources to make cards for them.
- Let them first pack out the numbers in question 1. Then ask them to show the expanded numbers and the solutions when they double them. Let them do the same with the numbers in question 2.

Solutions

1. a) 95 = 90 + 5
179 = 100 + 70 + 9
205 = 200 + 5
399 = 300 + 90 + 9
269 = 200 + 30 + 9
345 = 300 + 40 + 5
785 = 700 + 80 + 5
225 = 200 + 20 + 5

b) 3 395 = 3 000 + 300 + 90 + 5
998 = 900 + 90 + 8
959 = 900 + 50 + 9
2 239 = 2 000 + 200 + 30 + 9
5 699 = 5 000 + 600 + 90 + 9
1 499 = 1 000 + 400 + 90 + 9

2. a) 180 + 10 = 100 + 90 = 190
200 + 140 + 18 = 300 + 50 + 8 = 358
400 + 10 = 410
600 + 60 + 18 = 678
400 + 60 + 18 = 478
600 + 80 + 10 = 690
1 000 + 400 + 160 + 10 = 1 570
400 + 40 + 10 = 450

b) 6 000 + 600 + 180 + 10 = 6 790
1 800 + 180 + 16 = 1 996
1 800 + 100 + 18 = 1 918
4 000 + 400 + 60 + 18 = 4 478
10 000 + 1 200 + 180 + 18 = 11 398
2 000 + 800 + 180 + 18 = 2 998

Activity 2.1

- Ask the learners if they have seen a cheque before. You can show them some old cheques and ask them to explore the information. Draw their attention to the amounts. They should observe that the amounts are written in words and in numbers. Explain to them that this is one of the reasons they should be able to write numbers in words.
- Ask them why they think that the cheques cannot be accepted. They should understand that cheques are invalid if the information on the cheque is not complete. Let them write the numbers for the number words.
- Let them play the Place Value Scatter Board Game to practise place value.

Solutions

1. Learners read the amount on the cheque.
2. a) 3 395 = three thousand three hundred and ninety-five
   b) 998 = nine hundred and ninety-eight
   c) 959 = nine hundred and fifty-nine
   d) 2 239 = two thousand two hundred and thirty-nine
   e) 1 499 = one thousand four hundred and ninety-nine
3. a) Eight hundred and eighty-eight = 888
   b) Six thousand five hundred and fifty = 6 550
   c) Four thousand and seventy-five = 4 075
   d) Ten thousand and fifty-five = 10 055
   e) Sixteen thousand seven hundred and ten = 16 710
4. Learners play the Place Value Scatter Board Game.

Unit 3 Comparing and ordering numbers

MENTAL MATHS

- Learners will solve problems that seem simple but which they often struggle to solve mentally.
- Ask them to assess each other's work. They use calculators to check solutions.

Solutions

1. Ten more than 890 = 900
2. Five less than 2 500 = 2 495
3. One more than 7 999 = 8 000
4. Ten less than 878 = 868
5. Ten less than 405 = 395
6. Six more than 4 464 = 4 470
7. One less than 3 000 = 2 999
8. Twenty more than 680 = 700
9. Three less than 400 = 397
10. One less than 10 100 = 10 099

Activity 3.1

Solutions

1. The learners order the four-digit numbers in ascending order.

   6 036; 6 063; 6 306; 6 360; 6 603; 6 630; 8 036; 8 063; 8 306; 8 360; 8 603; 8 630

   You could ask the learners if they notice any patterns in the list of numbers. They should notice that the 3 and 6 in the tens and units place are alternated or switched in the hundreds, tens and units places. The recognition of the digits in different places and the learners' descriptions enhance the place value concept.

2. Ask the learners to create their own four-digit numbers using the digits in the circles. You should encourage them to work systematically, otherwise they might get confused. Do the first row with them, starting with 2 in the thousands place. They should get six numbers starting with a different digit. Ask them to look for patterns once they have completed the arrangements.

2 468	4 268	6 248	8 246
2 486	4 286	6 284	8 264
2 648	4 628	6 428	8 426
2 684	4 682	6 482	8 462
2 846	4 826	6 824	8 624
2 864	4 862	6 842	8 642

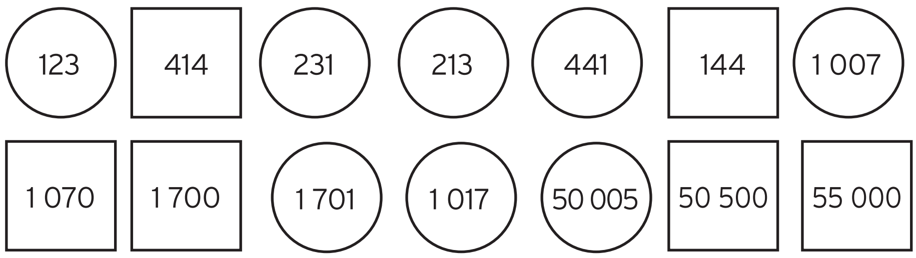
3. a) The learners write the numbers they have created in descending order (from largest to smallest). If they have worked systematically, they would find that they have to start with the last number in the fourth column and end with the first number in the first column.
   b) The numbers are uneven/odd numbers.
   c) It is not possible to create odd numbers because all the digits are even.

4. Ask them to use the four digits to create four-digit odd numbers. They should realise that the units could only be 1 and 3. Ask them to name the patterns they observe.

1 243	3 241
1 423	3 421
2 143	4 123
2 341	4 213
2 431	4 231
2 413	4 321

5. Learners write the odd numbers in ascending order by working from the first number in the first row to the last number in the second row.

6. The learners have to identify even and odd numbers in the list. Let them draw circles around the odd numbers and squares around the even numbers. Ask them to name the patterns they observe.



Unit 4 Counting and calculating

MENTAL MATHS

- Ask the learners to count the number of objects in each picture in the easiest way. They should explain their counting strategies.
- Check if there are learners who still apply repeated addition. Let them share and compare strategies to decide on the more effective ones.
- They then complete the numbers in the number chains. They display knowledge of multiples of one-digit counting numbers, counting in 5s, 25s, 50s and 100s and count in odd numbers and multiples of 3 from bigger

numbers. They also count forwards and backwards starting from multiples and non-multiples.

- Ask the learners to describe the numbers and the patterns they observe.

Solutions

1. a) 7 × 8 + 3 = 56 + 3 = 59 roses
   b) (5 × 5) + 2 × (10 × 2) = 25 + 40 = R65
   c) 6 × 6 + 4 = 36 + 4 = 40 fish
   d) 6 × 10 + 9 = 69 counters
   e) 6 × 9 + 4 = 54 + 4 = 58 muffins
   f) 5 × 12 + 8 = (5 × 10) + (5 × 2) + 8 = 68 pencils

2. a) 193 → +2 → 195 → +2 → 197 → +2 → 199 → +2 → 101 → +2 → 103 → +2 → 105
   b) 33 → +3 → 36 → +3 → 39 → +3 → 42 → +3 → 45 → +3 → 48 → +3 → 51
   c) 90 → –9 → 81 → –9 → 72 → –9 → 63 → –9 → 54 → –9 → 45 → –9 → 36
   d) 70 → –7 → 63 → –7 → 56 → –7 → 49 → –7 → 42 → –7 → 35 → –7 → 28
   e) 4 → +5 → 9 → +5 → 14 → +5 → 19 → +5 → 24 → +5 → 29 → +5 → 34
   f) 150 → –25 → 125 → –25 → 100 → –25 → 75 → –25 → 50 → –25 → 25 → –25 → 0
   g) 500 → –50 → 450 → –50 → 400 → –50 → 350 → –50 → 300 → –50 → 250 → –50 → 200
   h) 87 → +100 → 187 → +100 → 287 → +100 → 387 → +100 → 487 → +100 → 587 → +100 → 687

Activity 4.1

- The learners use the area model to calculate the number of boxes. They first calculate the bottom layer of boxes and then multiply by the number of layers.
- The example shows multiplication and then repeated addition. Ask them if they have another way of counting the boxes.
- They practise the commutative, associative and distributive properties of numbers, i.e. regrouping and doubling and halving. Encourage the learners to use brackets to indicate which calculations they do first. They should use grouping in which they manipulate numbers in the easiest ways, i.e. use numbers that they are comfortable with.
- Give the learners copies of the Counting Back Game. They play the game in pairs and toss a coin to decide who starts first. While counting back, a learner can either count 1 or 2 numbers. They may not realise at first that they have to say specific numbers to get to 1, which makes them a winner. If you count from 1 to 23, you can see the pattern clearly.

- Counting back and making sure that you land on these numbers is quite difficult. Ask them to use only one counter and say the numbers out loud as they count back. Do not show them the strategy. Let them play the game until they discover the strategy. The game assists in developing problem-solving and investigation skills.

Solutions

1. $(3 \times 3) \times 3 = 9 \times 3 = 27$

2. a) $3 \times (2 \times 3) = 3 \times 6 = 18$ $\quad (2 \times 3) \times 3 = 6 \times 3 = 18$ $\quad (3 \times 3) + (3 \times 3) = 9 + 9 = 18$

   b) $7 \times (2 \times 2) = 7 \times 4 = 28$ $\quad (2 \times 2) \times 7 = 4 \times 7 = 28$ $\quad (2 \times 7) + (2 \times 7) = 14 + 14 = 28$

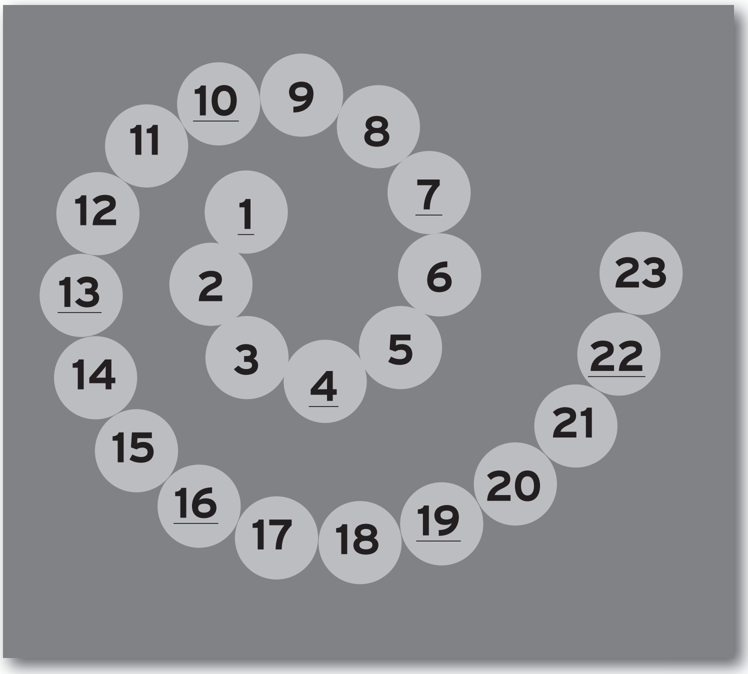
   c) $3 \times (6 \times 4) = 3 \times 24$ or
   $(6 \times 4) \times 3 = 24 \times 3 = (3 \times 20) + (3 \times 4) = 60 + 12 = 72$
   $6 \times (3 \times 4) = 6 \times 12 = (6 \times 10) + (6 \times 2) = 60 + 12 = 72$

   d) $4 \times (5 \times 3) = 4 \times 15 = (2 \times 15) + (2 \times 15) = 30 + 30 = 60$
   $(5 \times 3) \times 4 = 15 \times 4 = (4 \times 10) + (4 \times 5) = 40 + 20 = 60$

   e) $4 \times (4 \times 3) = 4 \times 12 = (2 \times 12) + (2 \times 12) = 24 + 24 = 48$
   $(4 \times 3) \times 4 = 12 \times 4 = 48$

3. $15 \times 4 = (2 \times 15) + (2 \times 15) = 30 + 30 = 60$

4. To make sure that you land on 1, you have to land on the underlined numbers. The pattern is: 22; 19; 16; 13; 10; 7; 4; 1.



Assessment

Tell the learners that they will perform an assessment task on what they have learnt in this topic. They will work individually. Set a time by which you want them to complete and ask them to manage the time effectively. They have to display knowledge of rounding off, estimation, place value, ordering numbers, even and uneven numbers, counting and calculating.

Assessment Task 1

1. Estimate the solution to the calculation. Round off the numbers:

$$\begin{array}{r} 3\,467 \\ +\ \underline{2\,312} \end{array}$$

   a) to the nearest 10
   b) to the nearest 100
   c) to the nearest 1 000.
   d) Calculate the accurate solution.
   e) Which estimation is closest to the accurate solution?

2. Expand each number using flard cards.
   a) 309
   b) 1 111
   c) 5 050
   d) 6 006
   e) 9 999

3. Write the numbers in ascending order.
   a) 4 732; 4 327; 4 273; 4 723; 4 372; 4 237
   b) 9 087; 9 807; 9 078; 9 780; 9 870; 9 708
   c) Draw circles around the even numbers in a).
   d) Draw squares around the odd numbers in b).

Solutions

1. The learners estimate the solution to the addition calculation by rounding off to the nearest 10, 100 and 1 000. They calculate the accurate solution and determine which was the best estimation.

   a) $\begin{array}{r} 3\,470 \\ +\ \underline{2\,310} \\ 5\,780 \end{array}$ b) $\begin{array}{r} 3\,500 \\ +\ \underline{2\,300} \\ 5\,800 \end{array}$ c) $\begin{array}{r} 3\,000 \\ \underline{+\ 2\,000} \\ 5\,000 \end{array}$ d) $\begin{array}{r} 3\,467 \\ +\ \underline{2\,312} \\ 5\,779 \end{array}$

   e) Rounding off to the nearest 10 is the closest: 5 780 is 1 more than 5 779; 5 800 is 21 more and 5 000 is 779 less than 5 779.

2. a) 309 = 300 + 9
   b) 1 111 = 1 000 + 100 + 10 + 1
   c) 5 050 = 5 000 + 50
   d) 6 006 = 6 000 + 6
   e) 9 999 = 9 000 + 900 + 90 + 9

3. a), c) 4 237; 4 273; 4 327; (4 372); 4 723; (4 732)
   b), d) 9 078; (9 087); 9 708; 9 780; 9 870; (9 807)

Number sentences

Tell the learners they will work with number sentences in this topic. This work is connected to the number sentences they worked with in addition, subtraction, multiplication and division. Tell them that they will apply knowledge of the four basic operations and counting to solve problems in number sentences. Writing number sentences helps them to order their thinking. The concepts that they develop in thus topic will assist them to understand algebraic concepts that they will work with in high school. Tell them that they will write an assessment task after these lessons.

Unit 5 Number sentences 1

MENTAL MATHS

- Learners may have worked with the 'I think of a number' activities in Grade 4. Let them look at the examples and solve them. Ask them to explain their strategies. Some of them might solve the problems by trial-and-improvement, while others might work backwards and apply inverse operations.
- Let them study the strategy provided. Explain to them that the number in the flow diagram, 'number machine' or function machine is called the operator. It is the function that you perform to get a solution.
- Ask them to fill in the missing numbers in the flow diagrams. Tell them that they will work with single and double number or function machines. They are called machines because you normally put something into a machine and get something out. The numbers that go into the machine are called input numbers and those that come out are called output numbers.
- Ask the learners to check and explain Peter's number sentences and to create their own 'I think of a number' problems. Let them choose learners to solve their problems.

Solutions

1. a) $\square \times 4 = 32$ $\square + 18 = 30$
   $32 \div 4 = 8$ $30 - 18 = 12$

2. a) ? → + 7 → 30 $30 - 7 = 23$
   b) ? → − 12 → 24 $24 + 12 = 36$
   c) ? → × 6 → 42 $42 \div 6 = 7$
   d) ? → ÷ 8 → 8 $8 \times 8 = 64$
   e) ? → + 15 → 40 $40 - 15 = 25$

   a) $30 + 7 = 37$. Incorrect. He should have subtracted 7 from 30. $30 - 7 = 23$.
   b) $24 - 12 = 12$. Incorrect. He should have added 12 and 24. $24 + 12 = 36$.
   c) $42 \times 6 = 252$. Incorrect. He should have divided 42 by 6. $42 \div 6 = 7$.
   d) $8 \div 8 = 1$. Incorrect. He should have multiplied 8 by 8. $8 \times 8 = 64$.
   e) $40 + 15 = 55$. Incorrect. He should have subtracted 15 from 40. $40 - 15 = 25$.

3. Learners make up their own puzzles.

Activity 5.1

- Ask the learners to write number sentences with the numbers in the flow diagrams and solve them. They do this by applying the inverse operations.
- The learners should know from previous work with number that when you add and subtract the same number in a calculation, it is as if you have added zero.
- They work with additive and multiplicative inverses. Tell the learners they will work with the additive property of zero in Unit 9.

- When you subtract the same number that you have added to a number you 'undo' the addition, so that for example $57 + 7 - 7 = 57$. When you multiply by a number and divide by the same number, you 'undo' the multiplication so that, for example, $24 \times 8 \div 8 = 24$. Allow the learners to use calculators to check this property of number.
- Ask the learners to check the output numbers in Zanele's function machines. They write number sentences to rectify and solve the functions. They write number sentences for the puzzles involving double function machines and solve them.

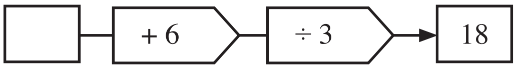
Solutions

1. a) $\square \div 4 = 16$
   $16 \times 4 = (8 \times 4) + (8 \times 4)$
   $= 32 + 32$
   $= 64$
   b) $\square - 15 = 335$
   $335 + 15 = 350$
   c) $\square \times 9 = 279$
   $279 \div 9 = (270 \div 9) + (9 \div 9)$
   $= 30 + 1$
   $= 31$
   d) $\square + 25 = 400$
   $400 - 25 = 375$
   e) $\square \times 8 = 328$
   $328 \div 8 = (320 \div 8) + (8 \div 8)$
   $= 40 + 1$
   $= 41$
   f) $\square \div 16 = 24$
   $24 \times 16 = (20 \times 16) + (4 \times 16)$
   $= 320 + (2 \times 16) + (2 \times 16)$
   $= 320 + 32 + 32$
   $= 384$
   g) $\square - 50 = 450$
   $450 + 50 = 500$
   h) $\square + 100 = 567$
   $567 - 100 = 467$

2. The learners work with the additive inverses of 0 and 1 and the multiplication inverse of 1.
   a) $\square \times 9 \div 9 = \square$
   b) $51 \div 17 \times 17 = 51$
   c) $\square + 40 - 40 = \square$
   d) $\square - 12 + 12 = \square$

3. a) Incorrect $6 \times 2 \div 2 = 6$
   b) Correct $4 + 7 - 7 = 4$
   c) Incorrect $15 \div 3 \times 3 = 15$
   d) Incorrect $9 - 1 + 1 = 9$
   e) Correct $5 + 5 - 5 = 5$
   f) Incorrect $8 - 7 + 7 = 8$
   g) Correct $25 \times 4 \div 4 = 25$
   h) Incorrect $50 \div 2 \times 2 = 50$

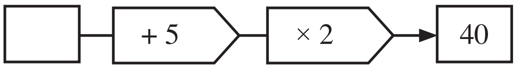
4. The learners create flow diagrams for each number puzzle and write a number sentence for each double flow diagram. They apply inverse operations to do this. Focus their attention on the order of operations again, for example in a): $(30 + 24) - 6 = 48$ and $30 + (24 - 6) = 18 + 30 = 48$. The order of operations does not influence the solution when addition and subtraction is involved. $(18 \times 3) - 6 = 48$ and $18 \times (3 - 6) = 18 \times -3 = -54$. The order of operations influences the solution. Multiplication should be done before subtraction. In c) however, the operations should be performed as they appear in the expression otherwise you will not get the intended input value. Subtraction should be performed before multiplication: $45 \div 3 + 12 = 27$ and $27 - 12 \times 3 = 45$ but $27 - (12 \times 3) = 27 - 36 = -9$.

a)


$\square + 6 \div 3 = 18$

$18 \times 3 - 6 = (9 \times 3) + (9 \times 3) - 6$
$= 27 + 27 - 6$
$= 54 - 6$
$= 48$

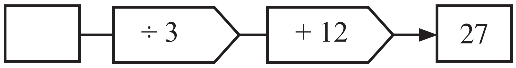
$48 + 6 \div 3 = 18$

b)


$\square + 5 \times 2 = 40$

$40 \div 2 - 5 = 20 - 5$
$= 15$

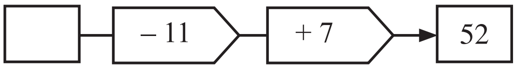
$15 + 5 \times 2 = 40$

c)


$\square \div 3 + 12 = 27$

$27 - 12 \times 3 = 15 \times 3$
$= 45$

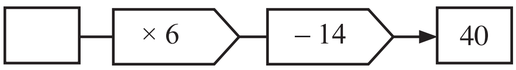
$45 \div 3 + 12 = 27$

d)


$\square - 11 + 7 = 52$

$52 - 7 + 11 = 55 + 11$
$= 66$

$66 - 11 + 7 = 52$

e)


$\square \times 6 - 14 = 40$

$40 + 14 \div 6 = 54 \div 6$
$= 9$

$9 \times 6 - 14 = 40$

Problem-solving

The learners should have solved a similar problem in Grade 4. Let them work in pairs to solve the problem. They should convert rands to cents.

Solutions

1. $\square \times 3 \times 2 = R4,50$
   $450 \div 2 \div 3 = 225 \div 3$
   $= 75c$

2. $\square \times 2 = R5,50$
   $550 \div 2 = (500 \div 2) + (50 \div 2)$
   $= 250 + 25$
   $= 275$
   $= R2,75$

Unit 6 Number sentences 2

MENTAL MATHS

- Learners practise the use of the commutative and associative property, using brackets, the correct order of operations and using additive and multiplicative inverses.

Solutions

1. a) 6 + 4 = 4 + 6
   b) 8 × 3 = 3 × 8
   c) 0 × 4 = 4 × 0 = 0
   d) 20 ÷ 2 × 2 = 20
   e) 8 + 13 + 12 + 7 = (8 + 12) + (13 + 7) = 20 + 20 = 40
   f) 17 × 5 × 2 = 17 × (5 × 2) = 17 × 10 = 170
   g) 52 – 10 + 10 = 52
   h) (2 × 3) + (4 × 5) = 6 + 20 = 26
   i) 6 × (3 + 1) = 6 × 4 = 24
   j) (4 + 5) × 10 = 9 × 10 = 90

Activity 6.1

- The learners solve number sentences involving the distributive property.
- They calculate the cost of the lesser products to decide which are the 'best buys' of each two items. They use rounding off and doubling to do this.
- They calculate the cost of different quantities of products.

Solutions

1. a) 8 × 24 = (8 × 20) + (8 × 4)
   = 160 + 32
   = 192
   b) R2,99 × 6 = (R2 × 6) + (99c × 6)
   = R12 + R5,94
   = R17,94
   c) R5,50 × 5 = (R5 × 5) + (50c × 5)
   = R25 + R2,50
   = R27,50
   d) R6,99 × 4 = (R7 × 4) – (1c × 4)
   = R28 + R0,04
   = R27,96
   e) R10,95 × 12 = (R11 × 12) + (5c × 12)
   = R132 + R0,60
   = R131,40
   f) R10,99 × 9 = (R10 × 9) + (99c × 9)
   = R90 + R8,91
   = R98,91
   g) 75 + 38 + 25 = 75 + 25 + 38 = 100 + 38
   = 138
   h) 125 + 46 – 25 = 125 – 25 + 46 = 100 + 46
   = 146
   i) 64 × 6 ÷ 8 = 64 ÷ 8 × 6 = 8 × 6
   = 48
   j) 56 – 37 + 4 = 56 + 4 – 37
   = 23

2. a) R6,95 × 2 = ☐
= (700 × 2) − 10
= 1 400 − 10
= 1 390
= R13,90

Double R6,95 = ☐
= R14,00 − 10c
= R13,90

You save 5c if you buy 2 jars of 350 g jars of jam.

b) R7,99 × 2 = ☐
= (800 × 2) − 2
= 1 600 − 2
= 1 598
= R15,98

Double R7,99 = ☐
= R16,00 − 2c
= R15,98

You save R3,01 if you buy two 500 g of butter.

c) R21,99 × 2 = ☐
= (2 200 × 2) – 2
= 4 400 – 2
= 4 398
= R43,98

Double R21,99 = ☐
= R44,00 − 2c
= R43,98

You save R1,99 if you buy the 5 kg pack of sugar.

d) R8,95 × 5 = ☐
= 900 × 5 – 25
= 4 500 – 25
= 4 475
= R44,75

R8,95 × 5 = ☐
= (R9,00 × 5) − (5 × 5c)
= R45,00 − 25c
= R44,75

You save 1c if you buy two 1 kg packs of washing powder.

e) R9,99 × 2 = ☐
= 1 000 × 2 – 2
= 2 000 – 2
= 1 998
= R19,98

Double R9,99 = ☐
= R20,00 − 2c
= R19,98

You save R3,80 if you buy the 5 kg bag of mealie meal.

Ask the learners whether they think a saving of 1c or 5c is worthwhile.

Unit 7 Balanced number sentences

MENTAL MATHS

- Ask the learners to solve the number sentences involving facts of multiples of 10. Ask them whether they have noticed the use of the equal sign. The value of the numbers on both sides should always be equal. In algebra, a number sentence with an equal sign and equal values on both sides is called an equation.
- Inform the learners that a number sentence like 4 + 7 is called an expression. The number sentence 4 + 7 = 7 + 4 is called an equation because both sides have a value of 11.
- Have a discussion about the apples and the mass on the scale. Ask them to find ways to determine the mass of one apple if all the apples have the same mass. Encourage them to write a number sentence or equation on the board. They use the inverse operation to find the mass of one apple. Show them how they could substitute the apples by place holders to find the value of each apple.

300 = 6 × ☐
300 ÷ 6 = ☐
= 50

300 = ☐ + ☐ + ☐ + ☐ + ☐ + ☐
300 = 50 + 50 + 50 + 50 + 50 + 50
300 = 6 × 50

Each apple weighs 50 grams.
Let them check the solution by doing multiplication, i.e. $50 \times 6 = (5 \times 6) \times 10 = 300$.

1. $\square + 150 = 500$
   $500 - 150 = 350$
   $350 + 150 = 500$

2. $1\,000 = \square + 750$
   $1\,000 - 750 = 250$
   $1\,000 = 250 + 750$

3. $4 \times 25 = 100$

4. $40 \times 25 = 1\,000$

5. $250 + \square = 1\,500$
   $1\,500 - 250 = 1\,250$
   $250 + 1\,250 = 1\,500$

6. $250 \times 4 = 1\,000$

7. $2\,000 = 50 \times 40$

8. $1\,000 \div 4 = \square$
   $1\,000 \div 4 = 250$

9. $125 \times \square = 1\,000$
   $(125 \times 2) \times 4 = 1\,000$
   $125 \times (2 \times 4) = 1\,000$
   $125 \times 8 = 1\,000$

10. $1\,000 = \square \times 200$
    $1\,000 = 10 \times 100$
    $= 5 \times (2 \times 100)$
    $1\,000 = 5 \times 200$

Activity 7.1

- The learners get opportunities to develop understanding of equations with the use of balancing scales as models. They know that balancing scales balance when the mass is the same on both sides of the scale.
- Have a class discussion about the illustrations and the equations. They should understand that objects and numbers are removed on both sides to make the mass or value of the numbers the same.
- Ask them to solve equations. They use place holders for the objects (tins of paint) and numbers for the masses. Tell them that one weight has a mass of 1 kg.

Solutions

1. The learners apply inverse operations, division, multiplication or repeated addition to solve the equations. They apply substitution to check the solutions to find out if the equations balance.
   a) 2 tins + 11 kg = 3 tins + 1 kg
      Let $\square$ stand for 1 tin.
      $\square + \square + 11 = \square + \square + \square + 1$
      $11 = \square + 1$ (Take away 2 tins on both sides.)
      $11 - 1 = \square$
      $10 = \square$
      One tin has a mass of 10 kg.
      Check by substitution: $10 + 10 + 11 = 10 + 10 + 10 + 1$
      $31 = 31$

b) 1 tin + 12 = 5 tins

$\square + 12 = \square + \square + \square + \square + \square$

$12 = \square + \square + \square + \square$ (Take away 1 tin from both sides.)

$12 = 3 + 3 + 3 + 3$

or $12 = 4 \times 3$

One tin has a mass of 3 kg.

Check by substitution: $3 + 12 = 3 + 3 + 3 + 3 + 3$

$15 = 15$

2. a) 3 bottles + 5 kg = 4 bottles + 3 kg

$\square + \square + \square + 5 = \square + \square + \square + \square + 3$

(Take away 3 bottles on both sides.)

$5 = \square + 3$

$5 - 3 = \square$

$2 = \square$

One bottle has a mass of 2 kg.

Check by substitution: $2 + 2 + 2 + 5 = 2 + 2 + 2 + 2 + 3$

$11 = 11$

b) 3 jars + 17 kg = 5 jars + 5 kg

$\square + \square + \square + 17 = \square + \square + \square + \square + \square + 5$

$17 = \square + \square + 5$ (Take away 3 jars on both sides.)

$17 - 5 = \square + \square$

$12 = \square + \square$

$12 = 6 + 6$

One jar has a mass of 6 kg

Check by substitution: $6 + 6 + 6 + 17 = 6 + 6 + 6 + 6 + 6 + 5$

$18 + 17 = 30 + 5$

$35 = 35$

3. The learners now solve equations out of context. They use inverse operations to solve the equations and substitution to check that the equations balance.

a) $\square + 14 = \square + \square + 3$

$14 = \square + 3$

$14 - 3 = \square$

$11 = \square$

$11 + 14 = 11 + 11 + 3$

$25 = 25$

b) $21 = \square + \square + \square$

$21 \div 3 = \square$

$7 = \square$

$21 = 7 + 7 + 7$

c) $\square + \square + \square + 8 = \square + \square + 10$

$\square + 8 = 10$

$\square = 10 - 8$

$\square = 2$

$2 + 2 + 2 + 8 = 2 + 2 + 10$

$14 = 14$

d) $\square + \square + 6 = \square + 10$

$\square + 6 = 10$

$\square = 10 - 6$

$\square = 4$

$4 + 4 + 6 = 4 + 10$

$14 = 14$

e) □ + □ + □ + 7 = □ + □ + 12
□ + 7 = 12
□ = 12 − 7
□ = 5
5 + 5 + 5 + 7 = 5 + 5 + 12
22 = 22

Assessment

Tell the learners that they will now write an assessment task to find out what they have learnt about number sentences. They will display knowledge of the concepts they have dealt with during the lessons. They work with inverse relationships, apply effective strategies using number properties and work with flow diagrams.

Assessment Task 2

1. Fill in the missing numbers in these number sequences.
   a) 750 + □ = 1 000
   b) 1 750 + □ = 2 000
   c) 3 × □ = 600
   d) □ + 190 = 300
   e) 4 × 150 = □
   f) 89 – 9 + 9 = □
   g) (10 – 10) × 5 = □
   h) 45 × □ = 45
   i) 23 – 23 = □
   j) 15 ÷ □ = 15
2. Solve the number sentences.
   a) 99 × 5 = □
   b) R15,99 × 2 = □
   c) R9,95 × 6 = □
   d) 24 + 26 = □ + 24 = □
   e) 6 × □ = □ × 6 = 54
   f) 32 ÷ 8 = □ and 32 ÷ □ = 8
   g) 85 + □ = 100 and 100 – □ = 85
   h) 0 × □ = □ × 0 = 0
   i) 1 × □ = 65 × 1 = □
   j) 28 ÷ 7 = □ and □ × 7 = 28
3. Solve the following. Write a number sentence for each flow diagram.
   a) 8 → × 4 → + 8 → □
   b) □ → + 4 → × 10 → 90
   c) 7 → □ → × 5 → 50
   d) 6 → × 5 → □ → 60
   e) 34 → – 10 → ÷ 3 → □
4. Write number sentences before you solve the calculations.
   How much would you pay for:
   a) 2 chocolates?
   b) 4 chocolates?
   c) 6 chocolates?
   d) 8 chocolates?
   e) 10 chocolates?

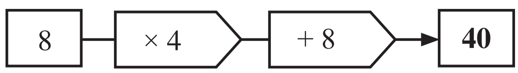
5. Fill in the missing numbers.
   a) (27 ÷ ☐) × 10 = 30
   b) ☐ + ☐ + ☐ = ☐ + 12
   c) 20 = ☐ × 2 = ☐ × 4
   d) 4 × ☐ = 2 × ☐ = 100
   e) ☐ + ☐ = ☐ + ☐ + ☐ = 60
   f) 50 = ☐ − 50 = ☐ − 25

Solutions

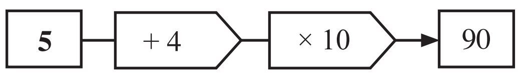
1. The learners fill in the missing numbers in the number sentences. The unknown values they have to find are in different positions. They work with bonds of multiples of 10 and additive and multiplicative inverses. They can use counting on or inverse operations.
   a) 750 + **250** = 1 000
   b) 1 750 + **250** = 2 000
   c) 3 × **200** = 600
   d) **110** + 190 = 300
   e) 4 × 150 = **600**
   f) 89 – 9 + 9 = **0**
   g) (10 – 10) × 5 = **0**
   h) 45 × **1** = 45
   i) 23 – 23 = **0**
   j) 15 ÷ **1** = 15

2. You should check if learners apply a short cut to multiply by 99 and amounts involving 98c and 95c. They have done this before. They round up the amounts to the nearest rand. They use rounding up, compensation, the commutative property and inverse operations.
   a) 99 × 5 = ☐
      (100 × 5) − (1 × 5) = 500 − 5
      = 495
   b) R15,99 × 2 = ☐
      (1 600 × 2) – (1 × 2) = 3 200 – 2
      = 3 198
      = R31,98
   c) R9,95 × 6 = ☐
      (1 000 × 6) – (5 × 6) = 6 000 – 30
      = 5 970
      = R59,70
   d) 24 + 26 = ☐ + 24 = ☐
      24 + 26 = 26 + 24 = 50
   e) 6 × ☐ = ☐ × 6 = 54
      6 × 9 = 9 × 6 = 54
   f) 32 ÷ 8 = 4 and 32 ÷ 4 = 8
   g) 85 + 15 = 100 and 100 – 15 = 85
   h) 0 × ☐ = ☐ × 0 = 0
      ☐ any real number
   i) 1 × 65 = 65 × 1 = 65
   j) 28 ÷ 7 = 4 and 4 × 7 = 28

3. The learners complete the flow diagrams with double functions. They write a number sentence for each flow diagram and solve them. They solve some number sentences by inspection.

   a) 

   8 × 4 + 8 = ☐
   32 + 8 = 40

   b) 

   ☐ + 4 × 10 = 90
   90 ÷ 10 − 4 = 5

c) 7 → **+ 3** → × 5 → 50

$7 + \square \times 5 = 50$
$50 \div 5 - 3 = 7$

d) 6 → **× 5** → **× 2** → 60

$6 \times 5 \times \square = 60$
$6 \times 5 \times 2 = 60$

e) 34 → **– 10** → **÷ 3** → **8**

$34 - 10 \div 3 = \square$
$24 \div 3 = 8$

4. Learners write number sentences to show how much they would pay for different numbers of chocolate slabs if one slab costs R11,99. They should round up the amounts and apply compensation.
   a) 2 × R12,00 − 2c = R24,00 − 2c
      = R23,98 for 2 chocolates
   b) 4 × R12,00 − 4c = R48,00 − 4c
      = R47,96 for 4 chocolates
   c) 6 × R12,00 − 6c = R72,00 − 6c
      = R71,94 for 6 chocolates
   d) 8 × R12,00 − 8c = R96,00 − 8c
      = R95,92 for 8 chocolates
   e) 10 × R12,00 − 10c = R120,00 − 10c
      = R119,90 for 10 chocolates

5. a) $(27 \div \square) \times 10 = 30$
   $30 \div 10 \times \square = 27$
   $3 \times 9 = 27$
   b) $\square + \square + \square = \square + 12$
   $\square + \square = 12$
   $6 + 6 = 12$
   c) $20 = \square \times 2 = \square \times 4$
   $20 = 10 \times 2$
   $20 = 5 \times 4$
   d) $4 \times \square = 2 \times \square = 100$
   $4 \times 25 = 100$
   $2 \times 50 = 100$
   e) $\square + \square = \square + \square + \square = 60$
   $30 + 30 = 60$
   $20 + 20 + 20 = 60$
   f) $50 = \square - 50 = \square - 25$
   $50 = 100 - 50$
   $50 = 75 - 25$

Whole numbers: addition and subtraction

Tell the learners that they will work with addition and subtraction during this week. They will solve mental calculation problems before each lesson and perform assessment tasks. They will work with four-digit numbers in calculations during this term. From Term 2 they will work with five-digit numbers and vertical column calculations.

Unit 8 Shortcuts and inverse operations

MENTAL MATHS

- The learners have played the 'I have…' games in Grade 4. Tell them they will continue to play these games because they help them to practise basic calculation facts as well as to work with the class, to listen carefully, be aware of learners' mistakes and practise the use of mathematical terminology.
- Use the game cards in the Photocopiable Resources of this file. You should copy the cards on stiff card and laminate them so that the cards can be used on a regular basis. There are 40 cards. If there are more cards than learners, give some learners two cards; if there are more learners than cards, let them work in pairs. You can start reading the first card. The learner who has the answer to your statement reads the next statement and question. The game ends with you answering the last question.
- Ask the learners to study and discuss the calculations. They should notice that the calculations involve inverse operations. Find out what they remember about this property of numbers. Learners should understand that subtraction is the inverse of addition and division is the inverse of multiplication. Remind them that we use inverse operations to check solutions. Let them use inverses in the calculations.

Solutions

2. a) 8 + 4 = 12   12 − 8 = 4   12 − 4 = 8
   b) 12 – 6 = 6   6 + 6 = 12
   c) 45 + 8 = 53   53 – 45 = 8   53 – 8 = 45
   d) 6 – 1 + 5 = 10   10 – 6 + 1 = 5   10 – 5 + 1 = 6
   e) 10 + 10 = 20   20 – 10 = 10

   You can also use these calculations to revise the commutative property, i.e. 8 + 4 = 4 + 8 = 12.

Activity 8.1

- Tell the learners they will practise strategies that help them to calculate more easily and more smartly. They will also use inverse operations to check calculations with three- and four-digit numbers.
- Let them study and discuss the strategies in the examples. The strategies involve building up 10s and 100s and using near doubles.
- Make sure that all learners understand the strategies. Ask them if they can apply different strategies from those in the examples. Ask them to check the solutions with inverse operations. They use the strategies to solve calculations. They also practise vertical column calculations without carrying and decomposing. They will apply this strategy from Term 2 when they work with five-digit numbers in calculations.

Solutions

1. a) 192 − 54 = ☐
   100 − 50 = 50
   92 − 4 = 88
   50 + 88 = 138

   b) 890 − 445 = ☐
   800 − 400 = 400
   90 − 45 = 45
   400 + 45 = 445

   c) 194 + 280 = ☐
   194 + 20 = 114
   280 + 20 = 300
   114 + 300 = 414

   d) 575 + 125 = ☐
   = 575 + 25 + 100
   = 600 + 100
   = 700

2. a) 237 + 64 = □
= 237 + 3 + 61
= 240 + 61
= 301

b) 397 + 397 = □
= 390 + 390 + 7 + 7
= 600 + 180 + 14
= 794

c) 584 − 280 = □
584 + 20 + 280 + 20 = 604 + 300
= 904

d) 1 000 − 320 = □
1 000 − 300 − 20 = 700 − 20
= 680

e) 728 + 729 = □
730 + 730 − 3 = 1 400 + 60 − 3
= 1 340 − 3
= 1 337

f) 900 − 430 = □
900 − 400 − 30 = 500 − 30
= 470

3. Learners use inverse operations to check their solutions to question 2.

4. a) 4 321 + 3 436 = 7 757 b) 5 472 + 2 127 = 7 599 c) 8 469 − 6 358 = 2 111 d) 7 935 − 4 614 = 3 321

a)	b)	c)	d)
4 321	5 472	8 469	7 935
+ 3 436	+ 2 127	− 6 358	− 4 614
7 757	7 599	2 111	3 321

5. The learners use inverse operations to check their solutions to question 4. Ask them to use the vertical column strategy.

a)	b)	c)	d)
7 757	7 599	2 111	3 321
− 3 436	− 2 199	+ 6 358	+ 4 614
4 321	5 400	8 469	7 935

Unit 9 Number rules

MENTAL MATHS

- Tell the learners that they will work with number rules or properties that they already know. Remind them of Activity 4.1 in which they counted boxes, for example, when they worked with different number properties. They do not have to know the terms commutative, associative and distributive properties.
- Let them look at and discuss the bead arrangements. They should be able to explain that the numbers have been reversed or swopped, but the answers remain the same in the calculations.
- Ask them to fill in the missing numbers in the calculations and to say whether the equations are true or false. (Remind learners that they learnt about this in the 'Number sentences' topic.)
- Explain to them that ≠ means 'is not equal to'. They then look for relationships to solve the number sentences involving addition and subtraction of multiples of 100, 100 and 1 000.

Solutions

2. a) 7 + 5 = **5** + 7 = **12**
   b) **8** + 9 = 9 + **8** = 17
   c) 13 = 6 + **7** = **7** + 6
   d) 23 + 7 = **30** and 7 + 23 = **30**
   e) 54 + 6 = **60** and 6 + 54 = **60**

3. a) True b) True
   c) False d) False
   e) False

   Ask the learners to check c) and d) on their calculators. Tell them that 10 − 20 = −10 and 7 − 15 = −8 involve negative numbers. Negative numbers are less than 0. They will learn more about negative numbers in the higher grades.

4. Calculate:

a) 4 + 5 = 9	b) 40 + 50 = 90
c) 400 + 500 = 900	d) 4 000 + 5 000 = 9 000
e) 9 + 5 = 14	f) 90 + 50 = 140
g) 900 + 500 = 1 400	h) 9 000 + 5 000 = 14 000
i) 13 – 7 = 6	j) 130 – 70 = 60
k) 1 300 – 700 = 600	l) 13 000 – 7 000 = 6 000
m) 8 – 5 = 3	n) 80 – 50 = 30
o) 800 – 500 = 300	p) 8 000 – 5 000 = 3 000

Activity 9.1

- The learners work with number properties. Let them discuss and explain the strategies in the examples.
- They group numbers by identifying pairs of numbers with a sum that is a multiple of 10, i.e. applying the associative property.
- The learners swop numbers (commutative property) and group numbers (associative property) that give a sum of a multiple of 10.
- They engage with the additive property of zero and should realise that adding and subtracting the same number or adding and subtracting zero in a calculation result in the addend or subtrahend, i.e. the number from which is subtracted or to which is added. Adding and subtracting zero from any number result in that number as a sum or difference. Zero is the identity element for addition because, for example: 0 + 5 = 5 and 5 + 0 = 5 so that 0 + 5 = 5 – 0. Zero is not an identity element for subtraction because 5 – 0 ≠ 0 – 5. The acceptance of the identity elements gives meaning to the idea of an inverse. In the problem 5 – 2 + 2 you work with additive inverses because 5 – 2 + 2 = 5 – 0. An identity element is a number that ensures validity of variables in equations to create the equality of expressions even when the law of commutativity is applied, i.e. 5 + 0 = 0 + 5 but 5 – 0 ≠ 0 – 5.

Solutions

1. Class discussion.

2. a) 37 + 59 + 13 + 11 = 37 + 13 + 59 + 11
= 50 + 70
= 120

b) 86 + 2 + 28 + 4 = 86 + 4 + 28 + 2
= 90 + 30
= 120

c) 103 + 105 + 7 + 5 = 103 + 7 + 105 + 5
= 110 + 110
= 220

d) 72 – 9 – 11 = 72 – 20
= 52

e) 87 – 5 – 15 = 82 – 15
= 82 – 10 – 5
= 72 – 5
= 67

f) 164 – 7 – 3 – 13 – 27 = 164 – 7 – 13 – 3 – 27
= 164 – 20 – 30
= 144 – 30
= 114

g) 237 + 116 + 13 + 4 = 237 + 13 + 116 + 4
= 237 + 3 + 10 + 120
= 240 + 10 + 120
= 250 + 120
= 370

h) 355 – 157 – 5 – 3 = 355 – 5 – 157 – 3
= 350 – 155 – 2 – 3
= 350 – 155 – 5 – 5
= 350 – 150
= 350 – 100 – 50
= 250 – 50
= 200

i) 999 + 2 + 998 + 1 = 999 + 1 + 998 + 2
= 1 000 + 1 000
= 2 000

j) 795 + 6 + 154 + 5 = 795 + 5 + 154 + 6
= 800 + 160
= 960

4. a) 4 + 5 + 6 = 4 + 6 + 5
= 15

b) 4 + 6 + 5 = 15

c) 5 + 4 + 6 = 15

d) 5 + 6 + 4 = 15

e) 6 + 4 + 5 = 15

f) 6 + 5 + 4 = 15

g) 14 + 15 + 16 = 14 + 16 + 15
= 30 + 15
= 45

h) 14 + 16 + 15 = 30 + 15
= 45

i) 15 + 14 + 16 = 15 + 30
= 45

j) 15 + 16 + 14 = 15 + 30
= 45

k) 16 + 14 + 15 = 15 + 30
= 45

l) 16 + 15 + 14 = 16 + 14 + 15
= 30 + 15
= 45

3. a) 17 + 6 + 3 = 17 + 3 + 6
= 20 + 6
= 26

b) 19 + 2 + 18 = 19 + 20
= 39

c) 11 + 18 + 19 = 11 + 19 + 18
= 30 + 18
= 48

d) 32 + 9 + 8 = 32 + 8 + 9
= 40 + 9
= 49

e) 16 + 15 + 14 = 16 + 14 + 15
= 30 + 15
= 45

5. a) True b) True
c) False d) True
e) True f) True
g) False h) True
i) True j) False

Unit 10 Using strategies to calculate smartly!

MENTAL MATHS

- Some item prices are advertised these days without the rand sign (R). Ask the learners if they can think why this is done and if it has an effect on how we read and write money amounts.
- Ask them to round off the prices on the brochure and how much change they would get if they pay in rand only. You could also ask how they would make up 99c in coins. Ask the learners to double each price. They should realise that you subtract 2c when you round off and double R19,99 to get R20 × 2 = R40, so that the accurate amount is R39,98. For double R199,95 (i.e. R200 × 2 = R400) they have to subtract R2,10 which results in R497,90.
- The learners calculate the original prices by subtracting the discount for each price.

Solutions

1. a) R19,99 + R4,00 = R19 + R1 + R3 + 99c
= R23,99
b) R199,95 + R20,00 = R200,00 − 5c
= R199,95
c) R24,99 + R5,00 = R29,99
d) R49,99 + R5,00 = R49 + R1 + R4 + 99c
= R54,99
e) R35,99 + R7,00 = R35 + R5 + R2 + 99c
= R42,99

2. Learners explain why they think the R is omitted in prices. Prices in real life brochures are often written in the form 19^{95}, for example, to save space.

3. Assist slower learners in using the building up tens to add and breaking down numbers to subtract in mental calculations involving carrying and decomposition. They should realise that they do not need written calculations for solving simple calculations like these.
a) 99 + 6 = 99 + 1 + 5
= 100 + 5
= 105
b) 95 + 7 = 95 + 5 + 2
= 100 + 2
= 102
c) 202 − 8 = 202 − 2 − 6
= 200 − 6
= 194
d) 298 + 5 = 298 + 2 + 3
= 300 + 3
= 303
e) 1 004 − 9 = 1 004 − 4 − 5
= 1 000 − 5
= 995
f) 140 − 3 = 137
g) 900 − 110 = 900 − 100 − 10
= 800 − 10
= 790
h) 505 − 7 = 505 − 5 − 2
= 500 − 2
= 498
i) 191 + 10 = 191 + 9 + 1
= 200 + 1
= 201
j) 406 + 7 = 406 + 4 + 3
= 410 + 3
= 413

Activity 10.1

- Ask the learners to estimate the solutions to the problems in question 1.
- They then calculate the accurate amounts using strategies they have practised in the Mental Maths. They solve problems involving addition and subtraction bonds of multiples of 100 and 1 000. They solve problems where they have to build up multiples of 100 and 1 000 by applying zero as an additive rule (e.g. + 5 − 5).
- Ask the learners to explore and discuss Peter's strategy. He uses the property of zero as the additive inverse to calculate easier. He adds 4 to make 1 436 a multiple of 10 and subtracts 4 to undo the plus 4. Applying the additive inverse is the same as compensation. Minus 4 compensates for the 4 he has added.

Solutions

1. a) R99,00 + R99,00 ≈ R100 + R100
   = R200
   b) R199 + R199 ≈ R200 + R200
   = R400
   c) R295 + R295 ≈ R300 + R300
   = R600
   d) R496 + R496 ≈ R500 + R500
   = R1 000
   e) R1 999 + R1 999 ≈ R2 000 + R2 000
   = R4 000
   f) R4,99 + R4,99 ≈ R5,00 + R5,00
   = R10,00
   g) R0,99 + R0,99 ≈ R1,00 + R1,00
   = R2,00
   h) R199,95 + R199,95 ≈ R200 + R200
   = R400
2. a) R99,00 + R99,00 = R200 – R2
   = R198
   b) R199 + R199 = R400 – R2
   = R398
   c) R295 + R295 = R600 – R10
   = R590
   d) R496 + R496 = R1 000 + R8
   = R992
   e) R1 999 + R1 999 = R4 000 – R2
   = R3 998
   f) R4,99 + R4,99 = R10,00 – R0,02
   = R9,98
   g) R0,99 + R0,99 = R2,00 – R0,02
   = R1,98
   h) R199,95 + R199,95 = R400 – R0,10
   = R399,90
3. a) 64 + 26 = 60 + 20 + 10
   = 90
   b) 73 + 17 = 70 + 10 + 10
   = 90
   c) 88 + 12 = 80 + 10 + 10
   = 100
   d) 59 + 41 = 50 + 40 + 10
   = 100
   e) 85 + 15 = 80 + 10 + 10
   = 100
   f) 122 + 18 = 120 + 10 + 10
   = 140
   g) 325 + 75 = 320 + 70 + 10
   = 400
   h) 777 + 23 = 770 + 20 + 10
   = 800

i) 1 086 + 14 = 1 080 + 10 + 10
= 1 100

k) 800 – 14 = 800 – 10 – 4
= 790 – 4
= 786

l) 750 – 12 = 750 – 10 – 2
= 740 – 2
= 738

m) 100 – 52 = 100 – 50 – 2
= 50– 2
= 48

n) 1 000 – 115 = 1 000 – 100 – 10 – 5
= 900 – 10 – 5
= 890 – 5
= 885

o) 2 500 – 25 = 2 500 – 20 – 5
= 2 480 – 5
= 2 475

4. a) 475 + 317 = 475 + 5 + 327 − 5
= 480 + 317 − 5
= 497 − 5
= 492

b) 2 343 + 1 238 = 343 + 7 + 1 238 − 7
= 350 + 1 238 − 7
= 1 588 − 7
= 1 581

c) 1 612 + 1 109 = 1 612 + 8 + 1 109 − 8
= 1 620 + 1 109 − 8
= 2 729 − 8
= 2 7 21

d) 3 144 + 2 047 = 3 144 + 6 + 2 047 − 6
= 3 150 + 2 047 − 6
= 5 197 − 6
= 5 191

e) 5 296 + 3 596 = 5 296 + 4 + 3 596 − 4
= 5 300 + 3 596 − 4
= 8 896 − 4
= 8 892

Problem-solving

Working with money amounts lays a basis for working with decimals in Grade 6. The learners should find out that it could be easier to multiply by 2 or double when they have to multiply amounts by odd numbers. Tell the learners that they have to find the best buys. They have to find out whether it is cheaper to buy one roll of gift wrap or a pack with 3 rolls of gift wrap. They should understand that, they have to multiply the price of one roll by 3. If this is cheaper than the pack with 3 rolls, they can buy three 1-roll packs instead of one 3-pack. They do the same with the packs of pens to find out which is cheaper. You should ask them to discuss the possibility that they would maybe not need as much paper or as many pens. What then?

Solutions

2. R9,50 × 3 = R9,50 × 2 + R9,50
= R19,00 + R9,50
= R28,50

It is cheaper to buy three 2-pack pens than a 6-pack for R29,99.
The difference is 50c + 99c = 50c + 50c + 49c = R1,49.

Unit 11 Adding and subtraction four-digit numbers

MENTAL MATHS

Allow the learners to play the Addition Bingo Game to practise basic addition facts mentally.

Activity 11.1

- Tell the learners that they will solve four-digit addition and subtraction problems. They will use their own methods and the methods suggested in the examples.
- Once the learners have solved the problems and shared their methods you could suggest the methods shown below if they did not use them. They use the inverse operation to solve the problems.

Solutions

1. a)

	2 435
+	2 362
	4 797

b)

3 000 + 4 000 =	7 000
300 + 700 =	1 000
70 + 60 =	130
4 + 6 =	10
	8 140

c)

4 000 − 2 000 =	2 000
800 − 500 =	300
70 − 40 =	30
6 − 5 =	1
	2 331

d)

	6 000 +	200 +	50 +	7
−	3 000 +	600 +	70 +	8
	5 000 +	1 100 +	140 +	17
−	3 000 +	600 +	70 +	8
	2 000 +	500 +	70 +	9
	= 2 579			

2. Let the learners use their own methods to do the inverse operations.
3. Learners explain how the calculation methods work.
4. a)

1 543	➞	1 000	+	500	+	40	+	3
+ 1 789	➞	+ 1 000	+	700	+	80	+	9
		2 000	+	1 200	+	120	+	12
		= 3 000	+	300	+	30	+	2
		= 3 332						

b)

6 127	➞	6 000	+	100	+	20	+	7
– 4 238	➞	+ 4 000	+	200	+	30	+	8
		5 000	+	1 000	+	110	+	17
		– 4 000	+	200	+	30	+	8
		1 000	+	800	+	80	+	9
		= 1 889						

c)	5 659	➞	5 000	+	600	+	50	+	9
	– 3 451	➞	+ 3 000	+	400	+	50	+	1
			8 000	+	1 000	+	100	+	10
			9 000	+	100	+	10	+	0
			= 9 110						
d)	7 764	➞	7 000	+	700	+	60	+	4
	– 5 876	➞	– 5 000	+	800	+	70	+	6
			6 000	+	1 600	+	150	+	14
			– 5 000	+	800	+	70	+	6
			1 000	+	800	+	80	+	8
			= 1 888						

5. Learners explain Theko's addition and subtraction methods.

6. a) 2 464 + 3 000 = 5 464
   5 464 + 400 = 5 864
   5 864 + 80 = 5 944
   5 944 + 6 = 5 950
   2 464 + 3 486 = 5 950

   b) 5 195 + 2 000 = 7 195
   7 195 + 800 = 7 995
   7 995 + 90 = 8 085
   8 085 + 6 = 8 091
   5 195 + 2 896 = 8 091

   c) 6 287 + 1 000 = 7 287
   7 287 + 800 = 8 087
   8 087 + 90 = 8 177
   8 177 + 8 = 8 185
   6 287 + 1 898 = 8 185

   d) (8 000 + 400 + 30 + 1) – (4 000 + 200 + 70 + 3)
   = (8 000 – 4 000) + (400 – 200) + (30 – 70) + (1 – 3)
   = 4 000 + 200 + (30 – 70) + (1 – 3)
   = 4 000 + 100 + (130 – 70) + (1 – 3)
   = 4 000 + 100 + 60 + (1 – 3)
   = 4 000 + 100 + 50 + (11 – 3)
   = 4 000 + 100 + 50 + 8
   = 4 158
   8 431 – 4 273 = 4 158

   e) (9 000 + 200 + 90 + 5) – (7 000 + 100 + 80 + 7)
   = (9 000 – 7 000) + (200 – 100) + (90 – 80) + (5 – 7)
   = 2 000 + 100 + 10 + (5 – 7)
   = 2 000 + 100 + (15 – 7)
   = 2 000 + 100 + 8
   = 2 108

   f) (6 000 + 400 + 20 + 4) – (5 000 + 600 + 30 + 5)
   = (6 000 – 5 000) + (400 – 600) + (20 – 30) + (4 – 5)
   = 1 000 + (400 – 600) + (20 – 30) + (4 – 5)
   = 0 + (1 300 – 600) + (110 – 30) + (14 – 5)
   = 0 + 700 + 80 + 9
   = 789

Unit 12 Problem-solving

MENTAL MATHS

- The learners have worked with consecutive numbers in Grade 4. Ask them to name two, three or four consecutive counting numbers, even numbers, odd numbers or multiples.
- They calculate the sums of the given consecutive numbers before they find the consecutive numbers on the 100-square that has the given sums. Check that they apply properties of numbers to do the calculations.
- They perform an investigation to find out if the sum of two consecutive odd numbers is always an even number.
- Let them explore different pairs of consecutive odd numbers (even three- and four-digit numbers).
- Suggest that they work systematically as in the solution below. Ask them to look for patterns.

Solutions

1. $17 + 18 + 19 = (20 + 20 + 20) - (3 + 2 + 1)$
   $= 60 - 6$
   $= 54$

2. $2 + 4 + 6 = 6 + 4 + 2 = 12$

3. $21 + 23 + 25 = (20 + 20 + 20) + 1 + 3 + 5$
   $= 60 + 9$
   $= 69$

4. a) $11 + 12 + 13 = (3 \times 10) + 1 + 2 + 3$
   $= 30 + 6$
   $= 36$
   b) $31 + 32 + 33 = (3 \times 30) + 1 + 2 + 3$
   $= 90 + 6$
   $= 96$
   c) $24 + 25 + 26 = (3 \times 20) + 6 + 4 + 5$
   $= 60 + 15$
   $= 75$

5.

$1 + 3 = 4$	$11 + 13 = 24$	$211 + 213 = 324$
$3 + 5 = 8$	$13 + 15 = 28$	$213 + 215 = 328$
$5 + 7 = 12$	$15 + 17 = 32$	$215 + 217 = 332$
$7 + 9 = 16$	$17 + 19 = 36$	$217 + 219 = 336$

Activity 12.1

- Tell the learners that they will do problem-solving in this lesson. They will solve real-life problems involving estimation, ratio and length and problems in other real-life contexts. Ask them if they remember and can explain what ratio means. Let them give examples.
- Ask the learners to solve these problems in groups. In some problems it is not so obvious which operations they have to perform – these problems require investigation. Ask the learners to write number sentences to show how they would solve the problems.

Solutions

1. a) 3 to 1 or 3:1
   b) 1 to 3 or 1:3
   c) 1 to 2 or 1:2

d) 1 to 12 or 1:12

e) The learners should reason that each house has a front and back door.
$2 \times 24 = (2 \times 20) + (2 \times 4)$
$= 48$

2. 2 400 − 1 800 = 24 − 18 = 6
2 400 − 1 800 = 600 cm longer

3. Let the learners check their solutions against each requirement. The numbers in the solution have a sum of 22. There is a different number of learners in each row. Rows 1 and 2 have a sum of 10, i.e. 4 + 6 = 10. The number of learners in each row is more than 1. The longest row has 7 learners – an odd number of learners.

Row 1	Row 2	Row 3	Row 4	
4	6	5	7	= 22

4.
$$\begin{array}{rcrcrcrcrcr} 9\,625 & \rightarrow & 9\,000 & + & 600 & + & 20 & + & 5 \\ -\ 4\,536 & \rightarrow & -\ \underline{4\,000} & \underline{+} & \underline{500} & \underline{+} & \underline{30} & \underline{+} & \underline{6} \\ & & 9\,000 & + & 500 & + & 110 & + & 15 \\ & & -\ \underline{4\,000} & \underline{+} & \underline{500} & \underline{+} & \underline{30} & \underline{+} & \underline{6} \\ & & 5\,000 & + & 0 & + & 80 & + & 9 \end{array}$$
= 5 089 papers printed in the morning

Assessment

Tell the learners that they will write an assessment task to find out what they have learnt about addition and subtraction during this topic. They will work with number properties, inverse operations, doubling and breaking and building up numbers as strategies to solve the problems. They will also look for and use relationships.

Assessment Task 3

Show your calculations in each question.

1. Calculate:
a) 37 − 20 = ☐ 20 + ☐ = 37
b) 57 + 13 = ☐ ☐ − 13 = 57

2. Use shortcuts to solve these problems.
a) 147 + 38 = ☐
b) 227 + 228 = ☐
c) 366 − 270 = ☐
d) 800 − 320 = ☐
e) 17 − 8 = ☐ 1 700 − 800 = ☐
f) 9 + 6 = ☐ 900 + 600 = ☐

3. Calculate the following.
a) $\begin{array}{r} 2\,341 \\ +\ \underline{3\,458} \end{array}$ b) $\begin{array}{r} 4\,763 \\ -\ \underline{2\,352} \end{array}$

4. Use inverse operations to check your solutions to question 3.

5. Calculate:
a) 18 + 2 = ☐ + 18 = ☐ b) ☐ + 14 = 14 + n = 25
c) 42 + 57 + 8 + 3 = ☐ d) 9 + 26 + 41 + 24 = ☐
e) 77 + 7 − 7 = ☐ f) 145 − 5 + 5 = ☐

6. Solve the following.
a) 99 + 5 = ☐ b) 299 + 299 = ☐
c) 500 − 9 = ☐ d) 1 007 − 9 = ☐

7. Which of these prices works out cheaper?
   1 glue stick @ R4,99 each or a 4-pack of glue sticks @ R24,99

8. Calculate:
   a) 3 265 + 3 478 = ☐ b) 7 431 − 4 279 = ☐

9. Three fishing trawlers brought the following loads of fish into the harbour.
   Seahorse: 245 snoek, 166 yellowtail and 147 red roman
   Toktokkie: 426 snoek, 124 cob and 233 red roman
   Fancy Face: 109 tuna and 254 yellowtail
   a) How many snoek did the fishermen catch altogether?
   b) How much more red roman did *Toktokkie* bring in than *Seahorse*?
   c) How much yellow tail did the fishermen catch altogether?
   d) How much more snoek did *Toktokkie* bring in than *Seahorse*?

Solutions

1. a) 37 − 20 = 17 20 + 17 = 37
   b) 57 + 13 = 70 70 − 13 = 57

2. a) 147 + 38 = 147 + 3 + 35 = 150 + 35 = 185
   b) 227 + 228 = (230 + 230) − (3 + 2) = 460 − 5 = 455
   c) 366 − 270 = 396 − 300 = 96
   d) 800 − 320 = 800 − 300 + 20 = 520
   e) 17 − 8 = 9 1 700 − 800 = 900
   f) 9 + 6 = 15 900 + 600 = 1 500

3. a)
```
  2 341
+ 3 458
  5 799
```
   b)
```
  4 763
− 2 352
  2 411
```

4. a)
```
  5 799
− 3 458
  2 341
```
   b)
```
  2 411
+ 2 352
  4 763
```

5. a) 18 + 2 = 2 + 18 = 20 b) 11 + 14 = 14 + 11 = 25
   c) 42 + 57 + 8 + 3 = (42 + 8) + (57 + 3)
      = 50 + 60
      = 110
   d) 9 + 26 + 41 + 24 = 9 + 41 + 26 + 24
      = 50 + 50
      = 100
   e) 77 + 7 – 7 = 84 – 7 = 77 f) 145 – 5 + 5 = 140 + 5 = 145

6. a) 99 + 5 = 99 + 1 + 4 = 104
   b) 299 + 299 = 300 + 300 − 2 = 598
   c) 500 − 9 = 491
   d) 1 007 − 9 = 1 007 − 7 − 2 = 998

7. R4,99 × 4 = (R5 × 4) − 4c = R19,96
   To buy four glue sticks is cheaper than buying a 4-pack.

8. a) 265 + 3 478 = 3 200 + 3 400 + 60 + 5 + 70 + 8
      = 6 600 + 130 + 13
      = 6 743
   b) 7 431 − 4 279 = (7 400 + 31) − (4 200 + 79)
      = (7 300 + 131) − (4 200 + 79)
      = (7 300 − 4 200) + (131 − 79)
      = 3 100 + (130 − 80) + 2
      = 3 100 + 50 + 2
      = 3 152

9. a) $245 + 426 = 200 + 400 + 40 + 20 + 5 + 6$
$= 600 + 60 + 11$
$= 671$ snoek were caught
b) $233 - 147 = (233 + 3) - (147 + 3)$
$= 236 - 150$
$= 200 - 150 + 36$
$= 50 + 36$
$= 86$
c) $166 + 254 = (166 + 4) + 250$
$= 170 + 250$
$= 170 + 30 + 220$
$= 200 + 220$
$= 420$
d) $426 - 245 = (400 + 20 + 6) - (200 + 40 + 5)$
$= (300 + 120 + 6) - (200 + 40 + 5)$
$= 181$

Numeric patterns

Tell the learners that they will work with number (or numeric) patterns during the next four lessons. They will perform an assessment task at the end of the lessons. Ask them to name number patterns that they know. Tell them that this work is closely related to counting, calculating and number sentences. They apply knowledge of number facts to solve problems. Tell them that looking for relationships or patterns is very important in dealing with numeric patterns. The activities will help them to identify patterns and relationships, so that they can develop rules for creating and completing number patterns.

Unit 13 Numeric patterns

MENTAL MATHS

- Ask learners to look at the numbers of 'Get well soon' cards in the different packets. They calculate the number of single cards in different packets. They fill in the missing numbers in the table by multiplying the same numbers to get square numbers as products.
- You can illustrate this concept by making drawings of area models and relating it to the length of sides of a square.
- Ask learners how the set of counting numbers is different to the set of square numbers. They should understand that all square numbers are counting numbers but all counting numbers are not square numbers.
- Ask them why 3, 5 and 7 are not square numbers.

Solutions

1. a) Three 2-packs = 3×2 = 6 cards
b) Four 4-packs = 4×4 = 16 cards
c) Six 7-packs = 6×7 = 42 cards
d) Three 9-packs = 3×9 = 27 cards
e) Seven 8-packs = 7×8 = 56 cards
f) Eight 10-packs = 8×10 = 80 cards
g) Five 6-packs = 5×6 = 30 cards
h) Nine 3-packs = 9×3 = 27 cards
i) Two 5-packs = 2×5 = 10 cards
j) Ten 1-packs = 10×1 = 10 cards

2.

Card-packs	0	1	2	3	4	5	6	7	8	9	10
Number of cards	0	1	4	**9**	**16**	25	36	**49**	**64**	**81**	**100**

Activity 13.1

- The learners use the sets of cards in Mental Maths to write and solve number sentences. They compare the prices of the different packs of cards to find out how much more the one pack costs than the other. They do this to explore a pattern in the prices of the cards and to realise that the difference between two prices is always R1,25. They use knowledge of the multiplication tables to do this.
- You should emphasise once again how important it is in mathematics to know multiplication and division facts. They need this knowledge in almost all topics in mathematics. Give them copies of the blank flow diagrams in the Photocopiable Resources of this file.
- Learners have to demonstrate knowledge of multiplication and division facts. They fill in the missing numbers in the number sequences. A sequence is an arrangement of numbers that are ordered in such a way that you can observe a pattern.
- The learners fill in the output numbers, i.e. the number of cards in the given number of 8-packs, 7-packs, 9-packs and 6-packs. They determine the number of 4-packs and find the rule to calculate the number of cards in the given numbers of 7-packs. Ask them to write a number sequence for the output numbers in each flow diagram in a) to e). In d) and e) they write the sequence for the first ten input numbers. Let them describe any patterns they observe in the sequences. The multiples should be consecutive.
- The learners work with multiples of 25 and 50.

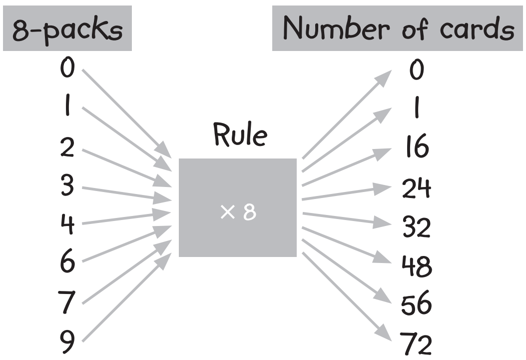
Solutions

1. a) R3,75 − R2,50 = R1,25 more
   b) R5,00 − R3,75 = R1,25 more
   c) R10,00 – R8,75 = R1,25 more
   d) R12,50 – R11,25 = R1,25 more
2. 2-pack – R1,25 = R2,50 – R1,25 = R1,25
3. 10-pack + R1,25 + R1,25 = R15,50 + R1,25 + R1,25
   = R18,00

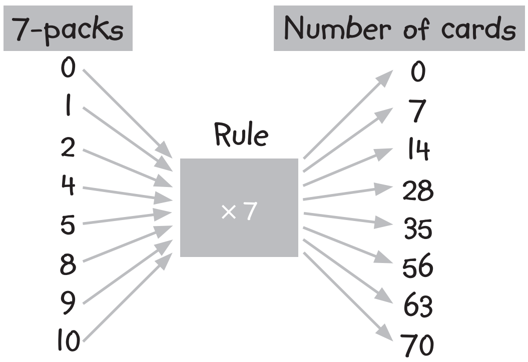
Number of cards	2	3	4	5	6	7
Price (R)	2,50	3,75	5,00	6,25	7,50	8,75
Common difference	2,25	1,25	1,25	1,25	1,25	1,25

4.

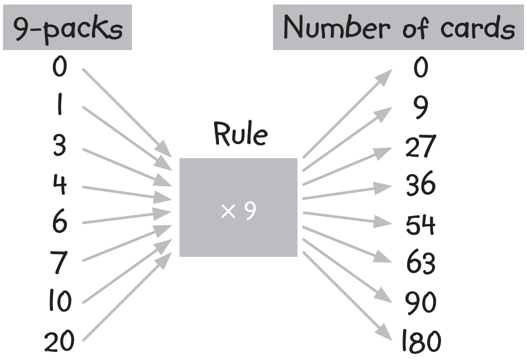
a)



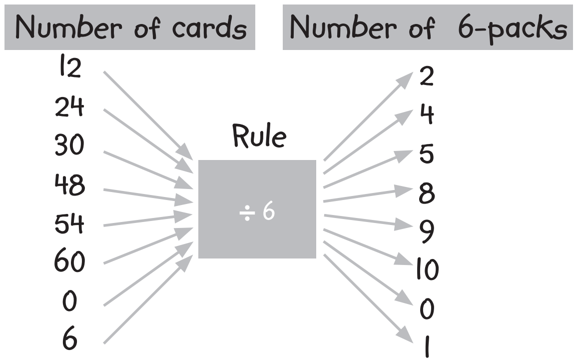
b)



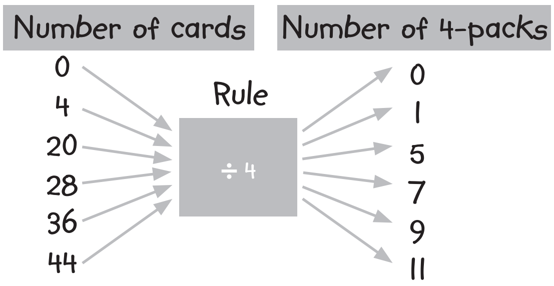
c)



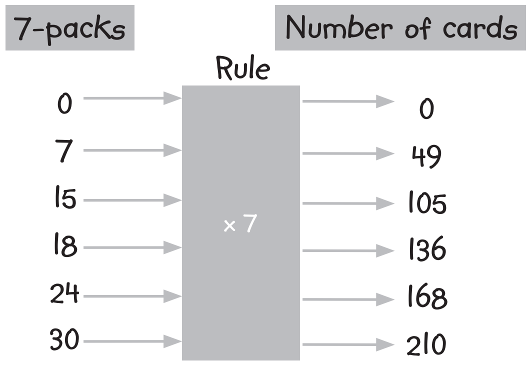
d)



e)



f)



5. a) 0; 25; **50**; **75**; 100; **125**; **150**; 175; **200**; **225**
   b) 1 000; **950**; **900**; 850; 800; **750**; **700**; **650**; 600; **550**
   c) 0; 75; 150; **225**; **300**; 375; **450**; **525**; 600; **675**; **750**
   d) **425**; 550; 675; **800**; **925**; 1 050; 1 175; **1 300**; 1 425; **1 550**

Unit 14 Number sequences

MENTAL MATHS

- Pascal's triangle was invented more than 600 years ago by a Chinese mathematician. It was later named after a French mathematician, Blaise Pascal, who invented many mathematical ideas. The triangle is a rich mathematical model because of the variety of patterns that can be explored.
- Ask the learners to look for number patterns in the triangle. Encourage them to search in the diagonals and rows. Let them explain the rules for the development of each pattern. Give them copies of the triangle and ask them to complete rows 10 and 11.
- The learners should discover that you add two numbers above to get the sum directly below and between them, for example 1 + 1 = 2; 1 + 4 = 5; 15 + 20 = 35 and so on. Encourage them to use effective mental addition strategies to find the terms in rows 10 and 11. Once they have complete row 10, they could they could reason for 36 + 84 that 3 + 8 = 11; 11 + 1 = 12 and insert 0 to get 120. For 84 + 126 they could argue that 8 + 12 = 20; 20 + 1 = 21 and insert 0 to get 210. 126 + 126 could be solved mentally as 12 + 12 = 24, 24 + 1 = 25 and insert 2 units to get 252.

Solutions

1. a) and b) Patterns in the diagonals, for example:

1; 2; 3; 4; ...	Counting or natural numbers
1; 3; 6; 10; ...	Triangular numbers
1; 4; 10; 20; …	Add 3; 6; 10; … each time (i.e. add triangular numbers)
1; 5; 15; 35; …	Add 4; 10; 20; …
1; 6; 21; 56; …	The differences are 5; 15; 35; …
1; 7; 28; 84; …	1 × 7; 7 × 4; 28 × 3; 7 × 30; …

Patterns in the rows, for example:

1; 2; 1; …	1 + 1 = 2; 2 − 1 = 1 or 1 × 2 = 2; 2 ÷ 2 = 1 (‘undo’ the first calculation)
1; 3; 3; 1; …	1 × 3 = 3; 3 ÷ 1 = 3; 3 ÷ 3 = 1
1; 4; 6; 4; 1; …	1 + 3 = 4; 4 + 2 = 6; 6 − 2 = 4; 4 − 3 = 1
1; 8; 28; 56; 70; …	1 + 7 = 8; 8 − 1 = 7 × 4 = 28; 7 × 4 = 28 × 2 = 56; etc.

The learners should realise that the differences between the terms are not always constant.

c) Learners should discover that you add two consecutive terms to get the term below.

Row 1	1
Row 2	1 1
Row 3	1 2 1
Row 4	1 3 3 1
Row 5	1 4 6 4 1
Row 6	1 5 10 10 5 1
Row 7	1 6 15 20 15 6 1
Row 8	1 7 21 35 35 21 7 1
Row 9	1 8 28 56 70 56 28 8 1
Row 10	1 9 36 84 126 126 84 36 9 1
Row 11	1 110 45 120 210 252 210 120 45 10 1

2. Explain to the learners that we call the numbers in sequences terms. They work with familiar sequences to find different terms.

a)

1; 3; 5; 7; 9; 11; …	5th term: 9
0; 2; 4; 6; 8; 10; …	5th term: 8
0; 3; 6; 9; 12; 15; …	5th term: 12
0; 5; 10; 15; 20; 25; …	5th term: 20
0; 6; 12; 18; 24; …	5th term: 24
0; 10; 20; 30; 40; 50; …	5th term: 40

b) Ask learners to extend the sequences to find the 8th term in each sequence.

c) 1; 3; 5; 7; 9; 11; … Uneven/odd numbers
0; 2; 4; 6; 8; 10; … Multiples of 2
0; 3; 6; 9; 12; 15; … Multiples of 3
0; 5; 10; 15; 20; 25; … Multiples of 5
0; 6; 12; 18; 24; … Multiples of 6
0; 10; 20; 30; 40; 50; … Multiples of 10

d) Let them find the 10th and the 15th terms in each sequence. They will count on to determine the terms.

3. a) Ask the learners why they think the numbers are called even numbers. Ask how they know 8 is an even number and 7 is not. Have a class discussion about the attributes of an even number.

b) Let them discuss whether zero is an even number or not. They might respond that it is because it is listed in the set of even numbers but this is not enough reason to justify. Use the attributes to prove that zero is an even number.

- Even numbers are created when you count in 2s.
  0; 2; 4; 6; 8; …
  But what about 1; 3; 5; 7; …? Do you count in 2s? Are these even numbers?
- If you divide even numbers by 2 there is no remainder.
  $8 \div 2 = 4$ $7 \div 2 = 3$ rem 1
  $6 \div 2 = 3$ $5 \div 2 = 2$ rem 1
  $4 \div 2 = 2$ $3 \div 2 = 1$ rem 1
  $2 \div 2 = 1$ $1 \div 2 = 0$ rem 1
  $0 \div 2 = 0$
  Zero is an even number because zero divided by 2 has no remainder.
- If you multiply a counting number by 2 you get an even number.
  $8 \times 2 = 16$ $7 \times 2 = 14$
  $6 \times 2 = 12$ $5 \times 2 = 10$
  $4 \times 2 = 8$ $3 \times 2 = 6$
  $2 \times 2 = 4$ $1 \times 2 = 2$
  $0 \times 2 = 0$
  Zero is an even number because $0 \times 2 = 0$. Multiplying by 2 gives even numbers.

Activity 14.1

- The learners create their own sequences using the sequence 1; 2; … Ask them to do this in their groups.
- Encourage them to explore possibilities by using the four basic operations to create sequences. Tell them that you can use counting numbers as input numbers to create different number sequences in the output numbers.
- Ask them to complete the flow diagrams. Use copies of the blank diagrams in the Photocopiable Resources of this file. Let them list the different sequences until the 10th terms. Ask them to use blank diagrams to create their own sequences using counting numbers as input numbers. They copy, extend and describe number sequences.
- The learners count back in three-digit uneven numbers, count on in intervals of 3 and 10 from non-multiples of these numbers. They count back in intervals of 10 and 9 from non-multiples of these numbers.

Solutions

1.

1; 2; 3; 4; …	+ 1
1; 2; 4; 7; 11; …	1 + 1 = 2; 2 + 2 = 4; 4 + 3 =; 7 + 4 = 11; …
1; 2; 4; 8; 16; 32; 64; …	1 × 2 = 2; 2 × 2 = 4; 4 × 2 = 8; 8 × 2 = 16; …
1;2; 4; 8; …	2 ÷ 2 = 1; 4 ÷ 2 = 2; 8 ÷ 2 = 4; 16 ÷ 2 = 8; …
1; 2; 1; 2; …	1 + 1 = 2; 2 − 1 = 1; 1 + 2 = 2; …

2. a)

1	2	3	4	5
↓	↓	↓	↓	↓
× 4	× 4	× 4	× 4	× 4
↓	↓	↓	↓	↓
– 3	– 3	– 3	– 3	– 3
↓	↓	↓	↓	↓
1	5	9	**13**	**17**

b)

1	2	3	4	5
↓	↓	↓	↓	↓
× 8	× 8	× 8	× 8	× 8
↓	↓	↓	↓	↓
+ 2	+ 2	+ 2	+ 2	+ 2
↓	↓	↓	↓	↓
10	18	26	**34**	**42**

c)

1	2	3	4	5
↓	↓	↓	↓	↓
+ 2	+ 2	+ 2	+ 2	+ 2
↓	↓	↓	↓	↓
× 2	× 2	× 2	× 2	× 2
↓	↓	↓	↓	↓
6	**8**	**10**	**12**	**14**

d)

1	2	3	4	5
↓	↓	↓	↓	↓
+ 1	+ 1	+ 1	+ 1	+ 1
↓	↓	↓	↓	↓
× 5	× 5	× 5	× 5	× 5
↓	↓	↓	↓	↓
10	**15**	**20**	**25**	**30**

3. a) 1; 5; 9; 13; 17; 21; 25; 29; 33; 37
   b) 10; 18; 26; 34; 42; 50; 58; 66; 74; 84
   c) 6; 8; 10; 12; 14; 16; 18; 20; 22; 24
   d) 10; 15; 20; 25; 30; 35; 40; 45; 50; 55
4. Let the learners create their own sequences.
5. a) 157; 155; 153; 151; **149**; **147**; 145; **143**; **141**; **139**
   b) 1; 4; 7; 10; **13**; **16**; 19; 22; 25; **28**; **31**
   c) 3; 8; 13; 18; **23**; **28**; **33**; 38; 43; **48**; **53**
   d) 84; 74; **64**; **54**; **44**; 34; **24**; **14**; **4**
   e) 100; 91; 82; **73**; **64**; 55; **46**; **37**; **28**
6. Learners talk about the sequences they have worked with in this unit.

Unit 15 Extending numeric patterns

MENTAL MATHS

- Ask the learners to copy the tables. Read the instructions to them. They create their own sequences. They create the 3 and 6 times tables. Ask the learners to describe relationships between the numbers in the two tables.

Solutions

1. a)

Column A	Column B
0	0
1	3
2	6
3	9
4	12
5	15
6	18
7	21
8	24
9	27
10	30
11	33
12	36

b)

Column A	Column B
0	0
1	6
2	12
3	18
4	24
5	30
6	36
7	42
8	48
9	54
10	60
11	66
12	72

2. a) The numbers in Column A are counting numbers and in Column B multiples of 3. The differences between in the input and output numbers are 0, 2; 4; 6; 8; …, i.e. consecutive even numbers. The sum of the digits in the multiples is always a multiple of 3.

   b) The numbers in Column A are counting numbers and in Column B multiples of 6. The differences between the input and output numbers are 0; 5; 10; 15; …, i.e. multiples of 5.

   0; 3; 6; 9; 12; 15; 18; 21; 24; 27; 30; 33; 36; 39; 42; 45; 48; 51; 54; 57; 60

   0; 6; 12; 18; 24; 30; 36; 42; 48; 54; 60

   The multiples of 3 are even and odd numbers. The multiples of 6 are all even numbers. All the multiples of 6 are also multiples of 3. The multiples of 3 are not always multiples of 6, only the even multiples of 3 are.

Activity 15.1

- Ask the learners to describe the patterns in the area models of rectangular numbers. Ask them how these patterns are different from the patterns with square numbers. They should realise that square patterns are arranged in squares and rectangular patterns are arranged in rectangles. Let them explore how they will get the next three terms in the pattern sequence.

- Let them try to describe numbers in the Fibonacci sequence. Fibonacci was an Italian mathematician who brought ideas about mathematics to Europe from India and China many years ago. They should realise that you add the previous two terms to get the next term. They complete this sequence by filling in the next 5 terms. Ask them to use the rule for the Fibonacci sequence to generate numbers in the sequence 1; 3; … Then, let them copy the number patterns (series) involving addition of consecutive numbers. Let them describe the patterns before they start completing them.

Solutions

1. 1 × 2 = 2; 2 × 3 = 6; 3 × 4 = 12; 4 × 5 = 20; 5 × 6 = 30; 6 × 7 = 42
   2; 6; 12; 20; 30; 42
2. a) 1; 1; 2; 3; 5; 8; 13; 21; 34; 55; 89
   b) 1; 3; 4; 7; 11; 18; 29; 47; 76; 123
3. a)

a)	1	= 1	b) 2	= 2
	1 + 2	= 3	2 + 4	= 6
	1 + 2 + 3	= 6	2 + 4 + 6	= 12
	1 + 2 + 3 + 4	= 10	2 + 4 + 6 + 8	= 20
	1 + 2 + 3 + 4 + 5	= 15	2 + 4 + 6 + 8 + 10	= 30
	1 + 2 + 3 + 4 + 5 + 6	= 21	2 + 4 + 6 + 8 + 10 + 12	= 42

c)	1	= 1
	1 + 3	= 4
	1 + 3 + 5	= 9
	1 + 3 + 5 + 7	= 16
	1 + 3 + 5 + 7 + 9	= 25
	1 + 3 + 5 + 7 + 9 + 11	= 36

Unit 16 Problem-solving with number sequences

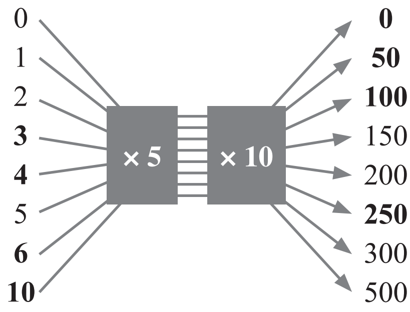
MENTAL MATHS

- Ask the learners to find the missing numbers on the cards that Grade 5 learners used to create number patterns. Let them explain how they found the missing numbers. They complete flow diagrams with double operators involving facts of multiples of 5 and 10.
- The learners should discover that there are different functions (operations) for multiplying by 50 which give the same input and output numbers.
  50 = 5 × 10 50 = 100 ÷ 2 50 = 200 ÷ 4 50 = 25 × 2
  Ask them to write a number sequence for the first 10 consecutive output numbers.

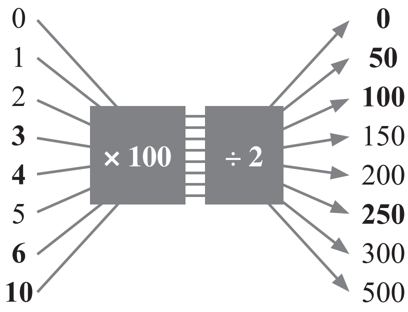
Solutions

1. a) 3; 7; 11; 19; **23**; 27; **31**; 35; 39; 41
   b) 2; 11; 20; **29**; 38; 47; **56**; 65; 74; 83
   c) 1; 12; 23; **34**; 45; 56; 67; 78; **89**; 100
   d) 46; 41; **36**; **31**; 26; 21; 16; 11; 6; 1
   e) 81; 91; **101**; **111**; 121; 131; 141; 151; 161; 171

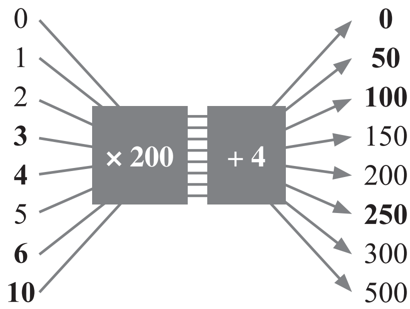
2. a)



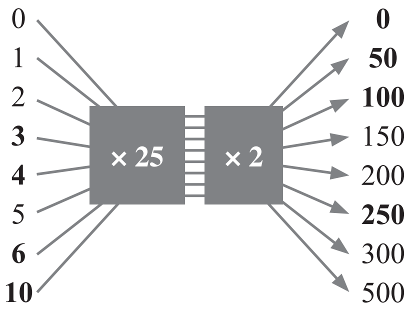
b)



c)



d)



Activity 16.1

- The learners get another opportunity to understand how numeric patterns are applied in real life. Ask them to study the pictures and describe the relationship between the number of horsemen and horses, and cars and motorbikes. They have to find rules to calculate the number of horsemen and motorbikes for each, given number of horses and cars.
- Ask questions such as, ‘How many horses are there for each horseman?’, ‘What do you notice about the pattern of cars and motorbikes?’, etc. They should consider the extra three horsemen and the motorbikes in front and behind the convoy. These numbers are added to the constant multiplication by 2.
- Give learners copies of the blank tables in the Photocopiable Resources to complete the numbers in each table. Ask the learners to explore the rules for creating numbers in the flow diagrams. They fill in the next three terms in each flow diagram. They complete the calculations in the number patterns by filling in the next three calculations.

Solutions

1. a)

Horses	2	4	6	8	10	12	14	16
Horsemen	**4**	**5**	**6**	**7**	8	**9**	**10**	**11**

b) The rule for calculating the number of horsemen is ☐ ÷ 2 + 3.

2. a)

Cars	1	2	3	4	5	6	7	8	9	10
Motorbikes	**4**	**6**	**8**	10	**12**	**14**	**16**	**18**	**20**	**24**

b) The rule for calculating the number of motorbikes is ☐ × 2 + 4.

3. The rules are:
   - times 3 or × 3
   - plus 3 or + 3
   - times 2 or × 2

4. a)
1 = 1 × (1 + 1) ÷ 2
3 = 2 × (2 + 1) ÷ 2
6 = 3 × (3 + 1) ÷ 2
10 = 4 × (4 + 1) ÷ 2
15 = 5 × (5 + 1) ÷ 2
21 = 6 × (6 + 1) ÷ 2
28 = 7 × (7 + 1) ÷ 2

b)
5 = (1 × 6) − 1
11 = (2 × 6) − 1
17 = (3 × 6) − 1
23 = (4 × 6) − 1
29 = (5 × 6) − 1
35 = (6 × 6) − 1
41 = (7 × 6) − 1

c)
7 = (1 × 2) + 5
9 = (2 × 2) + 5
11 = (3 × 2) + 5
13 = (4 × 2) + 5
15 = (5 × 2) + 5
17 = (6 × 2) + 5
19 = (7 × 2) + 5

Assessment

Tell the learners that they will work individually to complete an assessment task on numeric patterns. They will show what they have learnt during this topic. They will complete number sequences, tables, flow diagrams and calculations in number patterns. They will count on and back and use basic calculations facts to solve the problems.

You will find out if your learners are able to count on and back in intervals of 10 and 100 from non-multiples, count on in odd three-digit numbers, identify and complete a number sequence in which the difference is not constant and count on and back in multiples of 9, 7 and 2. You will also find out if they are able to extend number sentences in series of calculations.

Assessment Task 4

1. Complete the number sequences.
   a) 24; 44; □; 84; □; 124; □; 164; □; □
   b) 1 117; □; □; 817; 717; 617; □; □; □
   c) 457; □; 461; 463; □; □; □; □; 473; 475
   d) 1; 2; 4; 7; □; □; □; 29; □; □
   e) 108; 99; 90; □; □; 63; □; □; 36; □
2. Complete the tables.

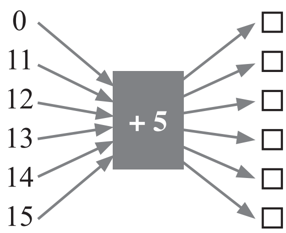
a)

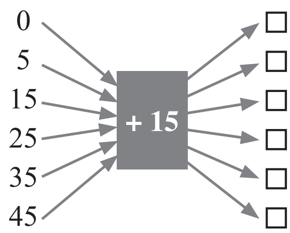
0	1	2	3	4	5	6	7	8	9
0			21			42		56	

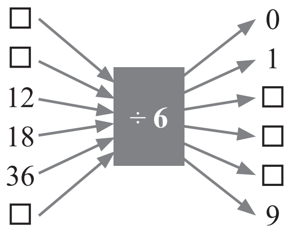
b)

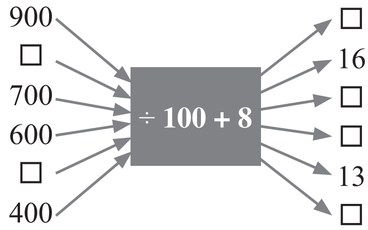
0	2	4	6	8	10	12	14	16	18
4	6			12		16			

3. Complete the flow diagrams.

a) 

b) 

c) 

d) 

4. What are the next three terms in these number patterns?

a.
5 = (1 × 4) + 1
9 = (2 × 4) + 1
13 = (3 × 4) + 1

b.
4 = (0 + 2) × 2
6 = (0 + 3) × 2
8 = (0 + 4) × 2

Solutions

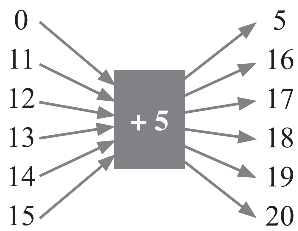
1. a) 24; 44; **64**; 84; **104**; 124; **144**; 164; **184**; **204**
   b) 1 117; **1 017**; **917**; 817; 717; 617; **517**; **417**; **317**
   c) 457; **459**; 461; 463; **465**; **467**; **469**; **471**; 473; 475
   d) 1; 2; 4; 7; **11**; **16**; **22**; 29; **37**; **46**
   e) 108; 99; 90; **81**; **72**; 63; **54**; **45**; 36; **27**

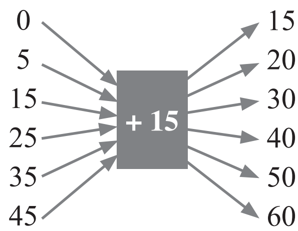
2. a)

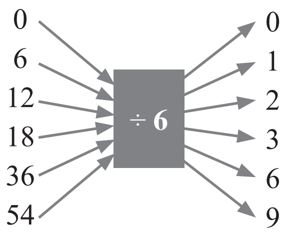
0	1	2	3	4	5	6	7	8	9
0	**7**	**14**	21	**28**	**35**	42	**49**	56	**63**

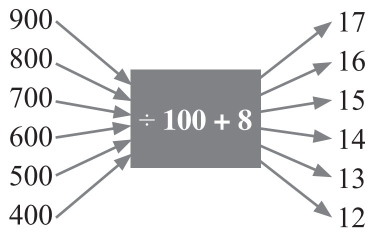
b)

0	2	4	6	8	10	12	14	16	18
4	6	**8**	**10**	12	**14**	16	**18**	**20**	**22**

3. a) 

b) 

c) 

d) 

4. a.
5 = (1 × 4) + 1
9 = (2 × 4) + 1
13 = (3 × 4) + 1
17 = (4 × 4) + 1
21 = (5 × 4) + 1
25 = (6 × 4) + 1

b.
4 = (0 + 2) × 2
6 = (0 + 3) × 2
8 = (0 + 4) × 2
10 = (0 + 5) × 2
12 = (0 + 6) × 2
14 = (0 + 7) × 2

Whole numbers: multiplication

Tell the learners that they will work with multiplication and division facts and calculations in this topic. They will do mental calculations before each lesson. They will write an assessment task at the end of the topic. They will revise the work they have done in Grade 4 before doing more advanced multiplication and division tasks.

Unit 17 Multiply and divide by multiples of 10

MENTAL MATHS

- Let the learners play the 'I have…' basic operation game to practise basic multiplication and division facts. Explain the rules to them. Remind the learners that they have to focus and listen carefully to statements and questions and not to shout out solutions. They have played the game in Grade 4 so they should be familiar with the rules.
- Ask the learners to write a multiplication and division number sentence for each set of objects. They work with multiples of 10 and division as the inverse of multiplication. Let them study and discuss the multiplication and division calculations in the speech bubbles. They should be able to make generalisations.
- Ask them to solve the problems based on the examples. They also look for relationships to solve problems, avoiding difficult calculations by using multiples of 10.
- Select some of the cards, for example (6 − 1) ÷ 5 and (9 + 3) ÷ 4 to reinforce number rules or properties, such as the order of operations and the use of brackets.

Activity 17.1

Solutions

1. a) 7 × 10 = 70
70 ÷ 10 = 7
   b) 9 × 10 = 90
90 ÷ 10 = 9
   c) 8 × 10 = 80
80 ÷ 10 = 8
   d) 4 × 10 = 40
40 ÷ 10 = 4
   e) 6 × 10 = 60
60 ÷ 10 = 6
   f) 5 × 10 = 50
50 ÷ 10 = 5

2. Learners explain what they notice.

3. a) 6 × 10 = 60
   b) 23 × 10 = 230
   c) 40 ÷ 10 = 4
   d) 370 ÷ 10 = 37
   e) 4 500 ÷ 100 = 45
   f) 3 000 ÷ 1 000 = 3
   g) 60 × 10 = 600
   h) 23 × 100 = 2 300
   i) 400 ÷ 10 = 40
   j) 3 700 ÷ 10 = 370
   k) 45 000 ÷ 100 = 450
   l) 30 000 ÷ 1 000 = 30
   m) 600 × 10 = 6 000
   n) 23 × 1 000 = 23 000
   o) 4 000 ÷ 10 = 400
   p) 37 000 ÷ 10 = 3 700

4. a) 6 × 2 = 12
60 × 2 = 120
60 × 20 = 1 200
600 × 20 = 12 000
   b) 7 × 3 = 20
70 × 3 = 210
70 × 30 = 2 100
700 × 30 = 21 000
   c) 9 × 9 = 81
90 × 9 = 810
90 × 90 = 8 100
900 × 90 = 81 000
   d) 6 × 8 = 48
60 × 8 = 480
60 × 80 = 4 800
600 × 80 = 48 000
   e) 45 ÷ 5 = 9
450 ÷ 5 = 90
4 500 ÷ 5 = 900
45 000 ÷ 5 = 9 000
   f) 42 ÷ 7 = 6
420 ÷ 7 = 60
4 200 ÷ 7 = 600
42 000 ÷ 7 = 6 000

g) 27 ÷ 9 = 3
270 ÷ 9 = 30
2 700 ÷ 9 = 300
27 000 ÷ 9 = 3 000

h) 56 ÷ 8 = 7
560 ÷ 8 = 70
5 600 ÷ 8 = 700
56 000 ÷ 8 = 7 000

Unit 18 Whole number multiplication and division

MENTAL MATHS

- Let the learners play the Multiplication Bingo Game. They have played the game in Grade 4 and should know the rules.

Activity 18.1

- Knowledge of multiplication tables is reinforced in this activity. Give the learners copies of the tables from the Photocopiable Resources to complete or let them record the tables to help them remember them.
- You should encourage the learners to learn the tables by heart. They should have conceptual understanding of multiplication and division and should now memorise them to recall from memory when needed.
- They should notice that the tables decrease in the columns. Let them explain why. They should understand that some tables are already included in previous rows. You should especially check that learners understand multiplication and division by 0 and 1. Learners often get confused with these. They have developed understanding of these concepts in Grade 4.
- Ask the learners to create their own division tables. This exercise strengthens their understanding of division and multiplication as inverses. They can do this for homework. You should take care when learners apply inverse operations with zero. At this stage they should understand that $0 \times 2 = 0$ and $0 \div 2 = 0$ but $2 \div 0 \neq 0$. Tell them that division by zero is not allowed or it is undefined. They will learn more about this concept later during this year. Give the learners copies of the template in the Photocopiable Resources to complete the flow diagrams. Check if they are able to make generalisations for multiplication and division with zero.

Solutions

1.

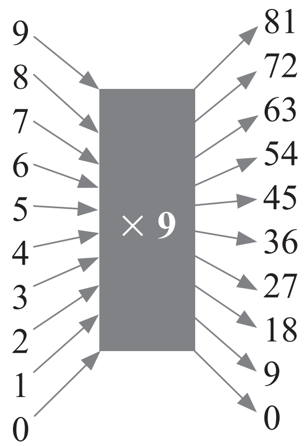
0 x 2 = 0	0 x 3 = 0	0 x 4 = 0	0 x 5 = 0	0 x 6 = 0	0 x 7 = 0	0 x 8 = 0	0 x 9 = 0	0 x 10 = 0
1 x 2 = 2	1 x 3 = 3	1 x 4 = 4	1 x 5 = 5	1 x 6 = 6	1 x 7 = 7	1 x 8 = 8	1 x 9 = 9	1 x 10 = 10
2 x 2 = 4	3 x 3 = 9	4 x 4 = 16	5 x 5 = 25	6 x 6 = 36	7 x 7 = 49	8 x 8 = 64	9 x 9 = 81	10 x 10 = 100
3 x 2 = 6	4 x 3 = 12	5 x 4 = 20	6 x 5 = 30	7 x 6 = 42	8 x 7 = 56	9 x 8 = 72	10 x 9 = 90	
4 x 2 = 8	5 x 3 = 15	6 x 4 = 24	7 x 5 = 35	8 x 6 = 48	9 x 7 = 63	10 x 8 = 80		
5 x 2 = 10	6 x 3 = 18	7 x 4 = 28	8 x 5 = 40	9 x 6 = 54	10 x 7 = 70			
6 x 2 = 12	7 x 3 = 21	8 x 4 = 32	9 x 5 = 45	10 x 6 = 60				
7 x 2 = 14	8 x 3 = 24	9 x 4 = 36	10 x 5 = 50					
8 x 2 = 16	9 x 3 = 27	10 x 4 = 40						
9 x 2 = 18	10 x 3 = 30							
10 x 2 = 20								

2. Learners explain what they notice.

3.

0 ÷ 2 = 0	0 ÷ 3 = 0	0 ÷ 4 = 0	0 ÷ 5 = 0	0 ÷ 6 = 0	0 ÷ 7 = 0	0 ÷ 8 = 0	0 ÷ 9 = 0	0 ÷ 10 = 0
2 ÷ 2 = 1	3 ÷ 3 = 1	4 ÷ 4 = 1	5 ÷ 5 = 1	6 ÷ 6 = 1	7 ÷ 7 = 1	8 ÷ 8 = 1	9 ÷ 9 = 1	10 ÷ 10 = 1
4 ÷ 2 = 2	9 ÷ 3 = 3	16 ÷ 4 = 4	25 ÷ 5 = 5	36 ÷ 6 = 6	49 ÷ 7 = 9	64 ÷ 8 = 8	81 ÷ 9 = 9	100 ÷ 10 = 10
6 ÷ 2 = 3	12 ÷ 3 = 4	20 ÷ 4 = 5	30 ÷ 5 = 6	42 ÷ 6 = 7	56 ÷ 7 = 8	72 ÷ 8 = 9	90 ÷ 9 = 10	
8 ÷ 2 = 4	15 ÷ 3 = 5	24 ÷ 4 = 6	35 ÷ 5 = 7	48 ÷ 6 = 8	63 ÷ 7 = 9	80 ÷ 8 = 10		
10 ÷ 2 = 5	18 ÷ 3 = 6	28 ÷ 4 = 7	40 ÷ 5 = 8	54 ÷ 6 = 9	70 ÷ 7 = 10			
12 ÷ 2 = 6	21 ÷ 3 = 7	32 ÷ 4 = 8	45 ÷ 5 = 9	60 ÷ 6 = 10				
14 ÷ 2 = 7	24 ÷ 3 = 8	36 ÷ 4 = 9	50 ÷ 5 = 10					
16 ÷ 2 = 8	27 ÷ 3 = 9	40 ÷ 4 = 10						
18 ÷ 2 = 9	30 ÷ 3 = 10							
20 ÷ 2 = 10								

4.

a)


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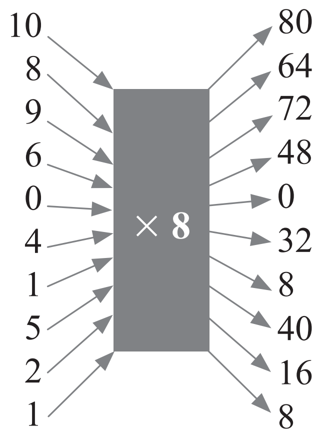

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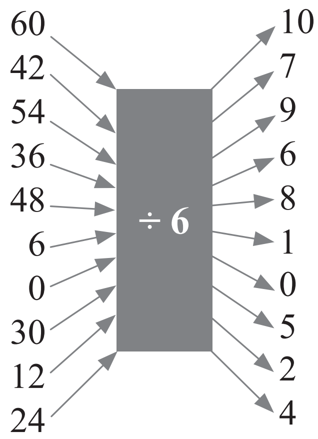

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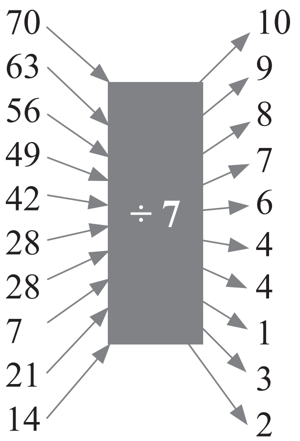

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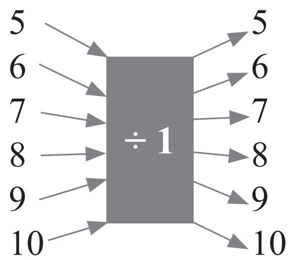

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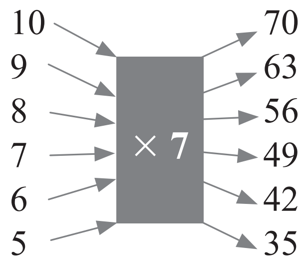

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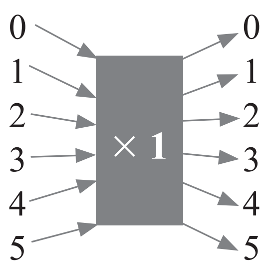

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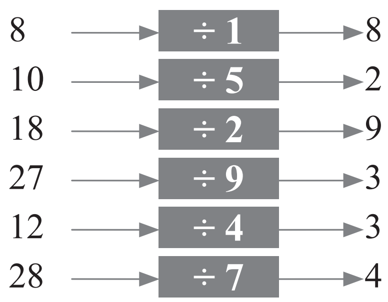


Unit 19 Whole number multiples

MENTAL MATHS

- Ask the learners to name the numbers that the arrows point to on the number lines. They work with multiples of 4, 8, 3 and 6. Ask them to count in these multiples.
- Interrupt them at certain stages in the counting processes to ask, for example, 'How many 8s have you counted up to 40?', 'How many 6s are in 42?'.
- Let them count as individuals, groups, pairs and as a whole class. Ask them to name the multiples that are the same in the 4 and 8, and 3 and 6 times tables.
- Ask more questions such as, 'What is 42 − 6? 56 + 8?'.
- Let them look at relationships, e.g. $4 \times 4 = 16$; $4 \times 8 = 32$; $8 \times 8 = 64$; $16 \times 4 = 64$; $4 \times 4 \times 4$. What do they notice about these solutions? Do not simply engage in rote counting but rather experience counting as purposeful – connected to different mathematical concepts.
- Learners should be able to assert that double 3 = 6, half of 16 = 8; in 24 there are three 8s, four 6s, eight 3s, six 4s, etc. They should notice that 6, 12, 18, 24 and 30 are multiples of 3 and 6, etc.
- Make sure that they understand the term multiple.

Solutions

1. a) 4; 8; 32; 36; 48; 52; 60; 64 b) 8; 16; 32; 48; 64; 72
   c) 18; 21; 27; 30; 39; 42; 52; 63 d) 18; 24; 30; 42; 54; 66; 78; 84

   These numbers are counting numbers or natural numbers.
2. Learners count in multiples of 3, 6, 4 and 8.
3. a) 2 b) 1 c) 6 d) 3
   e) 8 f) 4 g) 10 h) 5
   i) 6 j) 12

Activity 19.1

- Tell the learners that they will now use their knowledge of basic multiplication and division facts to work with two- and three-digit numbers.
- If they know the multiplication and division facts they should not experience problems with these operations on bigger numbers. Let them look for patterns and connections. They use their own and given methods to solve the problems.
- If you have learners who are already able to calculate some solutions mentally, do not insist that they write down all the procedural steps – rather give them more advanced problems from Term 2 activities.
- Check which learners use highly effective strategies. Let them share these strategies with the class and ask the rest of the learners to compare their strategies. You should create a classroom atmosphere in which your learners do not feel threatened or intimidated by each other's knowledge. They should encourage and support each other's thinking and reasoning. Use learners' mistakes or misconceptions as opportunities for learning.
- If you have learners who still use repeated addition to solve multiplication problems, allow them to do so. Encourage them, however, to compare their strategies to those of others.
- In question 1 they should mostly use the distributive property of numbers to calculate more easily. Emphasise the importance of knowing the tables and facts for 10, 100 and 1 000 while they solve the problems. They should now be able to work independently of learning aids.
- In question 2 they should look at the relationship between, for example, division by 2, 4 and 8 and realise that the solutions are halved each time.

- In question 3 they work with three-digit numbers. They use inverses to check solutions. Ask them to discuss the strategies provided and to use them to solve the problems.

Solutions

1. a) $23 \times 2 = (20 \times 2) + (3 \times 2)$
$= 40 + 6$
$= 46$

b) $46 \times 3 = (40 \times 3) + (6 \times 3)$
$= 120 + 18$
$= 138$

c) $57 \times 5 = (50 \times 5) + (7 \times 5)$
$= 250 + 35$
$= 285$

d) $23 \times 4 = (20 \times 4) + (3 \times 4)$
$= 80 + 12$
$= 92$

e) $46 \times 6 = (40 \times 6) + (6 \times 6)$
$= 240 + 36$
$= 276$

f) $57 \times 10 = (50 \times 10) + (7 \times 10)$
$= 500 + 70$
$= 570$

g) $23 \times 8 = (20 \times 8) + (3 \times 8)$
$= 160 + 24$
$= 184$

h) $46 \times 9 = (40 \times 9) + (6 \times 9)$
$= 360 + 54$
$= 414$

2. a) $48 \div 2 = 24$
b) $54 \div 3 = 18$
c) $60 \div 5 = 12$
d) $48 \div 4 = 12$
e) $54 \div 6 = 9$
f) $60 \div 10 = 6$
g) $48 \div 8 = 6$
h) $54 \div 9 = 6$

3. a) $515 \div 5 = \square$
$500 \div 5 = 100$
$15 \div 5 = 3$
$100 + 3 = 103$

b) $308 \times 9 = \square$
$300 \times 9 = 2\ 700$
$8 \times 9 = 72$
$2\ 700 + 72 = 2\ 772$

c) $206 \times 6 = \square$
$200 \times 6 = 1\ 200$
$6 \times 6 = 36$
$1\ 200 + 36 = 1\ 236$

d) $721 \div 7 = \square$
$700 \div 7 = 100$
$21 \div 7 = 3$
$100 + 3 = 103$

e) $408 \div 8 = \square$
$400 \div 8 = 50$
$8 \div 8 = 2$
$50 + 2 = 52$

f) $418 \times 3 = \square$
$400 \times 3 = 1\ 200$
$10 \times 3 = 30$
$8 \times 3 = 24$
$1\ 200 + 30 + 24 = 1\ 254$

Problem-solving

Ask the learners to work systematically, starting from 1, to find pairs of numbers with a product of 60. Make sure that the learners understand the term product. Also check if they know the terms sum, difference and quotient. Put these words up on your 'New Maths Words' board. This exercise serves as preparation for work on factors in Term 2. Ask them to swop or switch the numbers (using the commutative property) after they have explored and found all the factors of 60. Tell them that the numbers they multiplied to get 60 as a product are called factors of 60. Let them explore factors of other numbers.

Solutions

Let learners solve the problems in their groups or in pairs.

1. $6 \times 14 \times 8 = \square$
$14 \times 6 = (10 \times 6) + (4 \times 6)$
$= 60 + 24$
$= 84$
$84 \times 8 = (80 \times 8) + (4 \times 8)$
$= 640 + 32$
$= 672$

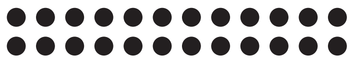
2. 1 × 60 = 60   60 × 1 = 60
2 × 30 = 60   30 × 2 = 60
3 × 20 = 60   20 × 3 = 60
4 × 15 = 60   15 × 4 = 60
5 × 12 = 60   12 × 5 = 60
6 × 10 = 60   10 × 6 = 60

Unit 20 Rules of multiplication and division

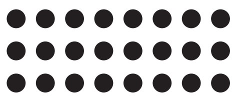
MENTAL MATHS

- Tell the learners that they will work with number rules or properties again.
- Let them look at the examples and discuss the strategies. They have worked with the strategies before so they should know that number rules are applied to make calculations less complicated. They work with the commutative and distributive properties and inverse relationships.
- Encourage the learners to make drawings or use counters to represent the number 24 in question 1. They should also represent 1 × 24, i.e. one row with 24 counters. They use the area model to strengthen knowledge of multiplication and division.

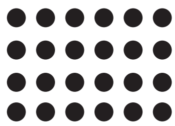
1. 2 × 12 = 24   24 ÷ 12 = 2
12 × 2 = 24   24 ÷ 2 = 12



3 × 8 = 24   24 ÷ 3 = 8
8 × 3 = 24   24 ÷ 8 = 3



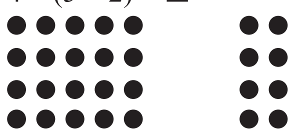
4 × 6 = 24   24 ÷ 6 = 4
6 × 4 = 24   24 ÷ 4 = 6



1 × 24 = 24   24 ÷ 1 = 24
24 × 1 = 24   24 ÷ 24 = 1

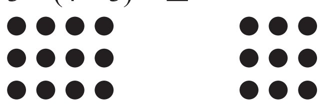
2. a) 4 × (5 + 2) = (**4** × **5**) + (4 × **2**) = 20 + 8 = **28**
b) 3 × (4 + 3) = (**3** × **4**) + (3 × **3**) = 12 + 9 = **21**

3. 4 × (5 + 2) = □



(4 × 5) + (4 × 2)
= 20 + 8
= 28

3 × (4 + 3) = □



(3 × 4) + (3 × 3)
= 12 + 9
= 21

Activity 20.1

- The learners practise number properties and knowledge of multiplication and division facts to solve calculations. Ask them to look for and describe the relationships.

Solutions

1. a) $7 \times 4 = \mathbf{28}$ $4 \times 7 = \mathbf{28}$
   b) $27 \div 9 = \mathbf{3}$ $27 \div 3 = \mathbf{9}$
   c) $6 \times 8 = \mathbf{48}$ $8 \times 6 = \mathbf{48}$
   d) $72 \div 8 = \mathbf{9}$ $72 \div 9 = \mathbf{8}$
   e) $6 \times 5 = \mathbf{5} \times 6 = \mathbf{30}$
   f) $7 \times 6 = 6 \times \mathbf{7} = \mathbf{42}$
   g) $3 \times 8 = 8 \times \mathbf{3} = \mathbf{24}$
   h) $8 \times 0 = \mathbf{0} \times 8 = \mathbf{0}$
   i) $101 \times 1 = 1 \times \mathbf{101} = \mathbf{101}$
   j) $0 \times \mathbf{97} = 97 \times \mathbf{0} = 0$

2. a) $7 \times 7 = 49$ $49 \div 7 = 7$
   b) $64 \div 8 = 8$ $8 \times 8 = 64$
   c) $0 \div 9 = 0$ $9 \times 0 = 0$
   d) $18 \div 3 = 6$ $6 \times 3 = 18$
   e) $1 \times 10 = 10$ $10 \div 1 = 10$
   f) $9 \times 7 = 63$ $63 \div 7 = 9$

3. a) $4 \times (4 + 5) = \square$
   $= (4 \times 4) + (4 \times 5)$
   $= 16 + 20$
   $= 36$
   b) $6 \times (2 + 6) = \square$
   $= (6 \times 2) + (6 \times 6)$
   $= 12 + 36$
   $= 48$
   c) $7 \times (4 + 0) = \square$
   $= (7 \times 4) + (7 \times 0)$
   $= 28 + 0$
   $= 28$
   d) $8 \times (5 + 1) = \square$
   $= (8 \times 5) + (8 \times 1)$
   $= 40 + 8$
   $= 48$
   e) $(2 + 7) \times 3 = \square$
   $= (2 \times 3) + (7 \times 3)$
   $= 6 + 21$
   $= 27$
   f) $(3 + 5) \times 8 = \square$
   $= (3 \times 8) + (5 \times 8)$
   $= 24 + 40$
   $= 64$

4. a) $17 \times 6 = \square$
   $= (10 \times 6) + (7 \times 6)$
   $= 60 + 42$
   $= 102$
   b) $(17 \times 2) + (17 \times 3) = \square$
   $= (10 \times 2) + (7 \times 2) + (10 \times 3) + (7 \times 3)$
   $= 20 + 14 + 30 + 21$
   $= 50 + 35$
   $= 85$
   OR
   $(17 \times 2) + (17 \times 3) = \square$
   $= 17 \times 5$
   $= (10 \times 5) + (7 \times 5)$
   $= 50 + 35$
   $= 85$
   c) $23 \times 8 = \square$
   $= (20 \times 8) + (3 \times 8)$
   $= 160 + 24$
   $= 184$
   d) $(23 \times 2) + (23 \times 4) = \square$
   $= (20 \times 2) + (3 \times 2) + (20 \times 4) + (3 \times 4)$
   $= 40 + 6 + 80 + 12$
   $= 120 + 18$
   $= 138$
   e) $126 \div 6 = \square$
   $= (120 \div 6) + (6 \div 6)$
   $= 20 + 1$
   $= 21$

f) $(126 \div 2) + (126 \div 3) = \square$
$= (120 \div 2) + (6 \div 2) + (120 \div 3) + (6 \div 3)$
$= 60 + 3 + 40 + 2$
$= 105$

g) $279 \div 9 = \square$
$= (270 \div 9) + (9 \div 9)$
$= 30 + 1$
$= 31$

h) $(279 \div 3) + (279 \div 3) = \square$
$= (270 \div 3) + (9 \div 3) + (270 \div 3) + (9 \div 3)$
$= 90 + 3 + 90 + 3$
$= 180 + 6$
$= 186$

Problem-solving

Ask the learners to work in their groups to solve the problem. They could use doubling or the distributive property to solve it. Ask the learners to use two different strategies.

Solutions

1. a) $45 \times 4 = (45 \times 2) + (45 \times 2)$ OR $(40 \times 4) + (4 \times 5)$
$= 90 + 90$ $= 160 + 20$
$= 180$ towels $= 180$ towels
b) $4 \times 6 = 24$ towels for 6 days

Unit 21 Remainders

MENTAL MATHS

- Ask the learners to use the price of the 4-pack birthday cards to estimate what they would pay for different numbers of 4-packs. They round off the price to the nearest rand. They should use multiplication, doubling and addition. Ask them to use two different strategies and explain the connections they observe. You could ask them to calculate the accurate amounts to revise working with amounts involving 99c. For example:
  R39,99 × 2 → R40 × 2 − 2c → R80,00 − 2c = R79,98
- Tell the learners that the birthday cards are not sold in 1s. If you need 2 cards you have to buy a whole pack of 4 cards. Ask them to fill in the missing numbers in the table by finding the number of 4-packs they have to buy for the given numbers of cards needed. They then fill in the number of cards that will be extra or will remain, i.e. they apply division with remainders. Ask the learners to write a division calculation for the numbers in each row in the table.

Solutions

1. a) 2 packs → R40 + R40 = R80 R40 × 2 = R80
b) 4 packs → R80 + R80 = R160 R80 × 2 = R160
c) 6 packs → R160 + R80 = R240 R40 ×6 = R240
d) 8 packs → R160 + R160 = R320 R160 × 2 = R320
e) 10 packs → R320 + R80 = R400 R40 × 10 = R400
The learners should understand that:
2 packs are double the price of 1 pack
4 packs are double the price of 2 packs
6 packs are the price of 4 packs plus the price of 2 packs or

6 packs are triple the price of 2 packs
8 packs are double the price of 2 packs
10 packs are simply 10 times the price.

2.

Number of cards needed	Number of packs to buy	Number of cards left over
6	2 (that's 8 cards)	2
11	3 (12 cards)	1
12	3 (12 cards)	0
13	4 (16 cards)	3
14	4 (16 cards)	2
15	4 (16 cards)	1
16	4 (16 cards)	0
21	6 (24 cards)	3
26	7 (28 cards)	2
35	9 (36 cards)	1

8 ÷ 6 = 1 remainder 2
12 ÷ 11 = 1 remainder 1
12 ÷ 12 = 1 remainder 0
16 ÷ 13 = 1 remainder 3
16 ÷ 14 = 1 remainder 2
16 ÷ 15 = 1 remainder 1
16 ÷ 16 = 1 remainder 0
24 ÷ 21 = 1 remainder 3
28 ÷ 26 = 1 remainder 2
36 ÷ 35 = 1 remainder 1

Activity 21.1

- Tell the learners that they will work on division with remainders.
- Ask them to solve problems like 3 ÷ 2, 7 ÷ 3, 12 ÷ 10, 34 ÷ 10 and 102 ÷ 10 to revise the concept. Ask them why there are remainders. Let them study the examples and the checking strategy.
- Ask them to use 31 counters to find out in how many ways they could divide the counters so that there is a remainder each time. They should try to work systematically. Suggest that they use the numbers 1 to 10 as divisors.
- They then use 26 counters and the numbers 10 to 1 as divisors to create division calculations.
- Let them use inverses to check the solutions. They then perform the one-minute division task to see how many problems they can solve in one minute. Ask them to use their own strategies to solve the problems in question 4.

Solutions

1. 31 ÷ 10 = 3 rem 1 31 ÷ 9 = 3 rem 4 31 ÷ 8 = 3 rem 7
   31 ÷ 7 = 4 rem 3 31 ÷ 6 = 5 rem 1 31 ÷ 5 = 6 rem 1
   31 ÷ 4 = 7 rem 3 31 ÷ 3 = 10 rem 1 31 ÷ 2 = 15 rem 1
   31 ÷ 1 = 31 rem 0

2. 26 ÷ 10 = 2 rem 6 6 + (2 × 10) = 20 + 6 = 26
   26 ÷ 9 = 2 rem 8 8 + (2 × 9) = 18 + 8 = 26
   26 ÷ 8 = 3 rem 2 2 + (3 × 8) = 24 + 2 = 26
   26 ÷ 7 = 3 rem 5 5 + (3 × 7) = 21 + 5 = 26
   26 ÷ 6 = 4 rem 2 2 + (4 × 6) = 24 + 2 = 26
   26 ÷ 5 = 5 rem 1 1 + (5 × 5) = 25 + 1 = 26
   26 ÷ 4 = 6 rem 2 2 + (6 × 4) = 24 + 2 = 26
   26 ÷ 3 = 8 rem 2 2 + (8 × 3) = 24 + 2 = 26
   26 ÷ 2 = 13 rem 0 0 + (13 × 2) = 26 + 0 = 26
   26 ÷ 1 = 26 rem 0

3.

One-minute division		
1. 13 ÷ 5 = **2 rem 3**	2. 19 ÷ 8 = **4 rem 1**	3. 19 ÷ 7 = **2 rem 3**
4. 20 ÷ 3 = **2 rem 5**	5. 16 ÷ 7 = **2 rem 5**	6. 25 ÷ 4 = **6 rem 1**
7. 27 ÷ 5 = **6 rem 2**	8. 30 ÷ 8 = **7 rem 1**	9. 35 ÷ 4 = **2 rem 2**
10. 37 ÷ 7 = **1 rem 7**	11. 17 ÷ 4 = **6 rem 1**	12. 17 ÷ 6 = **3 rem 3**
13. 17 ÷ 4 = **5 rem 2**	14. 15 ÷ 2 = **3 rem 2**	15. 17 ÷ 10 = **3 rem 6**
16. 24 ÷ 7 = **3 rem 3**	17. 29 ÷ 9 = **8 rem 3**	18. 33 ÷ 10 = **3 rem 8**
19. 35 ÷ 9 = **5 rem 2**	20. 38 ÷ 6 = **6 rem 2**	

4. a) 143 ÷ 10 = 14 rem 3
   b) 257 ÷ 5 = 51 rem 2
   c) 169 ÷ 8 = (160 ÷ 8) + (9 ÷ 8)
   = 20 + 1 rem 1
   = 21 rem 1
   d) 218 ÷ 7 = (210 ÷ 7) + (8 ÷ 7)
   = 30 + 1 rem 1
   = 31 rem 1
   e) 809 ÷ 4 = (800 ÷ 4) + (9 ÷ 4)
   = 200 + 2 rem 1
   = 202 rem 1
   f) 249 ÷ 8 = (240 ÷ 8) + (9 ÷ 8)
   = 30 + 1 rem 1
   = 31 rem 1
   g) 367 ÷ 6 = (360 ÷ 6) + (7 ÷ 6)
   = 60 + 1 rem 1
   = 61 rem 1
   h) 181 ÷ 9 = 20 rem 1
   i) 277 ÷ 10 = 27 rem 7
   j) 635 ÷ 3 = (600 ÷ 3) + (53 ÷ 3)
   = 200 + 17 rem 2
   = 217 rem 2

Unit 22 Different ways of dividing

MENTAL MATHS

Let the learners play the Division Bingo Game.

Activity 22.1

- Tell the learners they will now solve multiplication problems by multiplying two-digit by two-digit numbers.
- Ask them to study the given strategies. They use the distributive property to solve the problems in question 1. If they struggle with multiplication of big numbers during the procedures, ask them to break up the numbers further.

Solutions

1. a) 28 × 24 = □
   = 24 × (20 + 8)
   = 19 × (20 + 1)
   = (24 × 20) + (24 × 8)
   = 480 + (20 × 8) + (4 × 8)
   = (480 + 160) + 32
   = 480 + 20 + 140 + 32
   = 500 + 172
   = 672

b) $21 \times 19 = \square$
$= (19 \times 20) + (19 \times 1)$
$= 380 + 19$
$= 380 + 10 + 9$
$= 390 + 9$
$= 399$

c) $34 \times 32 = \square$
$= 32 \times (30 + 4)$
$= (32 \times 30) + (32 \times 4)$
$= 960 + (30 \times 4) + (2 \times 4)$
$= 960 + 120 + 8$
$= 960 + 40 + 80 + 8$
$= 1\ 000 + 88$
$= 1\ 088$

d) $35 \times 36 = \square$
$= 35 \times (30 + 6)$
$= (35 \times 30) + (35 \times 6)$
$= 30 \times (30 + 5) + (30 \times 6) + (5 \times 6)$
$= (30 \times 30) + (30 \times 5) + (30 \times 6) + (5 \times 6)$
$= 900 + 150 + 180 + 30$
$= 900 + 100 + 50 + 180 + 30$
$= 1\ 000 + 50 + 50 + 130 + 30$
$= 1\ 100 + 160$
$= 1\ 260$

e) $42 \times 41 = \square$
$= 41 \times (40 + 2)$
$= (41 \times 40) +(41 \times 2)$
$= 40 \times (40 + 1) + (40 \times 2) + (1 \times 2)$
$= (40 \times 40) + (40 \times 1) + 80 + 2$
$= 1\ 600 + 40 + 82$
$= 1\ 600 + 40 + 60 + 22$
$= 1\ 600 + 100 + 22$
$= 1\ 722$

f) $36 \times 34 = \square$
$= 36 \times (30 + 4)$
$= (36 \times 30) + (36 \times 4)$
$= 30 \times (30 + 6) + (30 \times 4) + (6 \times 4)$
$= (30 \times 30) + (30 \times 6) + 120 + 24$
$= 900 + 180 + 120 + 24$
$= 900 + 100 + 80 + 20 + 10 + 24$
$= 1\ 000 + 100 + 100 + 24$
$= 1\ 224$

g) $53 \times 43 = \square$
$= 53 \times (40 + 3)$
$= (53 \times 40) + (53 \times 3)$
$= (50 \times 40) + (3 \times 40) + (50 \times 3) + (3 \times 3)$
$= 2\ 000 + 120 + 150 + 9$
$= 2\ 000 + 100 + 20 + 100 + 50 + 9$
$= 2\ 000 + 200 + 70 + 9$
$= 2\ 279$

h) $54 \times 62 = \square$
$= 54 \times (60 + 2)$
$= (54 \times 60) + (54 \times 2)$
$= (50 \times 60) + (4 \times 60) + (50 \times 2) + (4 \times 2)$
$= 3\ 000 + 240 + 100 + 8$
$= 3\ 000 + 200 + 40 + 100 + 8$
$= 3\ 000 + 300 + 40 + 8$
$= 3\ 348$

Problem-solving

Ask the learners to work in pairs or groups to solve the problems. You could ask learners who are more competent to work with slow learners or those with reading problems. Let them use their own methods to solve the problems. Ask them to write number sentences before they solve the problems. Share the strategies suggested here with the learners after they have presented their methods during feedback. Questions 7 and 8 are non-routine problems, so they need to apply different strategies.

Solutions

1. $25 \times 28 = \square$
   $= (28 \times 100) \div 4$
   $= 2\ 800 \div 4$
   $= 700$ learners

   OR

   $25 \times 28 = \square$
   $= (28 \times 20) + (28 \times 5)$
   $= 560 + 140$
   $= 700$ learners

2. 1 kg = 8 oranges
   5 kg = 8×5
   = 40 oranges
   $5 \times 8 =$ R40

3. a) 1 pocket = R32
   2 pockets = R64
   4 pockets = R128

   b) $15 \times 4 = \square$
   $2 \times 15 = 30$
   $4 \times 15 = 60$ kg

4. $149 \div 7 = \square$
   $= 21$ rem 2
   Each child get 21 sweets and 2 sweets remain.

5. $35 \times 55 = \square$
   $= (35 \times 50) + (35 \times 5)$
   $= (30 \times 50) + (5 \times 50) + (30 \times 5) + (5 \times 5)$
   $= 1\ 500 + 250 + 150 + 25$
   $= 1\ 500 + 400 + 25$
   $= 1\ 925$
   Theko earns R1 925.

6. $(1\ 000 - 400) \div 5 = \square$
   $= 600 \div 5$
   $= 120$
   Each child gets R120.

7. a) 1 bus takes 40 learners
   10 buses take 400 learners
   2 buses take 80 learners
   1 bus takes 20 learners
   $1 + 10 + 2 + 1 = 14$ buses are needed

   b) Yes, 20 spare seats.

8. a) 3 times the ratio of yellow paint = $3 \times 4 = 12$ tins
   3 times the ratio of blue paint = $3 \times 1 = 3$ tins
   The ratio $3 : 12 = 1 : 4$.

b) Blue paint = 1 × 12 = 12 tins
Yellow paint = 4 × 12 = 48 tins
The ratio 1 : 4 = 12 : 48

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 5

1. Calculate:
   a) 18 ÷ 4 b) 52 ÷ 6
   c) 45 ÷ 7 d) 17 ÷ 3
   e) 53 ÷ 8
2. Calculate:
   a) 4 × 7 = ☐ 40 × 7 = ☐ 40 × 70 = ☐
   b) 3 × 6 = ☐ 30 × 6 = ☐ 30 × 60 = ☐
   c) 8 × 8 = ☐ 80 × 8 = ☐ 80 × 80 = ☐
   d) 36 ÷ 9 = ☐ 360 ÷ 9 = ☐ 3 600 ÷ 9 = ☐
   e) 21 ÷ 7 = ☐ 210 ÷ 7 = ☐ 2 100 ÷ 7 = ☐
3. Fill in the missing numbers.

a)

	0	2	4	6	8	10
× 6						

b)

	1	3	5	7	9	11
× 6						

c)

	9	8	7	6	6	4
× 7						

4. Fill in the missing numbers and operations signs.
   a) 5 × 9 = ☐ 9 × 5 = ☐
   b) 8 × 1 = ☐ 1 × 8 = ☐
   c) 0 × ☐ = 10 × ☐ = ☐
   d) 48 ☐ 6 = 8 6 ☐ 8 = ☐
   e) 1 ☐ 7 = 7 7 ☐ 7 = 1
   f) 6 × (4 + 2) = (☐ × ☐) + (☐ × ☐) = ☐
   g) 4 × (8 + 3) = (☐ × ☐) + (☐ × ☐) = ☐
5. Calculate:
   a) 42 × 4 = ☐ b) 36 × 6 = ☐
   c) 28 × 8 = ☐ d) 106 × 7 = ☐
   e) 21 × 23 = ☐
6. Calculate:
   a) 70 ÷ 10 = ☐ b) 72 ÷ 9 = ☐
   c) 287 ÷ 7 = ☐ d) 305 ÷ 5 = ☐
   e) 328 ÷ 8 = ☐
7. A piece of ribbon is 324 cm long.
   a) If it is cut into 6 equal pieces, how long will each piece of ribbon be?
   b) How long will each piece be if the ribbon is cut into 3 equal pieces?

Solutions

1. a) $18 \div 4 = (16 + 2) \div 4$
   $= (16 \div 4) + 2$
   $= 4$ rem 2
   b) $52 \div 6 = (48 + 4) \div 6$
   $= (48 \div 6) + 4$
   $= 8$ rem 4
   c) $45 \div 7 = (42 + 3) \div 7$
   $= (42 \div 7) + 3$
   $= 6$ rem 3
   d) $17 \div 3 = (15 + 2) \div 3$
   $= (15 \div 3) + 2$
   $= 5$ rem 2
   e) $53 \div 8 = (48 + 5) \div 8$
   $= (48 \div 8) + 5$
   $= 6$ rem 5

2. a) $4 \times 7 = 28$ $40 \times 7 = 280$ $40 \times 70 = 2\ 800$
   b) $3 \times 6 = 18$ $30 \times 6 = 180$ $30 \times 60 = 1\ 800$
   c) $8 \times 8 = 64$ $80 \times 8 = 640$ $80 \times 80 = 6\ 400$
   d) $36 \div 9 = 4$ $360 \div 9 = 40$ $3\ 600 \div 9 = 400$
   e) $21 \div 7 = 3$ $210 \div 7 = 30$ $2\ 100 \div 7 = 300$

3. a)

	0	2	4	6	8	10
× 6	0	12	24	36	48	60

b)

	1	3	5	7	9	11
× 6	6	18	30	42	54	66

c)

	9	8	7	6	6	4
× 7	63	56	49	42	35	28

4. a) $5 \times 9 = 45$ $9 \times 5 = 45$
   b) $8 \times 1 = 8$ $1 \times 8 = 8$
   c) $0 \times 10 = 10 \times 0 = 0$
   d) $48 \div 6 = 8$ $6 \times 8 = 48$
   e) $1 \times 7 = 7$ $7 \div 7 = 1$
   f) $6 \times (4 + 2) = (6 \times 4) + (6 \times 2) = 24 + 12 = 36$
   g) $4 \times (8 + 3) = (4 \times 8) + (4 \times 3) = 32 + 12 = 44$

5. a) $42 \times 4 = (40 \times 4) + (2 \times 4)$
   $= 160 + 8$
   $= 168$
   b) $36 \times 6 = (30 \times 6) + (6 \times 6)$
   $= 180 + 36$
   $= 180 + 20 + 16$
   $= 200 + 16$
   $= 216$
   c) $28 \times 8 = (20 \times 8) + (8 \times 8)$
   $= 160 + 64$
   $= 160 + 40 + 24$
   $= 200 + 24$
   $= 224$

d) $106 \times 7 = (100 \times 7) + (6 \times 7)$
$= 700 + 42$
$= 742$

e) $21 \times 23 = 21 \times (20 + 3)$
$= (20 \times 20) + (1 \times 20) + (20 \times 3) + (1 \times 3)$
$= 400 + 20 + 60 + 3$
$= 400 + 80 + 3$
$= 483$

6. a) $70 \div 10 = 7$
   b) $72 \div 9 = 8$
   c) $287 \div 7 = (280 \div 7) + (7 \div 7)$
   $= 40 + 1$
   $= 41$
   d) $305 \div 5 = (300 \div 5) + (5 \div 5)$
   $= 60 + 1$
   $= 61$
   e) $328 \div 8 = (320 \div 8) + (8 \div 8)$
   $= 40 + 1$
   $= 41$

7. a) $324 \div 6 = (300 \div 6) + (24 \div 6) = 50 + 4$
   $= 54$
   Each piece is 54 cm long.
   b) $324 \div 3 = (300 \div 3) + (24 \div 3)$
   $= 100 + 8$
   $= 108$
   Each piece is 108 cm long.

Time

Unit 23 The history of time measuring instruments

MENTAL MATHS

- The 10-minute Mental Maths session for today involves reading and interpretation of the history of time. You can read a paragraph and ask some of your strong readers to read some of the paragraphs.
- Let the learners explain to the class what they understand about the history of time measurement. You could ask them to do more research in the library or on the internet. Ask the Social Science or Language teacher to read the information and ask the learners some comprehension questions to impose the knowledge.

Activity 23.1

- This is a practical lesson. Be well prepared and make sure you bring the necessary equipment to school as the learners might find it difficult to obtain.
  You will need:
  1 × 60 cm dell stick cut into 15 cm lengths
  1 × sheet thick cardboard (sturdy box from shop will work)
  2 × black markers
  2 × candles and candle holders
  matches
  pendulum
  instruction sheets for every activity

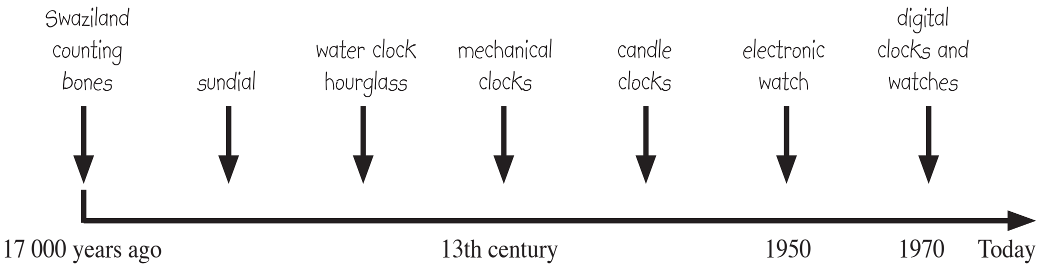
4 × 500 ml yoghurt tubs (you can ask learners before the time to collect for you).

- Explain how all the activities are done to the whole class before dividing them into groups.
- Divide the class into groups, hand out instruction sheets and monitor the activities and assist where necessary.
- Design your own observation and assessment sheets for each activity. It's important to observe who is the 'mastermind' in each group.
- Here is a sample instruction sheet for the water clock:
  1. Find 2 × 500 ml yoghurt or margarine tubs.
  2. Make a small hole in one tub.
  3. Put Prestik in the hole.
  4. Fill the tub to the brim with water.
  5. Put it at a higher level than the other tub.
  6. Pull out the Prestik 'plug' and time how long it takes to tap the water from one tub to the other.
  7. See if you can make the hole such a size that it takes 15 minutes to empty. Enlarge the hole bit by bit until you get it right.

Activity 23.2

Solutions

1.



2. a) sundial
   b) wristwatch
   c) hourglass
   d) grandfather (pendulum) clock
   e) stopwatch (digital)
   f) candle clock
   g) stopwatch (analogue)
   h) water clock
   i) alarm clock (digital)

Unit 24 Revise a little

MENTAL MATHS

- The learners revise what they know about time measurement. Ask them if they know the difference between an analogue and a digital clock.
- Tell them that a period of ten years is called a decade and a period of 100 years is a century. Explain the prefix 'deca' and the term decathlon. Ask them what they think a decagon is. They should know the names of polygons with up to 8 sides.
- Let them answer the questions involving mental calculations of years, days, hours and so on.

Solutions

1. Learners' answers will vary.

2. a) There are 30 + 31 + 30 = **90** days from April to June.
b) There are 52 × 4 = **208** weeks in 4 years.
c) There are 24 × 7 = **168** hours in 7 days.
d) Two years equals 365 × 2 = **730** days.
e) 30 years equal 30 ÷10 = **3** decades.
f) Every 4 years there is a **leap** year because **every year has 6 hours extra**.
(6 × 4 = 24, which represents another day, every 4th year therefore has an extra day.)
g) There are 10 + 10 + 5 = **25** years in $2\frac{1}{2}$ decades.
h) Our next leap year will be in **2016/2020**.
i) (Answers will vary.)
j) There are 7 × 10 = **70** years in 7 decades and $12\frac{1}{2}$ × 10 = **125** years in $12\frac{1}{2}$ decades.

Activity 24.1

Solutions

1. a) Ten to two b) Half past four
c) Quarter past nine d) Twenty-five to six

2. a) 5:30 b) 2:40
c) 9:45 d) 12:00

Activity 24.2

- Do a lot of oral work before the learners write in their books, as this was a new concept taught in Grade 4.
- Give the learners a copy of the table from the Photocopiable Resources.

24-hour	1 + 12 = 13 13:00	15:40		21:10		11:00		16:34	
12-hour	1:00 p.m.	15 − 12 = 3 3:40 p.m.	11:30 a.m.		10:40 p.m.		6:45 p.m.		00:12 a.m.

- Compare the two sides of the table – morning and afternoon.

Solutions

1.

24-hour	1 + 12 = 13 13:00	15:40	**11:30**	21:10	**22:40**	11:00	**18:45**	16:34	**00:12**
12-hour	1: 00 p.m.	15 − 12 = 3 3:40 p.m.	11:30 a.m.	**9:10 p.m.**	10:40 p.m.	**11:00 a.m.**	6:45 p.m.	**4:34 p.m.**	00:12 a.m.

2. a) 03:17 b) 07:55

3. a) i) Quarter past eight ii) Twenty-five minutes past 10
iii) Twenty-five minutes to one iv) Five minutes to eleven

4. a) 4 hours 45 minutes b) 4 hours
c) 15 hours

5. 1 hour 15 minutes

Unit 25 Working with seconds

MENTAL MATHS

- The learners develop knowledge about seconds and minutes, which involves multiples of 60. Ask them to count forwards and backwards in 60s. Write down the multiples as they name them.
- If they struggle with the counting ask them to look at the relationship between the multiples of 60 and 6. They should notice that the multiples of 60 are 10 times the multiples of 6, for example:

6	12	18	24	30
60	120	180	240	300

- Tell learners they could use knowledge of doubling and halving to solve the problems. Remind them to relate the calculations to multiples of 6, i.e.

$$
\begin{aligned}
120 \div 60 &= (120 \div 10) \div (60 \div 10) \\
&= 12 \div 6 \\
&= 2
\end{aligned}
$$

Solutions

1. 0; 60; 120; 180; 240. That's four 60s.
2. 300; 240; 180; 120; 60; 0. That's five 60s.
3. a) $1 \times 60 = 60$ b) $2 \times 60 = 120$
   c) $4 \times 60 = 240$ d) $8 \times 60 = 480$
   e) $3 \times 60 = 180$ f) $6 \times 60 = 360$
   g) $60 \div 60 = 1$ h) $120 \div 60 = 2$
   i) $240 \div 60 = 4$ j) $480 \div 60 = 8$
   k) $300 \div 60 = 5$

Activity 25.1

- This is mostly a practical activity. Stopwatches are introduced. Try to have as many stopwatches available in the class as possible.
- Divide the learners into groups so that every group has a stopwatch (cellphones can also be used if necessary, as many learners may have one.)
- Explain to them how the stopwatch works, which buttons must be pressed to start, stop and clear the stopwatch. Make sure you test the watches beforehand.
- Ask the learners to time certain activities in the class, e.g. sing a song, count to twenty, walk from the front of the class to the back, and let the learners time you. Compare the readings.
- Explain to the learners that the reading on the left is the hours × 60 = minutes × 60 is seconds and then the seconds work in the decimal system × 10 × 10 for split seconds. Give examples of where people make use of split seconds, such as athletics races.
- It is very important that the learners must learn how to say the time e.g. four minutes, twenty-five comma two five seconds. They must understand the concept of the split seconds and that we say the tenths first and then hundredths – that you don't read it as a combination number like a whole number.
- The written work can be given as homework if time doesn't allow for the practical and written work in 1 hour.

Solutions

1. Learners' answers will vary.

2. a) 120 seconds b) 300 seconds
   c) 1 800 seconds d) 3 600 seconds

3. a) $1\frac{1}{2}$ minutes b) 4 minutes
   c) 2 minutes d) $4\frac{1}{2}$ minutes

4. a) Firdous Khan b) Cindy Olivier
   c) gold medal
   d) Lerato Mokotedi. She has the slowest time; she came 4th and there are only three medals to be won.
   e) 00:03:57,10
   00:03:57,12
   00:04:30,21
   00:04:49,45

Activity 25.2

Solutions

Learners' answers will vary.

Unit 26 Reading timetables and calendars

MENTAL MATHS

Solutions

1. 25 minutes
2. 12 minutes
3. 35 minutes
4. 36 minutes
5. 2 hours 30 minutes = 150 minutes
6. 4 hours 8 minutes = 248 minutes

Activity 26.1

- Ask the learners a few days before you work on Unit 26 to collect TV timetables and let them paste these in their books.
- Explain to them how to read the timetables. You can also hand out a copy to practise with in class, and ask oral questions about the information and programmes – this way they get experience in reading the timetables. Keep this activity informal.
- The learners work with timetables and calendars. Ask them when and where they use timetables and what information is displayed in timetables.
- Let them explore the timetable for the TV programs and answer the questions involving comparison of time duration and lapsed time.

Solutions

1. a) Ultimate Weapons, American Chopper and Gold Rush. They are each 55 minutes long.
   b) All of them
   c) 50 minutes
   d) Possibly at 07:40 to allow time for advertisements

2. a) 1 hour 25 minutes
   b) 30 minutes

c) Palesa must take the 14:10 taxi.
d) Wynne Street

Activity 26.2

Solutions

1. a) Thursday
   b) Tuesday and Friday
   c) Friday
2. The numbers increase by 7 each time.
3. Sundays
4. 10 days
5. 10 days
6. Wednesday

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 6

1. a) Name three ways in which time was measured in the past.
   b) How many years are there in a decade?
   c) What mechanism is used inside a grandfather clock to tell the time?
   d) How can you tell the time using a candle?
2. Complete the following table.

12-hour clock	9:30 a.m.		5:45 p.m.	
24-hour cock		23:15		18:25

3. How many seconds are there in:
   a) 3 minutes
   b) $2\frac{1}{2}$ minutes
   c) $\frac{1}{4}$ minute
   d) $1\frac{1}{10}$ minute
4. How many minutes are there in:
   a) 180 seconds
   b) 240 seconds
   c) 210 seconds
   d) 75 seconds
5. A patient went into the hospital theatre for an operation at 11:22 a.m. She came out of the theatre at 11:54 a.m. and went into the recovery room. At 13:15 she was back in the hospital ward.
   a) How long was the patient in the operating theatre?
   b) How long did it take her to recover in the recovery room?
   c) If it took the doctors 15 minutes to prepare the patient in the theatre, before the operation started, how long was the operation?

Solutions

1. a) Hour glass, sundial, shadow stick, candle clock, etc.
   b) 10
   c) Pendulum
   d) Learners describe how to tell the time using a candle.

2.

12-hour clock	9:30 a.m.	**11:15 p.m.**	5:45 p.m.	**6:25 p.m.**
24-hour cock	**09:30**	23:15	**17:45**	18:25

3 a) $3 \times 60 = 180$ s b) $2 \times 60 + 30 = 150$ s
c) $60 \div 4 = 15$ s d) $60 + 6 = 66$ s

4. a) 3 minutes b) 4 minutes
c) $60 + 60 + 60 + 30 = 3\frac{1}{2}$ minutes d) $60 + 15 = 1\frac{1}{4}$ min

5. a) 32 minutes b) 1 hour 21 minutes
c) 15 minutes

Data handling

In this topic, the learners will extend the work on data and graphs that they started in Grade 4. They practise data collection and sorting skills and work with pictographs, bar graphs and pie charts again. In this grade, they also begin to look at sources and contexts of data and they learn to identify the mode of a set of numerical data.

Unit 27 Tallies and tables

If the learners do not yet understand the usefulness of tally tables, you may want to do an exercise in which they count the same set of items first without using tally marks and then with using tally marks. They will soon come to understand that tally marks and tally tables are useful, practical tools to use when collecting and sorting data.

MENTAL MATHS

- The learners should know by now that tally marks involve grouping in 5s or multiples of 5. Tell them that they have to give the numbers represented by the tally marks.
- Let them explain their counting strategies. They should use brackets in the calculations. Check which learners still apply repeated addition instead of multiplication. Ask them how they would rearrange the tally marks to count more easily in questions 9 and 10.

Solutions

1. a) 4
b) $(1 \times 5) + 1 = 6$
c) $(1 \times 5) + 3 = 8$
d) $(2 \times 5) + 2 = 12$
e) $(3 \times 5) + 3 = 18$
f) $(1 \times 5) + (3 \times 4) = 17$
g) $(3 \times 5) + (2 \times 4) + 3 = 15 + 8 + 3$
$= 26$
h) $(5 \times 5) + 1 = 26$
i) $(6 \times 5) + 8 = 38$
j) $(7 \times 5) + 3 + 2 + 4 = 35 + 9$
$= 44$

2. Learners would probably reckon that they could make more groups of 5, i.e. breaking up numbers to build up groups of 5. Let them do the regrouping on the board and write down the calculations.

f) $(1 \times 5) + (4 + 1) + (4 + 1) + 2 = (3 \times 5) + 2$
$= 17$

g) $(3 \times 5) + (4 + 1) + (4 + 1) + 1 = 15 + 10 + 1$
$= 26$

h) $(6 \times 5) + (4 + 1) + 3 = 30 + 5 + 3$
$= 38$

i) $(7 \times 5) + (3 + 2) + 4 = 35 + 5 + 4$
$= 44$

Activity 27.1

Solutions

1. a)

Buttons	Tally marks	Total number of buttons
Round	𝍸 III	8
Square	IIII	4
Triangular	𝍸 II	7

b)

Beads	Tally marks	Total number of beads
Red	𝍸 I	6
Yellow	𝍸 III	8
Pink	𝍸	5
Green	𝍸 II	7
Blue	𝍸 IIII	9

2. Once the learners have compiled their neat tables, let them summarise the data by stating which colour was the most common and which the least common. Then let them also briefly compare their data. Some learners may have been more observant than others and have recorded different numbers of cars under the different colours. Talk briefly about possible reasons for differences in the data. (They will focus more on comparing data in Term 3.)

Unit 28 Ordering groups of data

Most learners should not have a problem ordering data sets. The concept of ordering numbers from smallest to biggest is not new. However, they need to be very careful and accurate when doing so because careless errors may occur.

Activity 28.1

Solutions

1. a) It shows the favourite outdoor games of a group of children.
   b) When kept in tabular form, the data looks like this from smallest to largest group:

Favourite outdoor games	Number of children
Rounders	3
Red Rover	5
On-on	6
Dodgeball	7
Stuck in the Mud	9
Three Sticks	10

c) Three Sticks

2. a)

Favourite indoor activities	Number of children
Jigsaw puzzles	4
Drawing	5
Crafts	6
Building blocks	7
Word and number puzzles	7
Reading	11

b) Jigsaw puzzles
c) Reading
d) Building blocks, and word and number puzzles

Unit 29 Pictographs

The learners need to be able to draw pictographs and bar graphs of given data. In Grade 4 they learned what pictographs and bar graphs were and how to draw them. In this grade, they build on their knowledge. For example, they learn that pictographs can consist of pictures where one picture represents more than one item (many-to-one correspondence), and they also begin to work with very large numbers in bar graphs.

MENTAL MATHS

- The learners develop understanding and skills about pictures representing multiple items or objects. They apply knowledge of counting and calculating skills.
- Ask them to count the different number of objects represented by the pictures. Check their counting or calculating strategies. Some learners might count on, e.g. 4; 8; 12; 16; …. Others might apply multiplication. Let the learners share their strategies.
- Show them how they could use effective mental calculation strategies by using the distributive property, halving, compensation, and known facts to apply shortcuts doubling.
- The strategies below may seem long, but they are easily applied in mental calculations.

Solutions

1. 12 × 4 = (10 × 4) + (2 × 4)   (distributive property)
   = 40 + 8
   = 48 girls

2. $14 \times 7 = (7 \times 7) + (7 \times 7)$ (halving)
$= 49 + 49$
$= 100 - 2$ (compensation)
$= 98$ boys

3. $11 \times 25 = 11 \times 100 \div 4$ ($25 \times 4 = 100 \div 4$)
$= 1\,100 \div 4$
$= 275$ bicycles

4. $13 \times 50 = 13 \times 100 \div 2$ ($50 \times 2 = 100 \div 2$)
$= 1\,300 \div 2$
$= 650$ buses

5. $15 \times 12 = (15 \times 6) + (15 \times 6)$ (halving)
$= 90 + 90$
$= 180$ cars
or
$15 \times 12 = (12 \times 10) + (12 \times 5)$
$= 120 + 60$
$= 180$ cars

Activity 29.1

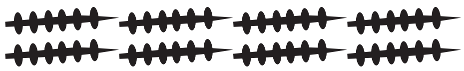
- This section revises and consolidates what the learners learnt in Grade 4.

Solutions

1.

Name	Number of glasses of juice sold
Mary	
Judy	
Anne	
Nombulelo	

2.

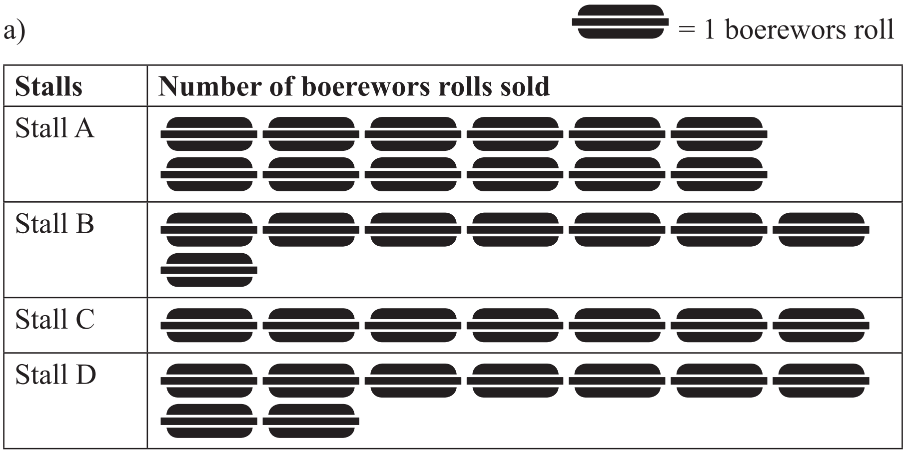
Snack	Number of each snack
Bowls of popcorn	
Fruit sticks	
Tubs of frozen yoghurt	
Muffins	
Tuna rolls	

Activity 29.2

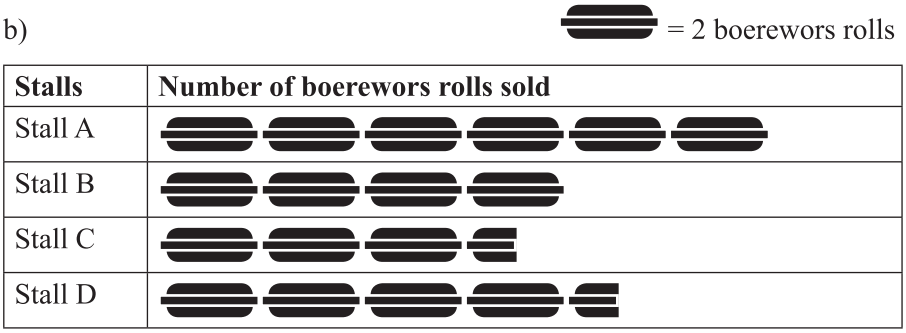
- Work slowly through the examples given to help the learners understand that one picture in a pictograph can also represent more than one item.
- The examples and activity questions move progressively from one picture standing for two items, to one picture for 10 items, and then one picture for hundreds of items.

Solutions

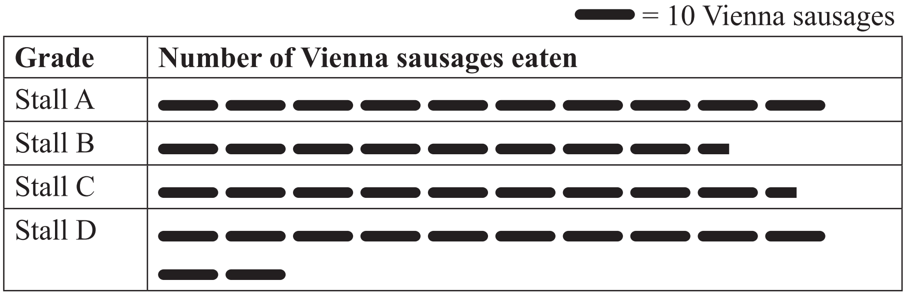
1. a)



b)



2.



3. Pictograph B is correct. Pictograph A shows the incorrect number of pictures for School B and School D.

Unit 30 Bar graphs

MENTAL MATHS

- The learners work with data represented in tables. Ask them to describe the data represented in each table.
- They apply knowledge of calculations with multiples of 10, order numbers and create, extend and describe number patterns. They apply number properties and strategies to calculate more smartly.
- Write the numbers on the board as they order them. Ask them to describe the patterns they observe. They should notice that the numbers are multiples of 50, 5 and 25.
- Let them fill in the missing multiples in the sequences and give the next four terms in each sequence.

Solutions

1. A: The number of learners in five schools.
   B: The number of learners in Grades 4 to 7 in a school.
   C: The number of learners at a school who use different types of transport to get to school.
2. A: 600 + 550 + 700 + 800 + 750
   = (700 + 800) + (600 + 500) + (750 + 50) (associative property)
   = 1 500 + 1 100 + 800
   = 2 600 + 400 + 400 (breaking down and building up)
   = 3 400
   B: 120 + 115 + 100 + 95
   = (120 + 110 + 100) + (95 + 5)
   = 330 + 100
   = 430
   C: 100 + 200 + 150 + 125 + 250
   = (100 + 200 + 100 + 100 + 200) + (50 + 50 + 25)
   = 700 + 125
   = 825
3. A: 550; 600; 700; 750; 800
   B: 95; 100; 115; 120
   C: 100; 125; 150; 200; 250
4. A: Multiples of 50
   B: Multiples of 5
   C: Multiples of 25

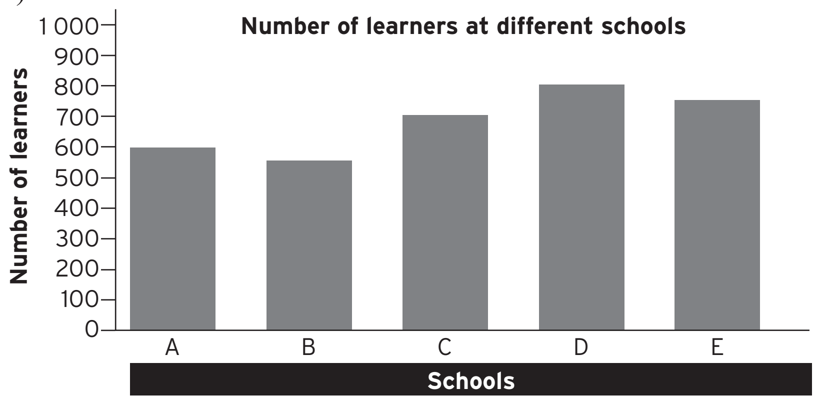
5, 6. A: 550; 600; 650; 700; 750; 800; 850; 900; 950; 1 000
   B: 95; 100; 110; 115; 120; 125; 130; 135; 140
   C: 100; 125; 150; 175; 200; 225; 250; 275; 300; 325; 350

Activity 30.1

- The learners worked with bar graphs in Grade 4. In Grade 5, they practise working with bar graphs where the numbers are larger and so the number intervals on the *y*-axis are bigger.
- Let the learners work together as a class to construct the bar graph and display the data in it.

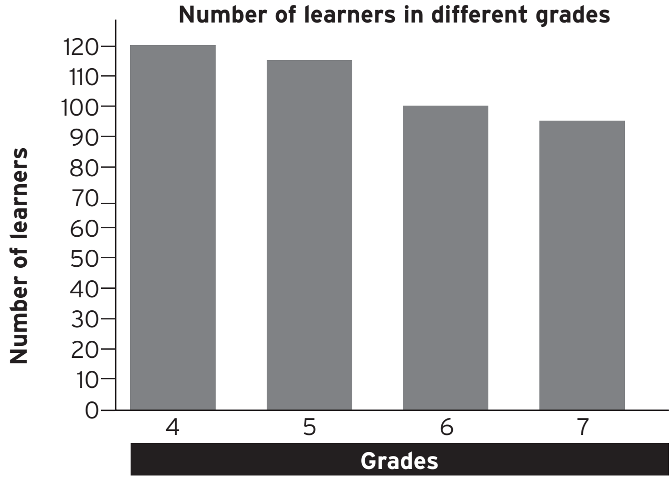
Solutions

1. a)



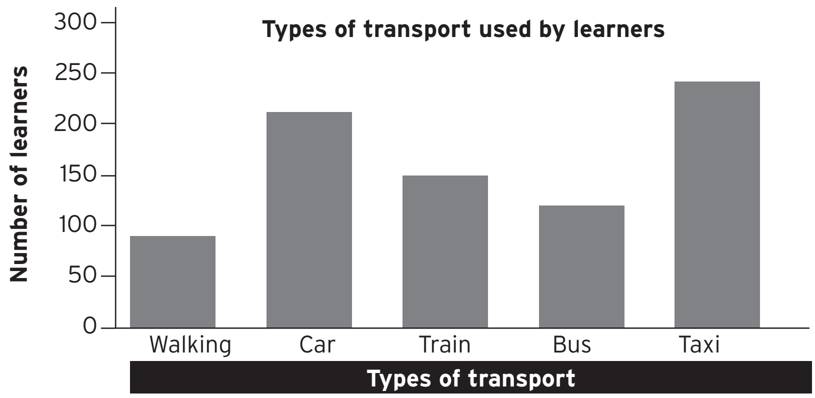
   b) The order of the schools is: B, A, C, E, D.
   c) School D

2. a)



   b) The order of the grades is: 7, 6, 5, 4.

3. a) Encourage the learners to experiment with number intervals on scrap paper before they work neatly in their books. Since the figures are in the hundreds, they may choose to use number intervals of 100. However, they will find that this will lead to very low bars. If they choose number intervals of 10, they will find that the bars will stretch very tall and they will have to use a lot of space on the page, which is unnecessary. Neither of the choices is wrong. However, to make a more balanced-looking bar graph, a number interval of 50 would probably be ideal. Learners must then recall how to count up in 50s (or 10s or 100s, etc.) to reach the number of learners represented by each bar.



   b) The order is: taxi, car, train, bus, walking.

Activity 30.2

- In this activity, the learners will work through the whole data cycle on their own to create their own bar graph.
- The data collection process can be time-consuming. However, do not be tempted to provide a set of data for the learners to use to create their bar graphs. They need to experience the process of collecting the data themselves. If you have a big class, you can take the learners outside or to a bigger area and follow this process:
  - Let each learner write down the names of five movies of his or her choice.
  - Let each learner prepare a tally table to record the data.
  - Let the learners stand in two circles, one on the inside of the other, with a learner from each circle facing a learner from the other circle. Let the learners have their tally tables with them. The pairs of learners ask one another their choices and mark them down in their tally tables.
  - Then, on your instruction, the inner circle steps to the right and each learner faces a new learner to collect data from. So it goes on until the learners have collected data from each learner in the other circle.
  - Let each circle then split into an inner and outer circle again. So there will be four circles. Let the learners collect the data in the same way. At this point, the learners will have collected sufficient data.

Solutions

Learners' answers will vary.

Unit 31 Data in words, pictographs and bar charts

MENTAL MATHS

This unit gives learners practice in analysing and interpreting data. The learners have worked with similar forms of data in Grade 4 and also in previous units in this term. However, the data now includes larger figures, which the learners are expected to be able to handle. A new concept in Grade 5 is that of the mode of a set of numerical data, which is the number that occurs most often in the data set. (Modes of non-numerical data are not dealt with here.)

The activities in this section include getting the learners to summarise and draw conclusions from data, to use data to make predictions and to identify where the data came from and when the data were collected. It is important to note that the learners are only beginning to engage with these concepts, so they are not expected to provide detailed answers. Use the activities to introduce learners to vocabulary such as 'source' (where the data come from) and 'published' (made available for the public to see, for example in a book or on an internet site). You could explain that there are some organisations, like Statistics South Africa, that collect data about how people in South Africa live, work, go to school etc., and use the data to help in planning for what people need. (Example: collecting data about how many children live in an area, so that the government can build enough schools for all the children in that area.)

- Use the Mental Maths session to assist learners in interpreting and understanding the reading about data represented in words, pictographs and bar graphs.

Activity 31.1

Solutions

1. a) 25 906 schools
   b) KwaZulu-Natal
   c) Northern Cape
   d) Northern Cape, Western Cape, Eastern Cape, KwaZulu-Natal
   e) 2009
   f) Probably KwaZulu-Natal, since it has the most schools.
   g) If Gauteng has more people than any other province, we can draw the conclusion that there will also be more children than other provinces, and therefore it probably had more than 6 091 schools (the maximum number in this data set). Make sure that learners understand that this conclusion does not tell us the exact number of schools in Gauteng.
2. a) Most children walked to school
   b) 590 000 children
   c) 90 000 children
   d) Taxi
   e) Other, bus, taxi, car, walking
   f) 500 000 children
   g) 2009
   h) Statistics South Africa
   i) No
   j) Yes, because the number of train users would be included in the 'Other' group on the graph, which is 10 000. So, the number of train users would have to be fewer than 10 000.
3. a) 2 000 schools
   b) 13 pictures (26 000 divided by 2 000)
   c) 16 000 schools
   d) 18 000 schools
   e) 17 000 schools
   f) Yes
   g)

Service	Number of schools
Electricity	17 000
Running water	16 000
Telephone	18 000
Computer	14 000
Internet	4 000

   h) The order is: telephone, electricity, running water, computer, internet.
   i) Telephone
   j) Statistics South Africa
   k) 2009
   l) Running water: 26 000 − 16 000 = 10 000 schools
   Electricity: 26 000 − 17 000 = 9 000 schools
   Computers: 26 000 − 14 000 = 12 000 schools
   m) Talk about this with the class. Accept any suggestions that include the idea of 'planning', e.g. people who plan what schools need; and the government that wants to give more services to schools that need them.
   n) Accept any answer that includes the idea that the people mentioned in m) could use the data to see which schools need to get more services, or what kinds of services are most needed, etc.

Unit 32 Pie charts

MENTAL MATHS

- The learners will work with pie charts in which data is represented by common fractions. They have worked with fractions of whole numbers since Grade 4 and have constructed a rule to calculate fractions of whole numbers. They calculate fractions of whole numbers.

Solutions

1. $\frac{1}{10}$ of 10 = **1**
2. $\frac{3}{10}$ of 10 = **3**
3. $\frac{7}{10}$ of 10 = **7**
4. $\frac{1}{12}$ of 24 = **2**
5. $\frac{3}{12}$ of 12 = **3**
6. $\frac{1}{5}$ of 15 = **3**
7. $\frac{4}{5}$ of 20 = **16**
8. $\frac{1}{4}$ of 60 = **15**
9. $\frac{3}{4}$ of 60 = **45**
10. $\frac{3}{8}$ of 40 = **15**

Activity 32.1

- Remind the learners of what they learned about pie charts in Grade 4, namely that a pie chart shows a set of data as a circle, and that different parts (fractions) of the data make up different slices of the circle.
- Work through examples, first showing a pie chart divided into halves, then thirds, quarters and fifths. Then work through the example in the Learner's Book that shows tenths.

Solutions

1. a) Flush toilet inside the home; flush toilet outside the home; pit toilet; other type or no toilet
   b) $\frac{4}{10}$
   c) $\frac{3}{10}$
   d) $\frac{2}{10}$
   e) $\frac{1}{10}$
   f) Flush toilet inside the home
   g) Pit toilets
   h) $\frac{1}{10}$; $\frac{2}{10}$; $\frac{3}{10}$; $\frac{4}{10}$
   i) Other type or no toilet; flush toilet outside the home; pit toilet; flush toilet inside the home
   j) Other type
   k) Statistics South Africa
   l) 2009
2. a) 12 equal parts
   b) Four: coal or other, electricity, wood, paraffin
   c) 'Other' could refer to other materials people use to make fire, or gas, or any other fuels learners suggest.
   d) $\frac{1}{12}$
   e) $\frac{2}{12}$

f) $\frac{2}{12}$

g) $\frac{7}{12}$

h) $\frac{1}{12}$; $\frac{2}{12}$; $\frac{2}{12}$; $\frac{7}{12}$

i) Electricity

j) No, the data shown was collected up to 2006, so the pie chart does not include data for the year 2008.

k) Most households in South Africa use electricity for cooking. Other households also use paraffin, wood and coal.

l) Learners give own answers; they could write this in a sentence that includes an explanation of why they chose this option (i.e. what fuel/s they use at home).

Unit 33 The mode

MENTAL MATHS

- Most learners do not have a problem in identifying the mode of a data set. However, some learners are not careful enough when working out the mode. They rush through the given numbers and make careless errors. So, encourage them to be thorough as they work with numerical data sets.

Solutions

1. 1, 2, 3, 5, 7, 8, 9
2. 2, 4, 4, 7, 7, 9, 12
3. 12, 17, 28, 40, 42, 59, 86
4. 10, 11, 100, 101, 110, 111, 1 001

Activity 33.1

Solutions

1. a) 2; 2; 2; 2; 2; 3; 3; 3; 3; 3; 3; 4; 4; 4; 4; 5; 5; 5; 5; 6
   b) 3 (it occurs six times)
   c) Size 2
   d) 1 $(3 - 2 = 1)$
   e) Size 6
   f) 3 $(6 - 3 = 3)$
2. a) 2; 2; 3; 3; 3; 3; 4; 4; 4; 4; 4; 4; 5; 5; 5; 5; 5; 5; 5; 6; 6; 6; 6; 6; 6; 7; 7; 8; 8; 9
   b) 5 people (it occurs seven times)
   c) 2 people
   d) 3 $(5 - 2 = 3)$
   e) 9 people
   f) 4 $(9 - 5 = 4)$
3. a) 11; 12; 12; 12; 13; 13; 14; 14; 14; 15; 15; 15; 16 ;16; 16; 16; 17; 17; 17; 18; 18
   b) 16 newspapers (it occurs four times)
   c) 11 newspapers
   d) 5 $(16 - 11 = 5)$
   e) 18 newspapers
   f) 2 $(18 - 16 = 2)$

4. a) 29; 30; 31; 33; 35; 36; 37; 37; 37; 38; 38; 39; 39; 39; 39; 40; 40; 40; 40; 40; 41; 41; 42; 42; 43; 43; 43; 44; 45; 45; 45; 46; 46; 48; 49
   b) 40 marks (it occurs five times)
   c) Lowest score: 29 marks
   Highest score: 49 marks
   d) 11 (40 − 29 = 11)
   e) 9 (49 − 40 = 9)

Activity 33.2

- The curriculum requires that the learners create a pictograph of data where the data consist of large numbers. The project presented here could be used as the Maths project for the term, or as a practice project before you design a similar project as the major term project.
- You may first like to read through the table with the learners to ensure that they can read the figures, which are in the millions.

Solutions

1. a) 8 500 000 households
   b) 8 000 000 households
   c) 9 500 000 households
   d) The order is: telephone; television; refrigerator (or refrigerator then television); running water; cell phone; radio.
   e) 2007
   f) Statistics South Africa
   g) Yes, 8 000 000 households have refrigerators while 9 500 000 households have radios.
   Yes, 9 000 000 households have cellphones and 8 500 000 households have running water.
   h) The services or items that most households have are a radio, followed by a cellphone. The service or item that the fewest households have is a telephone.

2. You could show the learners the pictograph symbol shown below, or let them design their own symbol to represent a number of households. An easy choice would be for each symbol to represent 1 000 000.

 = 1 000 000 households

Service or item	Number of households
Running water	
Refrigerator	
Radio	
Television	
Telephone	
Cell phone	

Remedial activities

- For pictographs, make sure that the learners understand that half a picture stands for half the number that a whole picture represents. Give them a few exercises in working out what half a picture means in various representations. For example:
  - One picture stands for one cake. What does half a picture stand for?
  - One picture stands for two cakes. What does half a picture stand for?
  - One picture stands for four cakes. What does half a picture stand for?
  - One picture stands for ten cakes. What does half a picture stand for?
  - One picture stands for 20 cakes. What does half a picture stand for?
  - One picture stands for 100 cakes. What does half a picture stand for?
  - One picture stands for 1 000 cakes. What does half a picture stand for?
- For bar graphs, draw the learners' attention to the number intervals on the vertical axis of a bar graph. Make sure that they understand that the numbers go up in even spaces. For example, the interval could be in 1s, 2s, 10s, 50s, 100s, 1 000s. Show the learners examples of each of these intervals and make sure they can count the numbers. Then help them to work out what halfway points between each number interval means.

Extension activities

- Ask the learners to find examples of pictographs, bar graphs and pie charts in old magazines or newspapers (or bring some of these to class for learners to choose from). Let them try to say what data the graphs are showing. They are not expected to be able to read and understand the graphs in detail, but they should be able to identify the different graphs and have a sense of the kind of data that the graphs are used for.

Self-assessment

How well are you able to do the following?

I can	Yes, easily	Most times	Sometimes	I need a lot of help
Collect data using tally marks and tables.				
Order data from the smallest to the largest group.				
Draw a pictograph where one picture stands for more than one item.				
Draw and label a bar graph.				
Answer questions about data shown in words.				
Answer questions about a pictograph.				
Answer questions about a bar graph.				
Answer questions about a pie chart.				
Find the mode in a set of data.				

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 7

1. a) Read the following paragraph.

   Twenty children from all over South Africa were asked about the kind of home they each live in. Three children said that they live in traditional homes, made of cow dung. Fifteen children said that they live in formal homes built with bricks. One child said that she lives in an informal home built with wood and metal sheets.

   b) Draw up a table to show the same data.
   c) Draw a bar graph of the data.
   d) Complete these sentences:
   - The data shows ____ types of homes.
   - Most of the children live in _____.

2. The following data show the number of juices that the tuck shop sold every day for the past 21 school days.

13; 18; 17; 18; 13; 16; 19; 15; 14; 15; 12; 16; 15; 16; 19; 17; 14; 17; 13; 18; 17

   a) Order the numbers from least to most.
   b) Find the mode.
   c) What is the smallest number of juices sold in one day?
   d) What is the difference between this number and the mode?
   e) What is the biggest number of juices sold in one day?
   f) What is the difference between this number and the mode?
   g) If you have to order juices for the tuck shop to sell tomorrow, how many juices will you order?
   h) Write a sentence to explain why you chose your answer to question g).

Solutions

1. a) and b)

Kind of home	Number of children
Traditional home	3
Formal home	15
Informal home	2

   c) Learners draw a bar graph of the data.

   d)
   - The data shows **three** types of homes.
   - Most of the children live in **formal homes**.

2. a) 12; 13; 13; 13; 14; 14; 15; 15; 15; 16; 16; 16; 17; 17; 17; 17; 18; 18; 18; 19; 19
   b) 17 juices (it occurs four times)
   c) 12 juices
   d) 5 (17 − 12 = 5)
   e) 19 juices
   f) 2 (19 − 17 = 2)

g) and h) Learners may choose the mode (17) and argue that since this is the most common number of juices sold, they predict that it will be the number sold tomorrow. Or they may argue that they should order the biggest number of juices sold on one day (19), to be on the safe side. Accept any answer that learners can justify with a reasoned argument.

Properties of 2-D shapes

The units on 2-D shapes in this term revise a lot of the work covered in Grade 4 and then extend the learners' knowledge and skills progressively. The learners will identify and name various 2-D shapes, including heptagons, which may be new to them. They will look at properties of shapes, such as type of sides, number of sides and length of sides, in order to sort and compare shapes. The learners will also be introduced to the concept of right angles.

Unit 34 Sides of shapes

This unit revises and consolidates the work on shapes with straight, curved or both straight and curved sides, which the learners covered in Grade 4. It serves well as an introduction to re-establish the concepts related to 2-D shapes for the first time in Grade 5.

MENTAL MATHS

- The learners will use the same properties to describe the shapes, i.e. number of sides and whether the sides are straight, curved or both straight and curved.
- Most learners should not struggle with the activity too much. However, for learners who do, make sure that they understand the language used, i.e. 'straight' and 'curved', especially if this is not their first language. If the learners struggle with the concepts of 'straight' and 'curved' or struggle with the drawn shapes, copy the shapes onto paper or cardboard and let the learners work with the concrete shape cut-outs. Let them feel around the edges for what is straight and what is curved and let them answer similar questions to those posed in the Learner's Book.
- Learners should now begin to move from concrete work with shapes to describing properties of shapes using diagrams and written sentences, but any learners who have difficulty with this should continue to use concrete cut-out shapes until they can confidently draw and write about them in their notebooks.

Solutions

1. Learners work in pairs.
2. a) O b) E
   c) G d) R
3. a) A; B; C; D; F b) M; Q
   c) H

Unit 35 Recognising polygons

MENTAL MATHS

- The learners will identify and name polygons. The new polygon they learn about is the heptagon, a seven-sided shape. Explain to the learners that the prefix 'hepta-' comes from a Greek word meaning 'seven'.
- If the learners struggle with hexagons and heptagons, provide more sides in the drawings so that they need to draw in fewer sides to complete the shape. For example, provide five sides of a shape so that the learners can draw in one or two sides only, then provide four sides, then three sides, and so on.

Solutions

1. a) Triangle b) Pentagon c) Hexagon
   d) Quadrilateral (you could also accept 'square' or 'rectangle' as an answer)
   e) Heptagon
2. a) Quadrilateral b) Hexagon c) Pentagon
   d) heptagon e) Triangle f) Square
   g) Heptagon h) Hexagon
3. Triangle A; square; pentagon A; hexagon A; heptagon A

Activity 35.1

It is very important for learners to work with concrete apparatus, especially if they are struggling to visualise the shapes mentally. Make a few geoboards of your own by hammering nails into a block of wood. The learners can also use string or wool instead of elastic bands to span around the nails as they explore various shapes.

Solutions

1. a) Learners make shapes on the geoboards.
   b) A: quadrilateral; B: pentagon; C: hexagon; D, E, F: heptagon
2. Depending on what the learners find easier, they could do either of the following:
   - Make each shape on a geoboard and then copy the shape from there onto grid paper.
   - Copy the shape from the pictures of the geoboards onto grid paper.
3. Show examples on the board of how to complete the drawings. There are various options, some of which are shown below. Ensure that the learners count and draw the correct numbers of sides each time.
4. Here, the learners test and assist each other and themselves.

Unit 36 Angles

MENTAL MATHS

- The learners will work with the construction of angles in this unit. Ask them to count in 90s and 60s. They should realise that the multiples of 60 are 10 times the multiples of 6 and the multiples of 9 are 10 times the multiples of 9. Write the multiples of 60 and 90 on the board as the learners count. Then ask them to count in multiples of 6 and 9. Ask them to describe the relationship between the multiples.

- They double and halve multiples of 60 and 90. Tell them that these numbers relate to angles that they are about to learn more about. They will apply knowledge of the multiples of 60 and 90 when they work with the concept of degrees in angles.

Solutions

1, 2. The learners count in 60s and 90s from 0 to 360.

3. a) Half of 90 = 45 b) Half of 180 = 90
   c) Half of 60 = 30 d) Double 60 = 120
   e) Double 180 = 360

Activity 36.1

- This is the first time in the Mathematics curriculum that learners are introduced to angles. They need to understand angles as amount of turn. It is important for the learners to see the movement of the one arm of the angle through the space in order to line up with the second arm of the angle.
- Make two large cardboard strips of your own, held together at one end with a split pin or a drawing pin. Demonstrate the examples in the Learner's Book before the learners make and work with their own strips. Let them open up their strips at different widths to create various angles, and then move one of the strips so that it falls in line with the second strip. If the learners do not have access to cardboard strips, let pairs of learners work together with two rulers to represent the arms of the angles.
- The concept of angles can be quite complex because learners may become confused between straight-line distances and amount of turn. This activity helps the learners to work concretely with apparatus in order to develop the concept of 'amount of turn'. Give them plenty of time to explore with angle sizes using their strips.

Solutions

Learners make and use their strips to complete the activity.

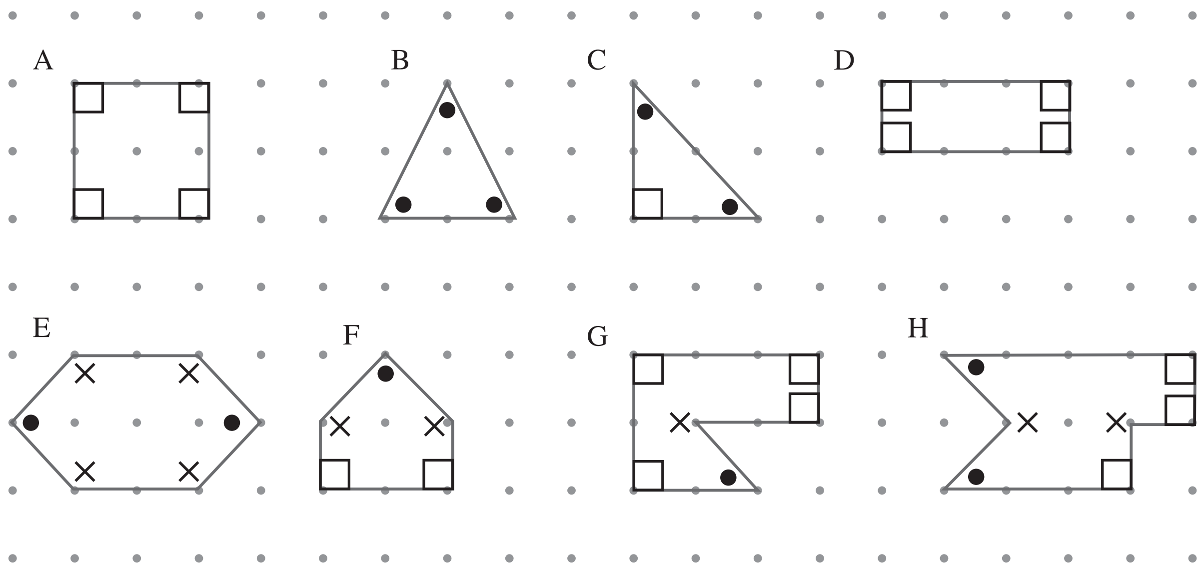
Activity 36.2

- In Grade 5, the learners are expected to be able to identify right angles and angles that are smaller or bigger than right angles. They do this with reference to corners of objects around them (doors, walls, books, etc.), but do not do any formal measuring of angles.

Solutions

1. Let the learners work in pairs to help one another make the angles using their strips.
2. Explain that the corners of a page form right angles. Let the learners draw in the squares on the corners of a page. Then let them find examples of right angles in the classroom. They should find plenty, for example on doors, windows, walls, floor, books, posters, bags, tables, and so on.

3.



Investigation

Let the learners work in on their own, in pairs or in groups of four to do the pencil-and-paper investigations. The learners will experiment with the concepts.

Unit 37 Squares and rectangles

Most Grade 5 learners will be able to distinguish between squares and rectangles. However, in this unit, they will start to look at the features of squares and rectangles in more detail in order to compare them. They look at the number of sides, lengths of sides, and which sides of the shape are the same length.

MENTAL MATHS

- The learners should already have informally learned the similarities and differences between squares and rectangles in former years. Now, they learn to formally describe and compare squares and rectangles.

Solutions

Squares: A; E; F
Rectangles: B; C; D

Activity 37.1

- Work through the activity as a class, as many learners will need you to demonstrate the information in the table and how to go about finding the answers in it.

Solutions

1. This question guides the learners in reading the information in the table, which describes the features or properties of squares and rectangles. As the learners work through the table to answer the questions, they learn how to describe and compare the features of the shapes.

a) 4	b) 4	c) All 4 sides
d) 2 sides	e) Yes	f) 4
g) 4	h) All right angles	i) All right angles

2. a) All four sides of a square are the same length, while the opposite sides of a rectangle are the same length.
   b) Check that learners can clearly show the difference in their drawings – the fact that the rectangle's adjacent sides are of different lengths, while all four sides of the square are equal, must be clearly visible.

Activity 37.2

- In order to enable the learners to better describe rectangles, they should become familiar with the terms 'length' and 'breadth' at this stage. Help them to understand that we sometimes say 'width' for 'breadth' – they will often encounter this term in future mathematics work.

Solutions

1. a) Learners complete the rectangles and squares.
   b) Rectangles: A; C; E
   Squares: B; D; F
   c) The learners can work in pairs and check that each other are pointing to the correct feature of each rectangle.
2. a) A (4 units). If learners are using 1 × 1 cm squared paper, let them count this as 4 cm, as well.
   b) 2 units
   c) F
   d) 1 unit
3. Note that drawing c) could show any rectangle whose length is twice the size of its breadth.
4. Squares: C; E
   Rectangles: D; G

Unit 38 Building shapes

- In Grade 4, the learners had practice in building composite shapes from smaller shapes. This unit provides further opportunities for the learners to work with composite shapes.
- Demonstrate some of the examples shown in the Learner's Book by using cardboard cut-outs of squares and triangles and assembling them on the board. Make sure the class can see how the smaller shapes are moved about to create the composite shape. This will be needed particularly for the shapes made of smaller triangles, as the learners may find it more difficult to visualise how the triangles may be turned and flipped as they are fitted together to build bigger shapes.

MENTAL MATHS

The learners work with smaller squares and triangles to construct bigger 2-D shapes. Ask them to count the number of squares in the 4 × 4 and 5 × 5 squares. They would probably reason that there are 16 squares and 25 squares and regard the exercise as easy. There are however more squares in the big square. Tell them they should investigate again and look for 2 × 2 squares and 3 × 3 squares that are embedded in the big squares. Share the solution with them. Ask them to describe the numbers in the solution. They should recall that these are square numbers.

Solutions

A
4×4 square = 1
3×3 squares = 4
2×2 squares = 8
1×1 squares = 16
Total: 29 squares

B
5×5 squares = 1
4×4 squares = 4
3×3 squares = 8
2×2 squares = 16
1×1 squares = 25
Total: 54 squares

Activity 38.1

- Ensure that you give the learners plenty of time to explore and experiment.
- The curriculum does not require the learners to be able to draw the composite shapes made up of the smaller shapes. However, if the learners are able to do so, let them try.

Remedial activities

- Let the learners draw triangles, quadrilaterals, pentagons, hexagons and heptagons on cards. Also let them write the names of the shapes on another set of cards. Let them mix up the sets of word and picture cards and then play a game of Snap, where they win cards when they identify matching words and shapes.
- Give the learners more practice in identifying right angles. Let them use the corner of a page to find and measure right angles in their homes and then report their findings to the class. They can draw pictures of every object at home where they found right angles.
- If the learners find it difficult to draw squares and rectangles on dotted paper when they are given descriptions of the shapes, first let them make the shapes on geoboards. They may need to work concretely with the shapes before they are able to make the drawings.

Extension activities

Divide the learners into two teams. Let each learner in the team take a turn to do a particular task or answer a particular question. Award the team a point for each correct answer. Examples of tasks or questions:

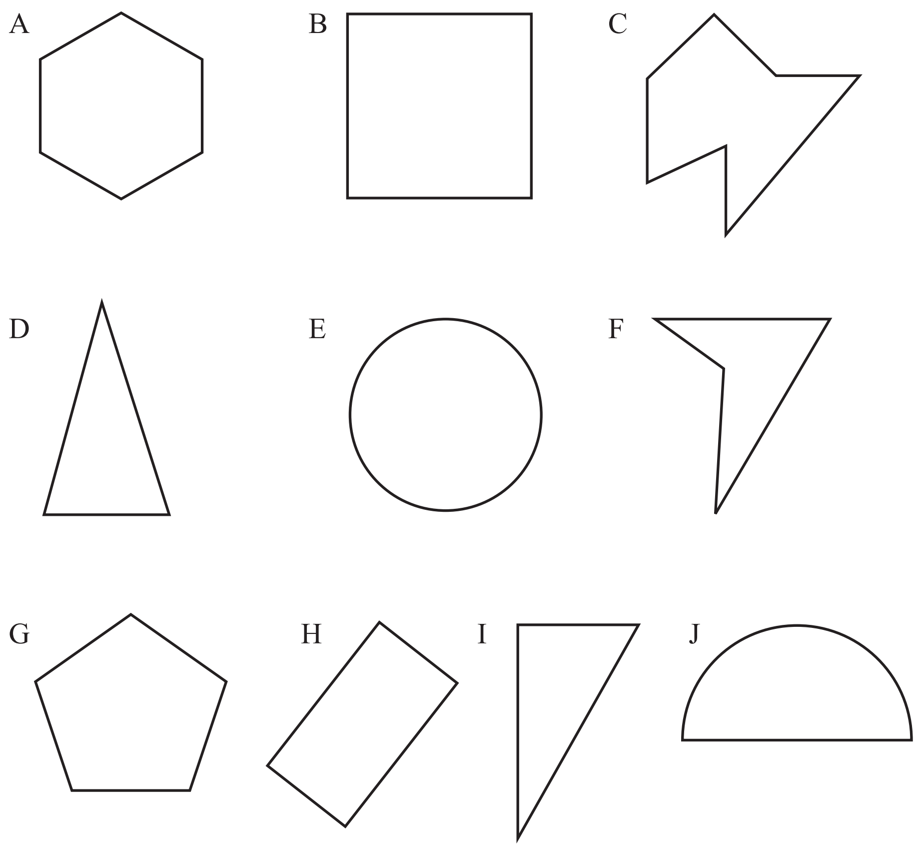
- describing a particular feature of a shape
- naming a shape correctly
- matching shapes to their correct features
- identifying right angles and angles bigger or smaller than right angles
- drawing shapes correctly
- completing shapes correctly
- making shapes correctly on a geoboard.

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 8

Here are a number of different 2-D shapes. Copy the table below and fill in the missing facts for each shape. The first one has been done for you.



Shape	Name	Type of side/s	Number of sides	Sides equal in length?	Angles
A	Hexagon	Straight only	6	All sides	All greater than right angles
B			4		
C				None	
D					All smaller than right angles
E			1	–	
F	Quadrilateral				
G			5		
H	Rectangle				
I		Straight only			One right angle and two angles smaller than a right angle
J					No angles

Self-assessment

How well are you able to do the following?

I can	Yes, easily	Most times	Sometimes	I need a lot of help
Tell the difference between straight and curved sides.				
Say which shapes are triangles, rectangles, squares, other quadrilaterals, pentagons, hexagons, heptagons, circles and semi-circles.				
Describe polygons according to the type of sides and number of sides they have.				
Say what is the same and different in squares and rectangles.				
Draw polygons on grid paper or dotted paper.				
Say which angles are right angles.				
Say which angles are bigger or smaller than right angles.				
Build bigger shapes using smaller squares or rectangles.				

Solutions

Shape	Name	Type of side/s	Number of sides	Sides equal in length?	Angles
A	Hexagon	Straight only	6	All sides	All bigger than right angles
B	Square	Straight only	4	All sides	All right angles
C	Heptagon	Straight only	7	None	One right angle; the rest bigger and smaller than right angles
D	Triangle	Straight only	3	None	All smaller than right angles
E	Circle	Curved only	1	–	No angles
F	Quadrilateral	Straight only	4	None	One bigger than a right angle; the rest smaller than a right angle
G	Pentagon	Straight only	5	All sides	All bigger than a right angle
H	Rectangle	Straight only	4	Opposite sides	All right angles

I	Triangle	Straight only	3	None	One right angle and two angles smaller than a right angle
J	Semi-circle	Straight and curved	2	Neither	No angles

Capacity/Volume

In this topic, for the units that cover capacity and volume, you need to be well prepared and have lots of different measuring tools available, such as a variety of measuring cups and measuring spoons, and containers of different shapes that all have the same capacity (wide and shallow containers that have the same capacity as some narrow, tall containers). Allow the learners to experiment with the measuring cups and spoons, and read the printed numbering on them.

Explain to the learners that in South Africa we use the metric system, but some other countries use different measuring units, such as pints and gallons, to measure capacity and volume. Learners may come across these imperial units in stories they read; if they do, use the opportunity to talk about how these units compare to the metric units they normally use.

Also encourage the learners to bring measuring instruments from home – the more the better.

It's very important to teach the learners how to stand when measuring. Measuring must take place at eye level and the container must be on a flat surface. It is best to keep both eyes open to prevent the error of parallax.

Unit 39 Working with capacity

- The activities in this unit revise measuring skills and understanding of different measuring units, as covered in Grade 4.
- Tell learners the day before to bring containers of different shapes and sizes from home. Do as many experiments as you can, such as 'How many teaspoons in a dessert spoon?' or 'How many cups in a litre bottle?'
- Learners can write down notes on how many of one container goes into another container, in other words, design their own number sentences with the containers and measuring tools available.
- Use a 5 ml syringe. Ask the learners if the liquid in the syringe will fill the spoon. Prove them right or wrong by doing the experiment. Make sure you have lots of different shapes and sizes of container (short, fat bottles to compare with tall, thin bottles, etc.).
- Use cake dye to put colour in the water to make it more interesting. You could pour blue and yellow together to make green colouring for the water.

MENTAL MATHS

- Tell the learners they will work with volume and capacity during the next five units. Ask them how the numbers in the number sentences relate to the measurement of capacity. They should be able to name products with capacities of 500 ml, 250 ml, 750 ml and so on.

Solutions

1. 2 × 500 = 1 000
2. 4 × 250 = 1 000
3. 750 + 250 = 1 000
4. 500 + 500 + 500 = 1 500
5. 350 + 350 = 700
6. 500 × 4 = 2 000
7. 250 × 8 = 2 000
8. 750 × 2 = 1 500
9. 500 × 6 = 3 000
10. 350 × 4 = 1 400

Activity 39.1

Solutions

1. a) litres b) litres
   c) ml d) ml
   e) litres f) ml

2. a) $1\frac{1}{2}$–2 litres b) 40–80 litres
   c) 50–250 ml d) 150–300 ml
   e) 1–2 litres f) 250–330 ml

3. a) 3 (3 × 5 = 15 ml)
   b) 22 (330 ml ÷15)
   c) 4 (4 × 250 = 1 000 ml = 1 litre)
   d) 50 (50 × 5 = 250)
   e) 20 (5 000 ÷ 250)

Activity 39.2

Solutions

1.

	200 ml	525 ml	350 ml	900 ml	775 ml
Number	1	3	2	5	4

2. Learners' answers will vary.
3. Match the measurement to the container or measuring tool.

   a) 3 b) 6
   c) 1 d) 5
   e) 4 f) 2

Unit 40 Converting litres and millilitres

MENTAL MATHS

- Tell the learners they will change (convert) litres to millilitres and millilitres to litres. They will multiply and divide by 1 000 and work with fractions of litres. Check who of them struggle with division with remainders. They use scraps of paper to show their solutions.

Activity 40.1

- Orally revise the rules on converting measuring units of volume/capacity. Revise the conversions given in the 'Remember' block of the Learner's Book in the previous unit,repeating the conversions until the learners know them by heart.
- If you think this will be helpful, give the class a small ten-mark Mental Maths test to check if they remember all the conversions.
- Remind learners that the decimal fraction 0,5 is the same as $\frac{1}{2}$. In calculations and conversions they should convert decimal quantities to common fractions before working out the answers.

Solutions

1. a) 10 000 ml b) 250 ml
   c) 3 000 ml d) 750 ml
   e) 6 000 ml f) 1 500 ml
   g) 2 400 ml h) 100 000 ml
   i) 5 014 ml j) 12 008 ml
   k) 500 ml l) 1 200 ml (1 000 ÷ 5 = 200 ml)
2. a) 4 ℓ 360 ml b) 8 ℓ 2 ml
   c) 2 ℓ 700 ml d) 14 ℓ 50 ml
   e) 5 ℓ 201 ml f) 12 ℓ 750 ml

Unit 41 Reading measuring jugs with gradation lines

MENTAL MATHS

- Tell the learners that they will practise reading gradation lines or calibrations on measuring jugs and develop or enhance knowledge of measuring instruments. The gradation lines on containers and measuring instruments are just like number lines. Let them find the numbers that the arrows point to on the number lines.
- Explain question 1 to the learners in the following way:
  From 1 litre to 2 litres there is an increase of 1 000 ml. There are 4 spaces between the litre marks on the jug. These four spaces show parts of the 1 000 ml that you add to get from 1 litre to 2 litres. Therefore to find the value at each mark, you have to divide 1 000 ml by 4: 1 000 ÷ 4 = 250 ml. This means that every mark represents another 250 ml in volume.
- Do questions 2 and 3 orally with the learners before they start writing the answers.

Solutions

1. 1 500 ml
2. 150 ml
3. 700 ml
4. 125 ml

Activity 41.1

- You can only do this activity if you have enough syringes, so start collecting them well before the time. Collect syringes of different capacities, e.g. 1 ml, 2 ml, 3 ml, 5 ml and 10 ml.
- Make sure the groups of learners have syringes, teaspoons, dessert spoons and measuring spoons from the kitchen, 1 × 250 ml measuring jug, an ordinary cup and any other uncalibrated containers available.

Solutions

1.

Jug	ml	ℓ and mℓ	Fraction of a ℓ
Jug A	1 250 ml	1ℓ 250 ml	$1\frac{1}{4}$ ℓ
Jug B	750 ml	0 ℓ 750 ml	$\frac{3}{4}$ ℓ
Jug C	400 ml	0 ℓ 400 ml	$\frac{4}{10}$ ℓ
Jug D	125 ml	0 ℓ 125 ml	$\frac{1}{8}$ ℓ

2. a) i) ±5 ii) ±5 ml
   b) i) ±15 ml ii) 5 ml iii) ±15 ml
   iv) 5 + 5 + 5 = 15 ml (answers will vary)

3. a) i) ±250 ml
   ii) The measuring spoons
   iii) Yes
   iv) Because the measuring tools are calibrated in exact measuring units.
   v) Answers will vary.
   b) Learners' answers will vary.

4. a) Syringe
   b) Measuring cups
   c) Measuring cup/beaker
   d) Jug (marked in litres)
   e) Teaspoon

Unit 42 Comparing measurements

MENTAL MATHS

- Tell the learners they will compare and order capacities. Remind them that they have worked with relation signs before. They will also compare capacities using a bar graph.

Solutions

1. 2 ℓ = 2 000 ml
2. 3 250 ml = 3ℓ 250 ml
3. 1,5 ℓ > $1\frac{1}{4}$ ℓ
4. 8 999 ml < 9 ℓ
5. 500 ml < $\frac{3}{4}$ ℓ
6. 750 ml > half a litre
7. 3 050 ml < 3 ℓ 5 ml
8. 14 020 ml < 14 ℓ 200 ml
9. 125 ml = $\frac{1}{8}$ ℓ
10. $\frac{1}{4}$ ℓ = 250 ml

Activity 42.1

1. a) 355 ml; 3 ℓ; 35,5 ℓ
   b) 5 050 ml; 5ℓ 500 ml; 50 550 ml; 505,5 ℓ
   c) 7 000 ml; 7 050 ml; 7ℓ 100 ml; 7 $\frac{1}{2}$ ℓ
   d) $2\frac{1}{4}$ ℓ; $2\frac{1}{2}$ ℓ; $2\frac{1}{2}$ ℓ; $2\frac{3}{4}$ ℓ

2. a) 14 000 litres
   b) 13 500 litres
   c) Sunday
   d) Tuesday
   e) 4 500 litres
   f) 52 500 litres
   g) People travel long distances at the weekend or people fill up their tanks for the next week – they probably fill up on their way home or later at night on the Friday.

Unit 43 Estimations and calculations with capacity and volume

MENTAL MATHS

- The learners will now engage in calculations involving capacity. They will solve problems in context and apply knowledge of the four basic operations. Work with them through the calculations. Write the calculations on the board and ask individual learners to try to solve the problems mentally.
- Learners must realise that calculations with capacity are done in exactly the same way as calculations with whole numbers, except that the measuring units litres or millilitres are added to the answer. Do a few calculations on the board until you are satisfied that all learners are sure what to do. Start with addition and subtraction and then move on to multiplication and division.
- Remind learners to check which measuring units are used in a calculation, and if necessary to change all the quantities to the same unit before calculating. For example, in the calculation 4 ℓ − 2 460 ml, first change 4 ℓ to 4 000 ml, and then do the subtraction.

Solutions

1. a)
```
   4 567 ℓ
+    789 ℓ
   5 356 ℓ
```
b)
```
   3 980 ml
+  2 768 ml
   6 748 ml
```
c)
```
   8 ℓ 406 ml
−  2 ℓ 397 ml
   6 ℓ   9 ml
```
d)
```
   7 982 ml
−  4 762 ml
   3 220 ml
```

2. a)
```
      31 ℓ
×     45
     155
   1 240
   1 395 ℓ
```
b)
```
   9 328 ml
×         6
  55 968 ml
```
c) 987 ℓ ÷ 7 = 141 ℓ
d) 856 ml ÷ 8 = 107 ml

Activity 43.1

1. a) i) 250 ml/30 minutes = 500 ml/hour
   500 ml × 6 hours = 3 000 ml or 3 litres/6 hours
   ii) 3 ℓ × 5 = 15 litres during school hours in a week.
   iii) 3 ℓ/6 hours × 4 (6 × 4 = 24; there are 24 hours in a day)
   3 × 4 = 12 ℓ/6 × 4 = 24 hours (1 day)
   The tap will waste 12 ℓ of water per day.
   iv) 31 days × 12 litres = 372 litres of water would we wasted.

b) i) 1 cup = 250 ml

$250 \times 6 = 1\,500$ ml

ii) 1 ℓ 500 ml

iii) $1\frac{1}{2}$ litres of coffee per day

c) $1\,500 \div 15 = 100$ times

2. a) Bottle (500 ml) + measuring cup (250 ml) and 50 ml measuring spoon:
$500 + 250 + 50 = 800$ ml (Learners can of course subtract as well.)
b) $(3 \times 500$ ml$) + (2 \times 50$ ml$) + (2 \times 10$ ml$) + 5$ ml
= 1 500 ml + 100 ml + 20 ml + 5 ml
= 1 625 ml

Activity 43.2

- Revise rounding up or down with 10, 100 and 1 000 before doing this calculation. Remind learners about the value of the 'halfway' mark, which is 5, 50, 500 or 5 000, when rounding: numbers below the halfway mark fall away as you round down to the next number ending in 0, 00, 000 or 0 000, and numbers that are 5 or more move on to the next number ending in 0, 00, 000 or 0 000.
- Learners must underline the value that is asked for, then look to the number on the right, ask the 'halfway' question and round up or down. For example: 2 ℓ 349 ml rounded off to the nearest 10 ml, underline the 49. Is it closer to 50 or to 40 (tens)? Closer to 50, so round up to 2 ℓ 350 (the 9 in the units place is more than 5, therefore it is rounded up to the next ten which is 50).

Solutions

1. a) 2 ℓ 130 ml
b) 5 300 ml
c) 6 ℓ
d) 13 000 ml
e) 44ℓ 400 ml
f) 10 ℓ

2. a) i)
$$\begin{array}{r} 2\,567 \text{ ml} \\ +\ \underline{4\,639 \text{ ml}} \\ 7\,206 \text{ ml} \\ \approx 7\ \ell \end{array}$$
ii)
$$\begin{array}{r} 9\,637 \text{ ml} \\ -\ \underline{6\,129 \text{ ml}} \\ 3\,508 \text{ ml} \\ \approx 4\ \ell \end{array}$$
b) i)
$$\begin{array}{r} 45 \\ \times\ \underline{\quad 67} \\ 315 \\ +\ \underline{\ 2\,700} \\ 3\,015 \text{ ml} \\ \approx 3\,000 \text{ ml} \end{array}$$
ii) 984 ml $\div 6 = 164$ ml ≈ 200 ml

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 9

1. a) Which quantity is less: 7 litres or 6 987 ml? Why?
b) Which measuring instrument matches which capacity? Link it with a line.

i) 10 ml	a litre jug
ii) 1 000 ml	adesert spoon
iii) 15 ml	a cup
iv) 250 ml	a syringe

2. Compare the following measurements by adding < ; > ; = to make the number sentences true.
   a) 3 070 ml ☐ 3 ℓ 7 ml b) 14 200 ml ☐ 14 ℓ 200 ml
   c) 250 ml ☐ $\frac{1}{4}$ ℓ d) $\frac{1}{10}$ ℓ ☐ 200 ml
3. Do the following calculations.
   a) 5 693 ml + 679 ml
   b) 9 ℓ − 3 570 ml
   c) 25 ℓ × 17
   d) 858 ℓ ÷ 6
4. a) A fishpond holds 1 500 ℓ of water. How many 50 ℓ cans of water will fill the pond?
   b) Mrs Dlamini mixes squash with water for the netball team. If she has to mix 1 litre of water with every 250 ml of squash:
      i) how many litres of water must she add to a 750 ml bottle of squash?
      ii) how many litres of cool drink will she have in total?

Solutions

1. a) 7 ℓ = 7 000 ml and 6 987 is 13 less than 7 000.
   c) i) syringe
      ii) jug
      iii) dessert spoon
      iv) cup
2. a) 3 070 ml > 3 ℓ 7 ml b) 14 200 ml = 14 ℓ 200 ml
   c) 250 ml = $\frac{1}{4}$ ℓ d) $\frac{1}{10}$ ℓ < 200 ml
3. a) 5 693 ml + 679 ml = 6 372 ml
   b) 9 ℓ − 3 570 ml = 9 000 ml – 3 570 ml = 5 430 ml
   c) 25 ℓ × 17 = 425 ℓ
   d) 858 ℓ ÷ 6 = 143 ℓ
4. a) 1 500 ℓ ÷ 50 = 150 ℓ ÷ 5 = 30 cans will fill the fishpond.
   b) i) 750 ÷ 250 = 3
         She will need 3 litres of water.
      ii) 3 litres + 750 ml = 3 $\frac{3}{4}$ ℓ of cool drink in total.

Term 2

Whole numbers: counting, ordering, comparing, representing and place value

Tell the learners that they will work with five- and six-digit numbers in this term. They will do addition and subtraction with five-digit numbers and multiply and divide by two-digit numbers. They will also work with common fractions again and continue to do Mental Maths before each lesson.

Unit 1 Place value, counting and representing numbers

MENTAL MATHS

- The learners will count in different intervals from a non-multiple of 10, 100, 1 000, 10 000 and 100 000. Do not do place value of 100 000 at this stage – they will cover it in this unit.
- You can tell learners that we call 10; 100; 1 000; 10 000; 100 000 and 1 000 000 powers of 10. Tell them they will learn more about this in higher grades. Do not tell them how to add 100 000 each time.
- Learners are often fascinated by large numbers and might surprise you. Draw the table on the board and write the numbers in the table. Ask them what they can tell you about the number 9 995. They will probably be able to say that the number is 995 more than 9 000; that it is 5 less than 10 000; break up the number to name the place value of the digits, etc.
- Let them read the numbers after the powers of 10 have been added in the third row. Ask them to describe what happens when each number is added. Let them do the counting in rows, i.e. do not let them count all the numbers in the first column first, rather across so that they can realise the difference in adding the different powers of 10.
- Check whether they are able to cross one million and ask them to name numbers with different numbers of digits, e.g. name six-digit number. Ask them to describe the counting process.
- Ask the learners to order the numbers on the cards in ascending order – they should know by now that this means from smallest to largest. Let them read the numbers aloud and write them on the board as they order the numbers. Let them round off each number to the nearest 10, 100 and 1 000.

Solutions

1.

9 995	9 995	9 995	9 995	9 995	9 995
+ 1	**+ 10**	**+ 100**	**+ 1 000**	**+ 10 000**	**+ 100 000**
9 996	10 005	10 095	10 995	19 995	109 995
9 997	10 015	10 195	11 995	29 995	209 995
9 998	10 025	10 295	12 995	39 995	309 995
9 999	10 035	10 395	13 995	49 995	409 995
10 000	10 045	10 495	14 995	59 995	509 995
10 001	10 055	10 595	15 995	69 995	609 995
10 002	10 065	10 695	16 995	79 995	709 995
10 003	10 075	10 695	17 995	89 995	809 995
10 004	10 085	10 795	18 995	99 995	909 995

10 005	10 095	10 895	19 995	109 995	1 109 995
10 006	10 105	10 995	20 995	119 995	1 209 995

2. 11 786; 11 876; 101 786; 101 678; 110 867; 110 768; 101 876; 110 687
3.

	To the nearest 10	**To the nearest 100**	**To the nearest 1 000**
11 786	11 790	11 800	12 000
11 876	11 880	11 900	12 000
101 786	101 790	101 800	102 000
101 678	101 680	101 700	102 000
110 867	110 870	110 900	111 000
110 768	110 770	110 800	111 000
101 876	101 880	101 900	102 000
110 687	110 690	110 700	111 000

Activity 1.1

- Ask the learners where they normally hear about large numbers in real life – what items do people buy that involve large numbers? For example, they should know that reality games, especially on TV, often involve millions – *Who wants to be a millionaire?*, the Lotto, etc.
- Let them read the prices of the items aloud and describe the numbers. Ask them, for example, how much must be added to each number to get a multiple or power of 10.
- Let the learners study the numbers in the place value table and ask them – do not tell them – to tell the class what they observe. They should especially note how the numbers get bigger as they move from right to left and that each number to the left of another is 10 times bigger. Tell them that they will work more with millions in Grade 6 – in Grade 5 they will work with numbers up to hundred thousands.
- Ask the learners to write the number words in numbers. They then count forward and backward in different multiples – 50s, 25s, 3s, 2s, 100s and 5s. Check if the learners are able to bridge powers of 10. Let them name the even and uneven numbers less than 20 and identify patterns. They apply this knowledge to write down the even numbers between 7 000 and 7 022 and uneven/odd numbers between 10 000 and 10 020.

Solutions

1. Learners read the numbers: R12; R259; R9 999; R95 555; R395 450.
2. Learners read the number on the place value board.
3. R12 : Twelve rand
   R259 : Two hundred and fifty-nine rand
   R9 999 : Nine thousand nine hundred and ninety-nine rand
   R95 555 : Ninety-five thousand five hundred and fifty-five rand
   R395 450 : Three hundred and ninety-five thousand four hundred and fifty rand
4. a) 13 469 b) 25 850
   c) 59 005 d) 99 015
   e) 101 300 f) 250 733
   g) 400 700 h) 607 000

5. a) 9 650 → + 50 → 9 700 → + 50 → 9 750 → + 50 → 9 800 → + 50
↓
10 000 ← 50 + 9 950 ← 50 + ← 9 900 ← 50 + ← 9 850 ← 50 +

b) 12 200 → – 25 → 12 175 → – 25 → 12 150 → – 25 → 12 125 → − 25
↓
12 025 ← 25 − ← 12 050 ← 25 − ← 12 075 ← 25 − ←12 100

c) 8 215 → + 3 → 8 218 → + 3 → 8 221 → + 3 → 8 224 → + 3 → 8 227
↓
8 236 ← 3 + ← 8 233 ← 3 + ← 8 230← 3 +

d) 10 010 → − 2 → 10 08 → – 2 → 10 006 → – 2 → 10 004→ − 2 → 10 002
↓
9 994 ← 2 − ← 9 996 ← 2 − ← 9 998 ← 2 − ← 10 000 ← 2 −

e) 20 432 → − 100 → 20 332 → – 100 → 20 232 → – 100 → 20 132 → − 100
↓
19 732 ← 100 − ← 19 832 ← 100 − ← 19 932 ← 100 − ← 20 032

f) 9 990 → + 5 → 9 995 → + 5 → 10 000 → + 5 → 10 005 → + 5 → 10 010
↓
10 030 ← 5 + ← 10 025 ← 5 + ← 10 020 ← 5 + ← 10 015

6. 7 002; 7 004; 7 006; 7 008; 7 010; 7 012; 7 014; 7 016; 7 018; 7 020

7. 10 001; 10 003; 10 005; 10 007; 10 009; 10 011; 10 013; 10 015; 10 017; 10 019

Unit 2 Round off to estimate and calculate

MENTAL MATHS

- Tell the learners that they will estimate, halve and double numbers. They practise the skill of estimation because they often apply this skill in working with numbers. Estimating solutions gives them an idea of the size of the answer they can expect.
- Ask them how long they think a Mini car, a minibus, a bus and a Boeing are. Also ask them how many Mini cars have to be lined up to be the same length of a bus. Ask them to give the names of some aeroplanes they know. If some of the learners have Internet access, ask them to research old aircraft types and to share the information with the class. Let them use the bus as a measure to estimate the lengths of the planes.
- Ask the learners to estimate how much they would pay for two of each of the items listed. They should realise that they have to double the quantities of the items and round off the prices to the nearest rand to get double the amounts. Then they have to halve the quantities and estimate prices of half quantities. They use doubling and halving to complete the flow diagrams.
- For homework, ask the learners to calculate the accurate prices if they buy double or half quantities of the items.

Solutions

1. a) The Lancaster is about 2 bus lengths, so its length is about 20 m.
   b) The BAC Super 1-11 is about $1\frac{1}{2}$ bus lengths, so its length is about 25 m.

c) The BAC Super 1-11 is about $2\frac{1}{2}$ bus lengths, so its length is about 25 m.

d) The Super VC-10 is about $4\frac{1}{2}$ bus lengths, so it length is about 45 m.

e) The Concorde is about 5 bus lengths, so its length is about 55 m.

f) The Boeing 747 is about 7 bus lengths, so its length is about 70 m.

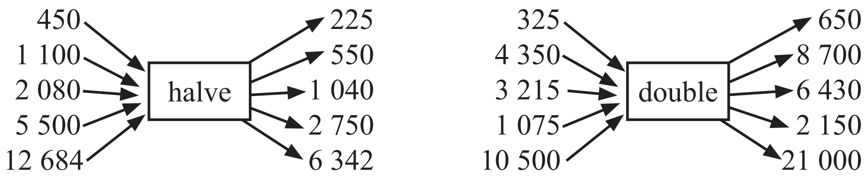
2.

Double quantities and prices (rough)	
a) 4 kg chicken portions	R70, 00
b) 4 litres sunflower oil	R58,00
c) 4 kg rice	R38,00
d) 4 litres full cream milk	R32,00
e) 4 litres ice cream	R66,00

3.

Half quantities & prices (rough)	
a) 1 kg chicken portions	R17,50
b) 1 litre sunflower oil	R14,50
c) 1 kg rice	R9,50
d) 1 litre full cream milk	R8,00
e) 1 litre ice cream	R16,50

4.



Accurate solutions:

Chicken portions:

R34, 99 × 2 = R35 × 2
= R70,00 − 2c
= R69,98

OR

R34,99 + R34, 99 = R35 + R35
= R70,00 − 2c
= R69,98

Sunflower oil:

R28,95 × 2 = R29 × 2 – 10c
= R58,00 – 10c
= R57,90

R28,95 + R28,95 = R29 + R29 – 10c
= R58 – 10c
= R57,90

Rice:

R18,98 × 2 = R19 × 2 – 4c
= R38 – 4c
= R37,96

R18,98 + R18,98 = R19 + R19 – 4c
= R38 – 4c
= R37,96

Milk

R15,99 × 2 = R16 × 2 – 2c
= R32 – 2c
= R31,98

R15,99 + R15,99 = R16 + R16 – 2c
= R32 – 2c
= R31,98

Ice-cream

R32,95 × 2 = R33 × 2 – 10c
= R66 – 10c
= R65,90

R32,95 + R32,95 = R33 + R33 – 10c
= R66 – 10c
= R65,90

Activity 2.1

- Learners estimate the solutions to the problems in question 1 by rounding off to the nearest 10, 100 and 1 000 and then calculate the accurate solutions to check how accurate their estimates were.

- They choose the best estimates for calculations from a list in question 3. They should find that rounding off to 10 normally gives the best estimate.
- Ask the learners to draw the number lines or give them copies of the blank number lines from the Photocopiable Resources. They estimate the positions of numbers indicated by the arrows on the number lines in question 4. If you see that some of them struggle, suggest that they find the half, quarter and three-quarter marks to start with. You can also tell them that the numbers they fill in should be multiples and powers of 5.

Solutions

1.

Round off:	to the nearest 10	to the nearest 100	to the nearest 1 000
a) 16 766 + 14 484 31 250	16 770 + 14 480 31 250	16 800 + 14 500 31 300	17 000 + 14 500 31 000
b) 36 857 – 23 644 13 213	36 860 – 23 640 13 220	36 900 – 23 600 13 300	37 000 – 24 000 13 000
c) 49 089 + 7 454 56 543	49 090 + 7 450 56 540	49 100 + 7 500 56 600	49 000 + 7 000 56 000
d) 52 623 – 47 475 5 148	52 620 – 47 480 5 140	52 600 – 47 500 5 100	53 000 – 47 000 6 000

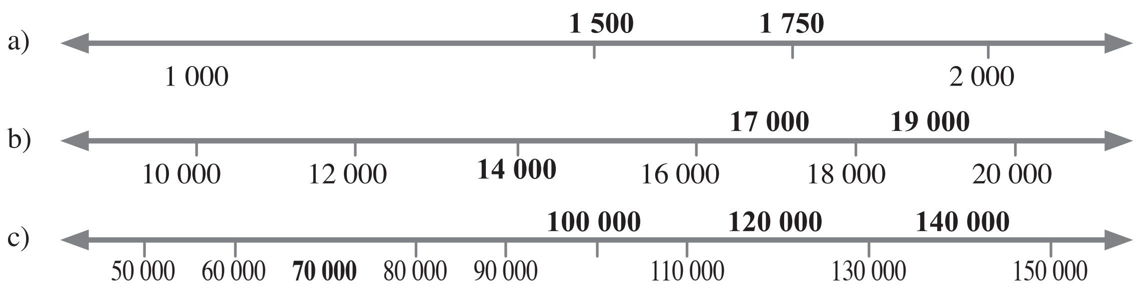
2.

Accurate solution	Best estimates	Difference
a) 16 766 + 14 484 = 31 250	31 250	0
b) 36 857 − 23 644 = 13 213	13 220	7
c) 49 089 + 7 454 = 56 543	56 540	3
d) 52 623 − 47 475 = 5 148	5 140	8

Rounding off to the nearest 10 gives the best solutions.

3. Accurate solutions:
   a) 15 045 + 4 526 = 19 571
   b) 24 456 – 12 334 = 12 122
   c) 33 309 – 22 214 = 11 095
   d) 47 546 + 13 463 = 61 009
   Best estimates:
   a) 3: 15 050 + 4 530 = 19 580 A difference of 9.
   b) 2: 24 460 – 12 330 = 12 130 A difference of 8.
   c) 1: 33 310 – 22 210 = 11 100 A difference of 5.
   d) 3: 47 550 – 13 460 = 61 010 A difference of 1.

4.



Whole numbers: addition and subtraction

Unit 3 Ancient addition and subtraction

MENTAL MATHS

- You will need to prepare number cards from 0 to 100 for each learner. The numbers could be pasted on hard card squares measuring about 10 cm × 10 cm each. Your learners use these cards to show the answers, especially to mental calculations. This prevents learners from shouting out answers, forces each learner to think, and you can immediately assess Learners' competencies and/or mistakes and misconceptions.
- Work with the learners to help them to make sense of the ancient subtraction method. Emphasise the importance of working with 10, multiples of 10 and powers of 10 – even some of the earliest mathematicians used these numbers as a basis for all other mathematical concepts. Ask them if they know easier methods.
- They apply the ancient method to solve the subtraction problems quickly and accurately. The learners should understand that strategies look long on paper but the process goes very quickly when you do it mentally, i.e. in your head.
- Then let them use their own short cuts and building up 10s to solve the addition and subtraction problems in question 2. They explain their strategies to the class.

1.

a) 15 − 9 = ☐ 16 − 10 = 6	b) 11 − 4 = ☐ 17 − 10 = 7	c) 15 − 7 = ☐ 18 − 10 = 8
d) 16 − 7 = ☐ 19 − 10 = 9	e) 12 − 7 = ☐ 15 − 10 = 5	f) 17 − 9 = ☐ 18 − 10 = 8
g) 13 − 5 = ☐ 18 − 10 = 8	h) 13 − 6 = ☐ 17 − 10 = 7	i) 16 − 9 = ☐ 17 − 10 = 7
j) 14 − 6 = ☐ 18 − 10 = 8	k) 17 − 8 = ☐ 19 − 10 = 9	l) 14 − 8 = ☐ 16 − 10 = 6
m) 15 − 8 = ☐ 17 − 10 = 7	n) 11 − 5 = ☐ 16 − 10 = 6	o) 13 − 4 = ☐ 17 − 10 = 7
p) 11 − 6 = ☐ 15 − 10 = 5	q) 12 − 8 = ☐ 14 − 10 = 4	r) 13 − 7 = ☐ 16 − 10 = 6
s) 14 − 9 = ☐ 15 − 10 = 5	t) 15 − 6 = ☐ 19 − 10 = 9	

The strategy involves compensation. You add to one number, take away and add to the other number. It also works with bigger numbers involving decomposition, for example:

22 − 7 = 25 − 10 = 15	32 – 9 = 33 − 10 = 23	46 − 8 = 48 − 10 = 38

You can also use the strategy to compensate with multiples of 10.
For example:

92 − 47 = 95 − 50 = 45	86 − 59 = 87 − 60 = 27	343 − 135 = 348 − 140 = 208

You can check the solutions with inverse operations.

47 + 45 = 50 + 42 = 92	59 + 27 = 60 + 26 = 86	135 + 208 = 140 + 203 = 343

2\.
a) 99 + 5 = ☐
99 + 1 = 100
100 + 4 = 104

b) 75 – 55 = ☐
75 – 50 = 25
25 – 5 = 20

c) 10 000 – 750 = ☐
10 000 – 700 = 9 300
9 300 – 50 = 9 250

d) 103 – 30 = ☐
103 – 3 = 100
100 – 20 = 80
80 – 7 = 73

e) 250 – 57 = ☐
250 – 50 = 200
200 – 7 = 193

f) 10 000 – 150 = ☐
10 000 – 100 = 9 900
9 900 – 50 = 9 850

g) 79 + 50 = ☐
79 + 1 = 80
80 + 49 = 129

h) 1 000 – 250 = ☐
1 000 – 200 = 800
800 – 50 = 750

i) 15 000 – 2 500 = ☐
15 000 – 2 000 = 13 000
13 000 – 500 = 12 500

j) 123 + 80 = ☐
123 + 7 = 130
130 + 3 = 133
133 + 70 = 203

k) 1 007 – 207 = ☐
1 007 – 7 = 1 000
1 000 – 200 = 800

l) 23 500 – 250 = ☐
23 500 – 200 = 23 300
23 300 – 50 = 23 250

m) 98 + 22 = ☐
98 + 2 = 100
100 + 20 = 120

n) 195 + 45 = ☐
195 + 5 = 200
200 + 40 = 240

o) 18 300 – 1 150 = ☐
18 300 – 1 000 = 17 300
17 300 – 100 = 17 200
17 200 – 50 = 17 150

Activity 3.1

- The use of ancient mathematics and strategies should assist in developing interest, curiosity and an appreciation for mathematics. You should assist learners in understanding that mathematics was developed and practised many centuries ago and that it is a human activity, i.e. a form of knowledge developed, used and improved by people in their real-life situations.
- Ask them to investigate the ancient addition method; this will assist in the development of understanding of addition using the vertical column method that they will use more often in Grade 5 and 6. They use the method to solve the addition problems. Encourage the learners to explain how they experienced (felt about) the use of this method.
- Assist the learners in understanding the method. You should especially assist them in understanding how the digits are aligned according to their place values. Let them try to explain the strategy before you show them the following procedures:

	9 379	
	389	
+	269	
	27	(9 + 9 + 9)
	21	(7 + 8 + 6)
	8	(3 + 3 + 2)
	9	(9 + 0)
	10 037	(9 000 + 800 + 200 + 30 + 7)

Solutions

1\. a)

```
  7 536
    475
+   384
     15
    18
   12
  7
  8 395
```

b)

```
  8 954
    367
+   259
     20
    16
   14
  8
  9 580
```

c)

```
  9 876
    569
+   347
     22
    17
   16
  9
 10 792
```

d)

```
 10 937
  4 382
+ 5 259
     18
    16
   14
  9
 1
 20 578
```

e)

```
 23 859
  4 458
+ 7 655
     22
    15
   18
  14
 2
 35 972
```

f)

```
 43 746
  5 875
+ 8 974
     15
    18
   24
  16
 4
 58 595
```

Let learners check their answers with a calculator.

Unit 4 More addition and subtraction

MENTAL MATHS

- Tell the learners that they will use calculations and letters of the alphabet to solve secret codes for creating a message. Each number is represented by a letter. The answers to the calculations are matched with the letters. The answers of the calculations in each box matched to the relevant letters form one word in the message. Let them read the message aloud after solving the problems.
- In question 2 they use the commutative and associative property and addition and subtraction of multiples of 10.

Solutions

1\.

	A	L		A	L
34 − 8	23	S	6 more than 12	18	A
16 + 7	26	M	5 × 4	20	T
25 take away 9	16	I			
Half of 26	13	L	Thirty-one minus eleven	20	T
17 + 7	24	E	15 + 9	24	E
			Triple six	18	A
Seven less than 15	8	Y	Twelve plus thirteen	25	C
Double eleven	22	0	8 less than 15	7	H
18 − 6	12	U	30 − 6	24	E
3 × 5	15	R	Five less than twenty	15	R

2\. a) 9 + 1 + 8 + 2 = 20

b) 70 + 30 + 60 + 40 = 200

c) 500 + 1 500 + 700 + 300
= 3 000

d) 4 000 + 6 000 + 8 000
= 18 000

e) 13 000 + 17 000 + 15 000 = 45 000

f) 120 – 70 = 50

g) 1 600 – 600 = 1 000
1 000 – 300 = 700

h) 2 500 – 1 000 = 1 500
1 500 – 300 = 1 200

i) 17 000 – 7 000 = 10 000
10 000 – 1 000 = 9 000

j) 30 000 – 10 000 = 20 000
20 000 – 2 000 = 18 000

Activity 4.1

- Tell the learners that they have to use only the numbers and operation signs on the cards to create their own addition and subtraction calculations: 1; 3; 9; 27; +; −. They may not repeat one of the symbols in a calculation.
- In question 2 they estimate the solutions to the problems before investigating the addition and subtraction strategies applied to solve these problems. You should ask the learners, after they have used this method, to compare the method to the ancient vertical column method they used in Unit 3. They should make decisions about the methods they want to use and are most comfortable with.
- In question 4 the learners use halving (division by 2) and the distributive property to find prices of items on a half-price sale.

Solutions

1. a) 27 + 3 − 9 = 21
b) 9 − 1 + 27 = 35
c) 27 − 3 + 1 = 25
d) 27 − 9 + 1 = 19
e) 3 − 1 + 9 = 11
f) 27 + 9 − 3 = 33
g) 27 − 1 + 3 = 31
h) 27 − 1 + 3 = 29

2. a) 45 567 + 13 356 + 2 782 = 61 705
b) 65 734 − 34 675 = 31 159

3. a)
37 476 → 30 000 + 7 000 + 400 + 70 + 6
+ 21 325 → 20 000 + 1 000 + 300 + 20 + 5
50 000 + 8 000 + 700 + 90 + 11
= 58 000 + 700 + 90 + 10 + 1
= 58 700 + 100 + 1
= 58 800 + 1
= 58 801

b)
18 447 → 10 000 + 8 000 + 400 + 40 + 7
12 242 → 10 000 + 2 000 + 200 + 40 + 2
+ 3 564 → 3 000 + 500 + 60 + 4
20 000 + 13 000 + 1 100 + 140 + 13
= 20 000 + 10 000 + 3 000 + 1 000 + 100 + 100 + 100 + 40 + 10 + 3
= 30 000 + 4 000 + 200 + 50 + 3
= 34 253

c)
45 675 → 40 000 + 5 000 + 600 + 70 + 5
+ 34 895 → 30 000 + 4 000 + 800 + 90 + 5
70 000 + 9 000 + 1 400 + 160 + 10
= 79 000 + 1 000 + 400 + 100 + 60 + 10
= 80 000 + 500 + 70
= 80 570

d)
28 179 → 20 000 + 8 000 + 100 + 70 + 9
52 563 → 50 000 + 2 000 + 500 + 60 + 3
+ 4 374 → 4 000 + 300 + 70 + 4
70 000 + 14 000 + 900 + 200 + 16
= 80 000 + 4 000 + 1 100 + 10 + 6
= 80 000 + 5 000 + 100 + 10 + 6
= 85 116

e)	67 483	➞		60 000 + 7 000 + 400 + 80 + 3	
	+ 13 572	➞		10 000 + 3 000 + 500 + 70 + 2	
				70 000 + 10 000 + 900 + 150 + 5	
				= 80 000 + 900 + 100 + 50 + 5	
				= 80 000 + 1 000 + 50 + 5	
				= 81 055	
f)	15 789	➞		10 000 + 5 000 + 700 + 80 + 9	
	– 11 678	➞		10 000 + 1 000 + 600 + 70 + 8	
				4 000 + 100 + 10 + 1	
				= 4 111	
g)	39 452	➞		30 000 + 9 000 + 400 + 50 + 2	
	– 23 564	➞		20 000 + 3 000 + 500 + 60 + 4	
				30 000 + 8 000 + 1 400 + 50 + 2	39 452
				30 000 + 8 000 + 1 300 + 150 + 2	
				30 000 + 8 000 + 1 300 + 140 + 12	
			–	20 000 + 3 000 + 500 + 60 + 4	
				10 000 + 5 000 + 800 + 80 + 8	
				=15 888	
h)	79 132	➞		70 000 + 9 000 + 100 + 30 + 2	
	– 46 465	➞		40 000 + 6 000 + 400 + 60 + 5	
				70 000 + 8 000 + 1 100 + 30 + 2	79 132
				70 000 + 8 000 + 1 000 + 120 + 12	
			–	40 000 + 6 000 + 400 + 60 + 5	
				30 000 + 2 000 + 600 + 60 + 7	
				= 32 667	
i)	35 467	➞		30 000 + 5 000 + 400 + 60 + 7	
	– 12 689	➞		10 000 + 2 000 + 600 + 80 + 9	
				30 000 + 4 000 + 1 400 + 60 + 7	39 452
				30 000 + 4 000 + 1 300 + 160 + 7	
				30 000 + 4 000 + 1 300 + 150 + 17	
			–	10 000 + 2 000 + 600 + 80 + 9	
				20 000 + 2 000 + 700 + 70 + 8	
				= 22 778	
j)	68 000	➞		60 000 + 8 000	
	– 34 999	➞		30 000 + 4 000 + 900 + 90 + 9	
				60 000 + 7 000 + 1 000	68 000
				60 000 + 7 000 + 900 + 90 + 10	
			–	30 000 + 4 000 + 900 + 90 + 9	
				30 000 + 3 000 + 0 + 0 + 1	
				= 33 001	

4. a) R550 ÷ 2 = (500 ÷ 2) + (50 ÷ 2)
   = 250 + 25
   = R275 for the pair of jeans

   b) R1 090 ÷ 2 = (1 000 ÷ 2) + (90 ÷ 2)
   = 500 + 45
   = R545 for the pair of takkies

   c) R1 698 ÷ 2 = (1 600 ÷ 2) + (90 ÷ 2) + (8 ÷ 2)
   = 800 + 45 + 4
   = R849 for the cell phone

   d) R896 ÷ 2 = (890 ÷ 2) + (6 ÷ 2)
   = 445 + 3
   = R448 for the camera

Unit 5 Place value and problem-solving

MENTAL MATHS

- If you do not have a set of flard cards for each learner yet, make copies of the template in the Photocopiable Resources. It is worth spending money on this extremely valuable mathematics learning material. Have the copies laminated and make a set for each learner.
- Ask the learners to use the flard cards to expand the numbers shown on the stacked flard cards in the picture. Next, they show the cards below their expanded cards to show double the top number. Then, they show the expansion for the original number when they take away 10 100 from each number. Next, they add 1 500 and show the next expanded number.
- In question 2 they stack the flard cards to show the numbers indicated by the expanded flard cards.

Solutions

1. a) The learners use flard cards to expand the numbers.
12 024 ➞ 10 000 + 2 000 + 20 + 4
34 144 ➞ 30 000 + 4 000 + 100 + 40 + 4
10 362 ➞ 10 000 + 300 + 60 + 2
15 658 ➞ 10 000 + 5 000 + 600 + 50 + 8
21 729 ➞ 20 000 + 1 000 + 700 + 20 + 9

b) They now double each number they have expanded. Ask them to show this below the original number. The activity enforces the carrying skill.
12 024 ➞ 10 000 + 2 000 + 20 + 4
24 048 ➞ 20 000 + 4 000 + 40 + 8
34 144 ➞ 30 000 + 4 000 + 100 + 40 + 4
68 288 ➞ 60 000 + 8 000 + 200 + 80 + 8
10 362 ➞ 10 000 + 300 + 60 + 2
20 724 ➞ 20 000 + 600 + 120 + 4
15 658 ➞ 10 000 + 5 000 + 600 + 50 + 8
31 316 ➞ 20 000 + 10 000 + 1 200 + 100 + 16
21 729 ➞ 20 000 + 1 000 + 700 + 20 + 9
43 458 ➞ 40 000 + 2 000 + 1 400 + 40 + 18

c) Tell the learners that they should now take away 10 000 from each of the original numbers.
12 024 ➞ 10 000 + 2 000 + 20 + 4
2 024 ➞ 2 000 + 20 + 4
34 144 ➞ 30 000 + 4 000 + 100 + 40 + 4
4 144 ➞ 4 000 + 100 + 40 + 4
10 362 ➞ 10 000 + 300 + 60 + 2
362 ➞ 300 + 60 + 2
15 658 ➞ 10 000 + 5 000 + 600 + 50 + 8
5 658 ➞ 5 000 + 600 + 50 + 8
21 729 ➞ 20 000 + 1 000 + 700 + 20 + 9
11 729 ➞ 10 000 + 1 000 + 700 + 20 + 9

d) They now add 1 500 to each of the original numbers.
12 024 ➞ 10 000 + 2 000 + 20 + 4
13 524 ➞ 10 000 + 3 000 + 500 + 20 + 4
34 144 ➞ 30 000 + 4 000 + 100 + 40 + 4
35 641 ➞ 30 000 + 5 000 + 600 + 40 + 4
10 362 ➞ 10 000 + 300 + 60 + 2
11 862 ➞ 10 000 + 1 000 + 800 + 60 + 2

15 658 ➞ 10 000 + 5 000 + 600 + 50 + 8
17 158 ➞ 10 000 + 7 000 + 100 + 50 + 8
21 729 ➞ 20 000 + 1 000 + 700 + 20 + 9
23 258 ➞ 20 000 + 3 000 + 200 + 50 + 8

2. Ask the learners to show the numbers for the expanded notation with their flard cards.
   a) 10 000 + 1 000 + 100 + 10 + 1 ➞ 11 111
   b) 30 000 + 3 000 + 30 ➞ 33 030
   c) 4 + 900 + 5 000 + 70 + 80 000 ➞ 85 974
   d) 800 + 6 + 90 + 50 000 + 7 000 ➞ 57 896
   e) 6 000 + 2 + 40 000 ➞ 46 002

Activity 5.1

- The learners work in their groups to solve these problems that also involve investigations. The learners should understand that problem solving is not about solving word problems only – sometimes it involves the investigation of number problems to find rules or make inferences.
- The learners often need logical, critical and creative thinking in solving investigations. They may need to apply various previously learnt concepts in solving a single problem. Looking for patterns and relationships is a key problem-solving skill that needs consistent practice. You should not tell learners how to solve the problems − they have to battle and find their own ways to do so.
- Keep in mind that communication amongst the learners should be encouraged and they should often be allowed to reflect on their thinking processes. Once they have solved the problems in their own ways or you notice they really are stuck, show them the suggested strategies – not the whole process, but just enough to stimulate their thinking.

Solutions

1. The learners will probably use counting in 50s but this process would be time-consuming and does not involve numbers ending in 50 only, i.e. 50; 100; 150; 200; 250; …

   They should count in 100s from 50 to 1 000 they get:

   50; 150; 250; 350; 450; 550; 650; 750; 850; 950.

   There are 10 numbers from 0–1 000 ending in 50.

   10 000 = 1 000 × 10 (there are ten 1 000s in 10 000)
   10 × 10 = 100 people received DVDs.

   Tell the learners that this type of problem involves an investigation. There is no fixed recipe to solve problems like these. Use simpler problems to help enforce understanding of the processes in this investigation. You could how many people would receive DVDs if there are 100 people and each one with a ticket number ending in 5 gets a free DVD. They start by reasoning that there are 20 fives in 100 but all the multiples of 5 do not end in 5; only 10 of the multiples do and you count from 5 in 10s to get them:

   5; 15; 25; 35; 45; 55; 65; 75; 85; 95

   Now you could ask, 'What if there are 1 000 people? And 10 000 people?'

   Tell the learners that they should realise that they use knowledge they have learned previously to solve the investigation, i.e. counting in 5, 10, 50 and 100, multiplication and division facts of 10, 100, 1 000 and 10 000 (powers of 10). Solving investigations develops thinking and reasoning at a higher level.

2. a) The strategy involves grouping pairs of numbers to calculate more smartly. They should notice that the first six odd numbers involve three pairs of numbers each with a sum of 12 if you pair the first and the last number, the second and the second-last number and so on. They then multiply the sum of the pairs by 3.

   b) They calculate the sum of the first six even numbers using the Gauss method. Check if they include 0 as an even number.

   0 + 2 + 4 + 6 + 8 + 10 = (0 + 10) + (2 + 8) + (4 + 6)
   = 3 × 10
   = 30

   c) 0 + 2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18
   = (0 + 18) + (2 + 16) + (4 + 14) + (6 + 12) + (8 + 10)
   = 5 × 18
   = (5 × 9) + (5 × 9) (using halving)
   = 90

   1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19
   = (1 + 19) + (3 + 17) + (5 + 15) + (7 + 13) + (9 + 11)
   = 5 × 20
   = 100

   d) They should now find out that there is a number left that they cannot pair with another. Check what they do in this situation.

   0 + 2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20
   = (0 + 20) + (2 + 18) + (4 + 16) + (8 + 12) + 10
   = 4 × 20 + 10
   = 90

   1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21
   = (1 + 21) + (3 + 19) + (5 + 17) + (7 + 15) + (9 + 13) + 11
   = 5 × 21 + 11
   = 105 + 11
   = 116

   Let the learners share their learning experiences with the class.

3. The learners have worked with consecutive numbers in Grade 4 (numbers that follow immediately on from each other) such as counting numbers (0; 1; 2; …) and even numbers (102; 104; 106; …). They have to find two consecutive numbers that give the different sums. To do this they round off to the nearest 10, halve the numbers and determine which two consecutive numbers have a sum equal to the units in the numbers.
   a) 42 + 43 = 85 b) 131 + 132 = 263
   c) 2 443 + 2 444 = 4 887 d) 12 124 + 12 125 = 24 249

4. The problem involves rates of pay. Some learners might use multiplication to solve it. A more effective way could be doubling, for example:
   1 hour = R10,50
   2 hours = R21,00
   4 hours = R42,00
   5 hours = R42,00 + R10,50 (1 hour + 4 hours)
   = R52,50

5. Learners should understand that they have to use the inverse operation. Writing a number sentence would be helpful, i.e. 21 869 + ☐ = 54 657.
   ☐ = 54 657 − 21 869
   ☐ = 32 788
   The other number is 32 788. Let them check the solution by doing addition.

6. The problem involves subtraction from the current year. Tell the learners that they would probably read some of the author's books in matric.
   2011 − 1616 = □
   He has been dead for 395 years.
7. Ask the learners if they know international or local athletes, such as Usain Bolt and Oscar Pistorius, and what it means to break a record.
   1936 + 24 = □
   Boston broke Owen's record in 1960.

Reflection

Make some time to allow your learners to reflect on the mathematics work they have done, and to record their reflections. Let them talk about and write about their learning experiences in mathematics. They can do the writing in the language lesson and talk about the mathematics in the maths lesson. This practice will allow learners to think about their learning and assist you in understanding their thinking, successes and failures in order to improve your teaching.

Assessment

Tell the learners that they will work individually to show what they have learnt during this topic. They will show knowledge of counting, ordering and representing numbers, estimation, addition and subtraction and problem solving, for example.

Assessment Task 10

1. Fill in the missing numbers in the number patterns.
   a) 1 006; 1 004; □; □; □; 996; 994; □; □; □
   b) 5 000; n; 5 050; □; 5 100; 5 125; □; □; □
2. Write the numbers from smallest to biggest.

220 202	22 020	22 220	202 202
20 220	22 202	20 202	202 220

3. Write the numbers for the number words.
   a) Thirteen thousand four hundred and forty-four
   b) Three hundred thousand five hundred and fifty-six
4. Which is the best estimate for the calculation?

   24 546 + 4 764 = □

   a) 24 500 + 5 000 b) 25 000 + 5 000
   c) 24 500 + 4 800 d) 24 550 + 4 760
5. Calculate:
   a) 199 + 6 = □
   b) 830 + 80 = □
   c) 1 500 – 700 = □
   d) 17 000 – 9 000 = □
   e) 23 000 + 8 000 = □
6. Use your own methods to calculate the following.
   a) 16 345 + 12 574 + 4 658
   b) 42 657 – 21 768
7. The book that Sipho is reading has 286 pages. Sipho has read 197 pages already. How many pages must he still read?

8. Look at the price list of items sold in the Coffee Shop.

> Coffee @ R8,50 per cup
>
> Muffins @ R5,99 each
>
> Cream scones @ R6,98 each

What is the total cost of:
a) a cup of coffee and a muffin?
b) a cup of coffee and a cream scone?
c) one of each item?

Solutions

1. a) 1 006; 1004; 1 002; 1000; 998; 996; 994; 992; 990; 988
   b) 5 000; 5 025; 5 050; 5 075; 5 100; 5 125; 5 150; 5 175; 5 200

2. 20 202; 20 220; 22 020; 22 202; 22 220; 202 202; 202 220; 220 202

3. a) Thirteen thousand four hundred and forty-four = 13 444
   b) Three hundred thousand five hundred and fifty-six = 300 556

4. 24 546 + 4 764 = 29 310
   The best estimate is: d) 24 550 + 4 760

5. a) 199 + 6 = ☐
   199 + 1 + 5 = 205
   b) 830 + 80 = ☐
   830 + 70 + 10 = 910
   c) 1 500 − 700 = ☐
   1 500 – 500 – 200 = 800
   d) 17 000 − 9 000 = ☐
   17 000 – 7 000 – 2 000 = 8 000
   e) 23 000 + 8 000 = ☐
   23 000 + 7 000 + 1 000 = 31 000

6. Learners use their own methods.

a)

16 345	➞	10 000 +	6 000 +	300 +	40 +	5
12 574	➞	10 000 +	2 000 +	500 +	70 +	4
+ 4 658	➞		4 000 +	600 +	50 +	8
		20 000 +	12 000 +	1 400 +	160 +	17
		= 30 000 +	3 000 +	500 +	70 +	7
		= 33 577				

b)

42 657	➞	40 000 +	2 000 +	600 +	50 +	7
– 21 768	➞	20 000 +	1 000 +	700 +	60 +	8
		40 000 +	1 000 +	1 500 +	140 +	17
	–	20 000 +	1 000 +	700 +	60 +	8
		20 000 +	0 +	800 +	80 +	9
		= 20 889				

7. 286 − 197 = 89 pages

8. a) R8,50 + R5,99 = ☐
   (850 + 50) + 540 = 900 + 100 + 440
   = 1 440
   = R14, 40 for a cup of coffee and a muffin

b) R8,50 + R6,98 = ☐
850 + 698 = (850 + 50) + 648
= 900 + 100 + 548
= 1 548
= R15,48 for a cup of coffee and a cream scone.

c) R8,50 + R5,99 + R6,98 = ☐
850 + 599 + 698 = (850 + 50) + 549 + 698
= (900 + 100) + 449 + 698
= 1 000 + (400 + 600) + (40 + 60) + (9 + 38)
= 2 000 + 100 + 47
= 2 147
= R21,47 for a cup of coffee, a muffin and a cream scone.

Common fractions

Remind the learners about the fractions they learnt in Grade 4. They name different fractions. Tell them that they will also use sevenths, ninths, elevenths and twelfths in Grade 5. Let them write the fractions they know on the board and name the different parts of a fraction. Put the terms numerator and denominator up on the number board. Ask them to explain what they think a fraction is. They also discuss the differences between a fraction and a whole number. Explain to them that percentages and decimals are also fractions. Demonstrate to them that a fraction is another way of writing a division expression. Use examples – such as $\frac{4}{4}$, 4 ÷ 4, $\frac{3}{3}$ and 3 ÷ 3 – which they know result in 1. Then use a calculator for them to see that they get a result of 0,75 from 3 ÷ 4 or 1 ÷ 2 = 0,5. Tell them they will learn about decimals and percentages in Grade 6. They will also encounter a few decimal fractions when they work on measurement, as some products in shops have their mass or volume given in decimal quantities. Help learners to recognise that these decimal values on product labels are equivalent to common fraction quantities they work with in Grade 5.

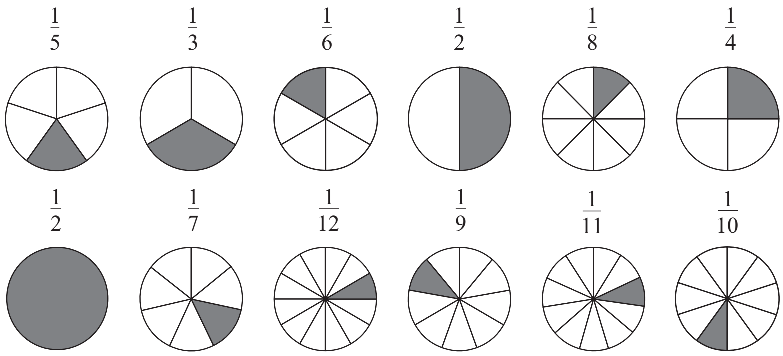
Unit 6 Recognising and counting in fractions

MENTAL MATHS

- Tell the learners that they will play the Fraction Domino Game in groups of four. Explain the rules to them.
- The game will help them to identify and name fractions. They will later use the diagrams in Unit 7. If they use terms like three over four for $\frac{3}{4}$, you should rectify this and encourage them to use the correct fraction terminology.
- In the Photocopiable Resources there are templates for fraction circles. You should make copies of these beforehand, one set per learner. The learners write the fraction parts on the circles and you could ask them to shade each circle of fractions a different colour (this is done for homework; not in the maths lesson where they have to focus on the mathematics to be learnt).
- They compare the different fractions and state whether the statements are true or false. Let them cut the circles into their fraction parts (use plastic bags to keep the cut-out pieces).
- They now use different fraction parts to construct $1\frac{1}{2}$ in different ways, e.g. $\frac{4}{4} + \frac{4}{8} = 1\frac{1}{2}$; $1 + \frac{3}{6} = 1\frac{1}{2}$.
- They add fractions and work with equivalent fractions in an informal way. Let them list their combinations on A3 paper and put up their work on the classroom wall.

Solutions

1. Learners play the Fraction Domino Game.
2. Look at the fraction circles below. Copy them into your notebook and write the fraction names of the equal parts in each circle.



b) $\frac{1}{8}$; $\frac{1}{6}$; $\frac{1}{5}$; $\frac{1}{4}$; $\frac{1}{3}$; $\frac{1}{2}$; 1

3.

a) True	b) True	c) False
d) True	e) False	f) True
g) True	h) True	i) False
j) True		

4. $\frac{2}{2} + \frac{1}{2} = 1\frac{1}{2}$ $\quad \frac{4}{4} + \frac{2}{4} = 1\frac{1}{2}$

$\frac{12}{12} + \frac{2}{4} = 1\frac{1}{2}$ $\quad \frac{8}{8} + \frac{4}{8} = 1\frac{1}{2}$

$\frac{6}{6} + \frac{3}{6} = 1\frac{1}{2}$ $\quad \frac{12}{12} + \frac{3}{6} = 1\frac{1}{2}$

Activity 6.1

- The learners should understand that fractions are numbers, just like counting or natural numbers. Fractions are rational numbers.
- Let the learners use the halves, thirds and quarters fraction circle parts to do practical or physical counting in fractions. Ask questions such as 'How many halves are there in 2 wholes?'; 'How many thirds are there in 3 wholes?'; 'How many quarters are there in $2\frac{1}{2}$?'.
- Let them count the fractions aloud in question 1. Then give them copies of the number lines from the Photocopiable Resources and ask them to fill in the missing fractions. They fill in the missing fractions to complete the number lines.
- Give them copies of the blank number chains from the Photocopiable Resources so that they fill in the correct fractions. Let them explain to the class what they have learnt about counting in fractions.

Solutions

1. a) $\frac{1}{2}$; 1; $1\frac{1}{2}$; 2; $2\frac{1}{2}$; 3; $3\frac{1}{2}$; 4

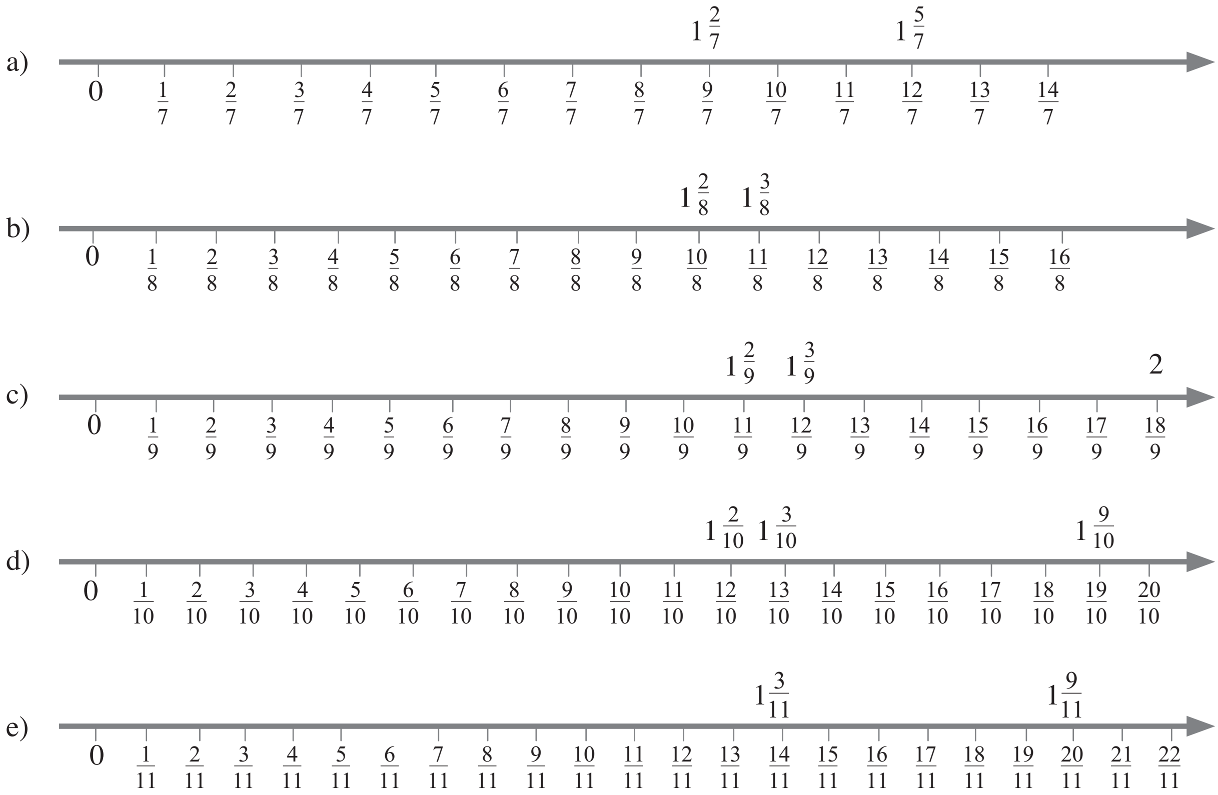
b) $\frac{1}{3}$; $\frac{2}{3}$; $\frac{3}{3}$; $1\frac{1}{3}$; $1\frac{2}{3}$; $\frac{6}{3}$ (= 2); $2\frac{1}{3}$; $2\frac{2}{3}$

c) $\frac{1}{4}$; $\frac{2}{4}$; $\frac{3}{4}$; $\frac{4}{4}$; $1\frac{1}{4}$; $1\frac{2}{4}$; $1\frac{3}{4}$; $\frac{8}{4}$ (= 2)

d) $\frac{1}{5}$; $\frac{2}{5}$; $\frac{3}{5}$; $\frac{4}{5}$; $\frac{5}{5}$; $1\frac{1}{5}$; $1\frac{2}{5}$; $1\frac{3}{5}$

e) $\frac{1}{6}$; $\frac{2}{6}$; $\frac{3}{6}$; $\frac{4}{6}$; $\frac{5}{6}$; $\frac{6}{6}$; $1\frac{1}{6}$; $1\frac{2}{6}$

2.



a) $0 \rightarrow +\frac{1}{3} \rightarrow \frac{1}{3} \rightarrow +\frac{1}{3} \rightarrow \frac{2}{3} \rightarrow +\frac{1}{3} \rightarrow \frac{3}{3} = 1 \rightarrow +\frac{1}{3} \rightarrow 1\frac{1}{3} \rightarrow +\frac{1}{3}$

$3 \leftarrow \frac{1}{3} + \leftarrow 2\frac{2}{3} \leftarrow \frac{1}{3} + \leftarrow 2\frac{1}{3} \leftarrow \frac{1}{3} + \leftarrow 2 \leftarrow \frac{1}{3} + \leftarrow \frac{1}{3} \leftarrow \frac{2}{3}$

b) $0 \rightarrow +\frac{1}{4} \rightarrow \frac{1}{4} \rightarrow +\frac{1}{4} \rightarrow \frac{2}{4} \rightarrow +\frac{1}{4} \rightarrow \frac{3}{4} \rightarrow +\frac{1}{4} \rightarrow 1 \rightarrow +\frac{1}{4}$

$\frac{1}{4} + \leftarrow 2 \leftarrow \frac{1}{4} + \leftarrow 1\frac{3}{4} \leftarrow + \frac{1}{4} \leftarrow 1\frac{2}{4} \leftarrow \frac{1}{4} + \leftarrow 1\frac{1}{4}$

$2\frac{1}{4} \rightarrow +\frac{1}{4} \rightarrow 2\frac{2}{4} \rightarrow +\frac{1}{4} \rightarrow 2\frac{3}{4} \rightarrow +\frac{1}{4} \rightarrow 3$

c) $3 \rightarrow -\frac{1}{5} \rightarrow 2\frac{4}{5} \rightarrow -\frac{1}{5} \rightarrow 2\frac{3}{5} \rightarrow -\frac{1}{5} \rightarrow 2\frac{2}{5} \rightarrow -\frac{1}{5} \rightarrow 2\frac{1}{5} \rightarrow -\frac{1}{5}$

$\frac{1}{5} - 1\frac{1}{5} \leftarrow \frac{1}{5} - \leftarrow 1\frac{2}{5} \leftarrow \frac{1}{5} - \leftarrow 1\frac{3}{5} \leftarrow \frac{1}{5} - \leftarrow 1\frac{4}{5} \leftarrow \frac{1}{5} - \leftarrow 2$

$1 \rightarrow -\frac{1}{5} \rightarrow \frac{4}{5} \rightarrow -\frac{1}{5} \rightarrow \frac{3}{5} \rightarrow -\frac{1}{5} \rightarrow \frac{2}{5} \rightarrow -\frac{1}{5} \rightarrow \frac{1}{5} - \frac{1}{5} \rightarrow 0$

Unit 7 Representing and comparing fractions

MENTAL MATHS

- The learners study the fractions on the number lines they have worked with in Unit 6.
- They name fractions between 0 and 1, those closer to 0 than to 1, fractions more than $\frac{1}{2}$ but smaller than 1, etc. This exercise assists in conceptualising the idea and size of a fraction.
- Ask them to estimate the capacity of the cool drink that is left in the different bottles. They find out how much of the remaining cool drink will fill a 500 ml bottle, etc.

Solutions

1. a) $\frac{1}{7}$; $\frac{2}{7}$; $\frac{3}{7}$; $\frac{4}{7}$; $\frac{5}{7}$; $\frac{6}{7}$

$\frac{1}{8}$; $\frac{2}{8}$; $\frac{3}{8}$; $\frac{4}{8}$; $\frac{5}{8}$; $\frac{6}{8}$; $\frac{7}{8}$

$\frac{1}{9}$; $\frac{2}{9}$; $\frac{3}{9}$; $\frac{4}{9}$; $\frac{5}{9}$; $\frac{6}{9}$; $\frac{7}{9}$; $\frac{8}{9}$

$\frac{1}{10}$; $\frac{2}{10}$; $\frac{3}{10}$; $\frac{4}{10}$; $\frac{5}{10}$; $\frac{6}{10}$; $\frac{7}{10}$; $\frac{8}{10}$; $\frac{9}{10}$

$\frac{1}{11}$; $\frac{2}{11}$; $\frac{3}{11}$; $\frac{4}{11}$; $\frac{5}{11}$; $\frac{6}{11}$; $\frac{7}{11}$; $\frac{8}{11}$; $\frac{9}{11}$; $\frac{10}{11}$

b) $\frac{1}{7}$; $\frac{2}{7}$; $\frac{3}{7}$

$\frac{1}{8}$; $\frac{2}{8}$; $\frac{3}{8}$

$\frac{1}{9}$; $\frac{2}{9}$; $\frac{3}{9}$; $\frac{4}{9}$

$\frac{1}{10}$; $\frac{2}{10}$; $\frac{3}{10}$; $\frac{4}{10}$

$\frac{1}{11}$; $\frac{2}{11}$; $\frac{3}{11}$; $\frac{4}{11}$; $\frac{5}{11}$

c) $\frac{4}{7}$; $\frac{5}{7}$; $\frac{6}{7}$; $\frac{5}{8}$; $\frac{6}{8}$; $\frac{7}{8}$

$\frac{5}{9}$; $\frac{6}{9}$; $\frac{7}{9}$; $\frac{8}{9}$

$\frac{6}{10}$; $\frac{7}{10}$; $\frac{8}{10}$; $\frac{9}{10}$

$\frac{6}{11}$; $\frac{7}{11}$; $\frac{8}{11}$; $\frac{9}{11}$; $\frac{10}{11}$

d) $\frac{8}{7}$; $\frac{9}{7}$; $\frac{10}{7}$; $\frac{11}{7}$; $\frac{12}{7}$; $\frac{13}{7}$

$\frac{9}{8}$; $\frac{10}{8}$; $\frac{11}{8}$; $\frac{12}{8}$; $\frac{13}{8}$; $\frac{14}{8}$; $\frac{15}{8}$

$\frac{10}{9}$; $\frac{11}{9}$; $\frac{12}{9}$; $\frac{13}{9}$; $\frac{14}{9}$; $\frac{15}{9}$; $\frac{16}{9}$; $\frac{17}{9}$

$\frac{11}{10}$; $\frac{12}{10}$; $\frac{13}{10}$; $\frac{14}{10}$; $\frac{15}{10}$; $\frac{16}{10}$; $\frac{17}{10}$; $\frac{18}{10}$; $\frac{19}{10}$

$\frac{12}{11}$; $\frac{13}{11}$; $\frac{14}{11}$; $\frac{15}{11}$; $\frac{16}{11}$; $\frac{17}{11}$; $\frac{18}{11}$; $\frac{19}{11}$; $\frac{20}{11}$; $\frac{21}{11}$

e) $1\frac{4}{7}$; $1\frac{5}{7}$; $1\frac{6}{7}$

$1\frac{5}{8}$; $1\frac{6}{8}$; $1\frac{7}{8}$

$1\frac{5}{9}$; $1\frac{6}{9}$; $1\frac{7}{9}$; $1\frac{8}{9}$

$1\frac{6}{10}$; $1\frac{7}{10}$; $1\frac{8}{10}$; $1\frac{9}{10}$

$1\frac{6}{11}$; $1\frac{7}{11}$; $1\frac{8}{11}$, $1\frac{9}{11}$; $1\frac{10}{11}$

2. a) Bottle A
   b) Bottles A and B
   c) Bottle B
   d) Bottle C
   e) 2.5 ℓ
   f) 2.5 ℓ

Activity 7.1

- Ask the learners to copy the number lines and fill in the fractions that the arrows are pointing to. Please note that some of the learners might not write fractions in the accurate places. Let them explain why they have written the fractions in the places they have during the class discussion, to address misconceptions or mistakes.
- The diagrams shown are some of those on the cards used in the Fraction Domino Game. Let the learners name the fractions that are not shaded. Check that they pronounce the names accurately.
- Write out cards with fraction names (e.g. tenths, eighths) and put them up on the number board or the wall. Even better, let the learners make charts with the number names, symbols and representations to put up on the wall.
- The learners use the diagrams to solve the addition and subtraction problems with the same denominators. They further use the diagrams to compare fractions and fill in the correct relationship signs to make the statements true.

Solutions

1. a) $\frac{1}{4}$ b) $\frac{3}{4}$ c) $1\frac{2}{4}$
   d) $\frac{1}{3}$ e) $\frac{2}{3}$ f) $1\frac{2}{3}$
   g) $\frac{1}{5}$ h) $\frac{2}{5}$ i) $1\frac{3}{5}$
   j) $\frac{1}{2}$ k) $1\frac{1}{2}$ l) $\frac{1}{8}$
   m) $\frac{5}{8}$ n) $1\frac{7}{8}$

2. a) $\frac{8}{10}$ b) $\frac{3}{9}$ c) $\frac{1}{6}$ d) $\frac{3}{5}$
   e) $\frac{2}{8}$ f) $\frac{5}{10}$ g) $\frac{6}{8}$ h) $\frac{1}{4}$
   i) $\frac{2}{3}$ j) $\frac{8}{9}$ k) $\frac{5}{7}$ l) $\frac{4}{8}$

3. a) $\frac{2}{10} + \frac{8}{10} = \frac{10}{10}$ b) $\frac{9}{9} - \frac{6}{9} = \frac{3}{9}$
   c) $\frac{1}{6} + \frac{5}{6} = \frac{6}{6}$ d) $\frac{5}{5} - \frac{2}{5} = \frac{3}{5}$
   e) $\frac{5}{10} + \frac{5}{10} = \frac{10}{10}$ f) $\frac{2}{8} + \frac{6}{8} = \frac{8}{8}$
   g) $1 - \frac{3}{4} = \frac{1}{4}$ h) $1 - \frac{1}{3} = \frac{2}{3}$
   i) $\frac{1}{9} + \frac{8}{9} = \frac{9}{9}$ j) $\frac{2}{7} + \frac{5}{7} = \frac{7}{7}$
   k) $\frac{4}{8} + \frac{4}{8} = \frac{8}{8}$ l) $1 - \frac{6}{8} = \frac{2}{8}$

4. a) $\frac{2}{5} > \frac{2}{6}$

   b) $\frac{5}{10} > \frac{2}{7}$

   c) $\frac{1}{4} < \frac{1}{3}$

   d) $\frac{2}{7} < \frac{2}{5}$

   e) $\frac{1}{3} > \frac{1}{9}$

   f) $\frac{1}{9} < \frac{1}{6}$

   g) $\frac{5}{10} = \frac{4}{8}$

   h) $\frac{4}{8} < \frac{8}{10}$

   i) $\frac{2}{8} < \frac{1}{3}$

   j) $\frac{6}{9} > \frac{2}{5}$

Unit 8 Fractions of whole numbers

MENTAL MATHS

- Ask some questions to check learners' knowledge of time, such as how many seconds in a minute, minutes in an hour, hours in a day, days in a week, a month or a year. How many hours in a $\frac{1}{2}$ day, minutes in a $\frac{1}{2}$ hour, etc.?
- Let them study the clocks and explain what they observe. They find out how many minutes there are in different fractions of the clock and determine different fractions of 60.

Solutions

1. 60 minutes

2. a) 30 minutes
   b) 15 minutes
   c) 45 minutes
   d) 20 minutes
   e) 40 minutes
   f) 12 minutes

3. a) 30
   b) 15
   c) 45
   d) 20
   e) 40
   f) 12
   g) 36
   h) 10
   i) 30
   j) 48

Activity 8.1

- Ask the learners to study the groups of objects arranged in arrays. They find different fractions of the whole numbers 16, 24 and 20. They work with a problem in a real-life context to share equally and to calculate fractions of whole numbers.
- Remember that the learners do not work with the fraction multiplication algorithms at this stage. You can, however, ask them to explain the relationships between the fraction, the whole number and the solution, e.g. $\frac{1}{4}$ of 16 = 4. They should observe that 16 ÷ 4 = 4.

Solutions

1. a) $\frac{1}{4}$ of 16 = 4
   $\frac{1}{8}$ of 16 = 2
   $\frac{1}{2}$ of 16 = 8
   $\frac{5}{8}$ of 16 = 10
   $\frac{3}{4}$ of 16 = 12
   $\frac{6}{8}$ of 16 = 12

   b) $\frac{1}{2}$ of 24 = 12
   $\frac{2}{3}$ of 24 = 16
   $\frac{1}{12}$ of 24 = 2
   $\frac{3}{8}$ of 24 = 6
   $\frac{5}{6}$ of 24 = 20
   $\frac{10}{12}$ of 24 = 20

   c) $\frac{1}{10}$ of 20 = 2
   $\frac{1}{5}$ of 20 = 4
   $\frac{1}{4}$ of 20 = 5
   $\frac{4}{10}$ of 20 = 8
   $\frac{2}{5}$ of 20 = 8
   $\frac{3}{4}$ of 20 = 15

2. a) 21 sleeping bags: 7 + 7 + 7
   b) 30 spoons: 10 + 10 + 10
   c) 27 plates: 9 + 9 + 9
   d) 24 mugs: 8 + 8 + 8
   e) 18 knives: 6 + 6 + 6
   f) 12 tents: 4 + 4 + 4

3. a) $\frac{1}{3}$ of 21 = 7
   b) $\frac{1}{3}$ of 30 = 10
   c) $\frac{1}{3}$ of 27 = 9
   d) $\frac{1}{3}$ of 24 = 8
   e) $\frac{1}{3}$ of 18 = 6
   f) $\frac{1}{3}$ of 12 = 4

4. Two learners share a tent.

Unit 9 Equivalent fractions

MENTAL MATHS

- Ask the learners to study the fraction circles in the picture. They can also use their own fraction circles to check their answers. Let them create as many fractions with the same size as they can. They name the fractions and write the fractions on the board.
- Ask them to study the fraction parts in the fraction bars. They should notice fraction parts that are equal to $\frac{1}{2}$. Ask them to name more fractions of the same size that they notice in the bars.
- Let them explain Jabulani's rule for creating equivalent fractions and use the rule to create equivalent fractions for the numbers given.

Solutions

1. $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{6}{12} = \frac{12}{24}$

   $1 = \frac{2}{2} = \frac{3}{3} = \frac{4}{4} = \frac{5}{5} = \frac{6}{6} = \frac{7}{7} = \frac{8}{8} = \frac{10}{10}$

   $\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12} = \frac{8}{24}$

   $\frac{1}{4} = \frac{2}{8} = \frac{4}{16} = \frac{3}{12} = \frac{5}{20} = \frac{6}{24}$

   $\frac{3}{4} = \frac{6}{8} = \frac{9}{12} = \frac{12}{16} = \frac{15}{20}$

   $\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12} = \frac{16}{24}$

2. The diagram shows that:

   $$\left.\begin{array}{l}\frac{1}{2} = \frac{2}{4} \\ \frac{1}{2} = \frac{3}{6} \\ \frac{1}{2} = \frac{5}{10}\end{array}\right\}$$ Denominator is double the numerator

3. $\frac{1}{5} = \frac{2}{10}$; $\frac{2}{3} = \frac{4}{6}$; $\frac{3}{5} = \frac{6}{10}$; $\frac{2}{5} = \frac{4}{10}$

4. a) $\frac{1}{3} = \frac{2}{6}$
   b) $\frac{1}{8} = \frac{2}{16}$
   c) $\frac{1}{5} = \frac{2}{10}$
   d) $\frac{1}{9} = \frac{2}{18}$
   e) $\frac{1}{6} = \frac{2}{12}$
   f) $\frac{1}{10} = \frac{2}{20}$
   g) $\frac{1}{4} = \frac{2}{8}$
   h) $\frac{1}{11} = \frac{2}{22}$
   i) $\frac{1}{7} = \frac{2}{14}$
   j) $\frac{1}{12} = \frac{2}{24}$

Activity 9.1

- Tell the learners they will investigate and explore more equivalent fractions – fractions of the same size. Let them copy the fraction wall (this will give them a feeling of the fractions but it can also be time consuming) or give them copies from the Photocopiable Resources.
- They write the fraction symbols on the wall and find equivalent fractions for the ones indicated.
- Let them use the rule for calculating equivalent fractions to complete the equivalent fractions.
- They use the fraction walls to compare fractions and state whether the statements are true or false. Let them explain their solutions to the class.

Solutions

1.

1

$\frac{1}{2}$ $\frac{1}{2}$

$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$

$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$

$\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$

$\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$

$\frac{1}{7}$ $\frac{1}{7}$ $\frac{1}{7}$ $\frac{1}{7}$ $\frac{1}{7}$ $\frac{1}{7}$ $\frac{1}{7}$ $\frac{1}{7}$

$\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$

$\frac{1}{9}$ $\frac{1}{9}$ $\frac{1}{9}$ $\frac{1}{9}$ $\frac{1}{9}$ $\frac{1}{9}$ $\frac{1}{9}$ $\frac{1}{9}$ $\frac{1}{9}$ $\frac{1}{9}$

$\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$

2. Write down all the fractions that are equivalent to

$1 = \frac{2}{2} = \frac{3}{3} = \frac{4}{4} = \frac{5}{5} = \frac{6}{6}$

$\frac{1}{2} = \frac{2}{4} = \frac{4}{8} = \frac{3}{6} = \frac{5}{10} = \frac{6}{12}$

$\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12} = \frac{6}{18} = \frac{5}{15}$

$\frac{1}{4} = \frac{2}{8} = \frac{4}{16} = \frac{3}{12} = \frac{5}{20}$

$\frac{1}{5} = \frac{2}{10} = \frac{3}{15} = \frac{4}{20} = \frac{5}{25}$

$\frac{1}{6} = \frac{2}{12} = \frac{3}{18} = \frac{4}{24} = \frac{5}{30}$

3. a) $\frac{3}{4} = \frac{9}{12}$ b) $\frac{5}{6} = \frac{10}{12}$

c) $\frac{2}{3} = \frac{6}{9}$ d) $\frac{5}{10} = \frac{1}{2}$

e) $\frac{9}{12} = \frac{3}{4}$ f) $\frac{2}{3} = \frac{4}{6}$

g) $\frac{4}{5} = \frac{8}{10}$ h) $\frac{6}{9} = \frac{8}{12}$

i) $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{6}{12}$ j) $\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12}$

4. a) $\frac{2}{3} = \frac{6}{9}$ True

b) $\frac{4}{5} > \frac{8}{10}$ False $\frac{4}{5} = \frac{8}{10}$

c) $\frac{1}{9} < \frac{1}{3}$ True

d) $\frac{6}{12} = \frac{5}{10}$ True

e) $\frac{3}{4} > \frac{6}{8}$ False $\frac{3}{4} = \frac{6}{8}$

f) $\frac{3}{4} = \frac{9}{12}$ True

g) $\frac{1}{5} < \frac{2}{10}$ False $\frac{1}{5} = \frac{2}{10}$

h) $\frac{5}{9} = \frac{2}{3}$ False $\frac{5}{9} < \frac{2}{3}$

i) $\frac{4}{6} > \frac{8}{12}$ False $\frac{4}{6} = \frac{8}{12}$

j) $\frac{5}{6} = \frac{10}{12}$ True

Unit 10 Problem-solving

MENTAL MATHS

- The learners work with equal sharing with remainders that have to be shared. They should understand that a candy bar is one unit or whole, and remainders have to be cut to give equal parts.
- Use actual candy bars or bars represented by strips of paper to give them practical experiences of sharing wholes with remainders that have to be shared too.
- Encourage the learners to make drawings or cut and paste strips of papers to show their understanding. They will work informally with different types of calculations with fractions, e.g. sharing 4 candy bars among 3 learners: Each child gets $1\frac{1}{3}$ OR if all the bars are divided into thirds, each child gets $\frac{4}{3}$.
- You can tell the learners that $1\frac{1}{3}$ is called a mixed fraction and $\frac{4}{3}$ is called an improper fraction. $\frac{1}{3}$ is a proper fraction. Let them explore the relationship amongst the numbers in the different fractions.
  Explain to them that $1 = \frac{3}{3} + \frac{1}{3} = \frac{4}{3}$, etc.
  They should also realise that $1\frac{1}{3} + 1\frac{1}{3} + 1\frac{1}{3} = 3\frac{3}{3} = 4$ if they put the bars back together again and $\frac{3}{3} + \frac{3}{3} + \frac{3}{3} + \frac{3}{3} = 4$ or $\frac{4}{3} + \frac{4}{3} + \frac{4}{3} + \frac{4}{3} = \frac{12}{3} = 4$.

Solutions

Learners who are still dependent on learning with concrete or semi-concrete learning aids might use drawings to do the equal sharing. Others should apply more abstract approaches to the learning. The learners have worked with these types of equal sharing problems in Grade 4 and should be familiar with various strategies to do equal sharing effectively on a sophisticated level. The first solution below indicates different possibilities for solving the problems.

1. 3 candy bars shared between 2 learners:

1	1	$\frac{1}{2}$	$\frac{1}{2}$

$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$

$1\frac{1}{2} + 1\frac{1}{2} = 3$

$\frac{3}{2} + \frac{3}{2} = \frac{6}{2} = 3\ (6 \div 2 = 3)$

$3 \div 2 = 1 \text{ rem } 1 = 1\frac{1}{2}$

Each learner gets $1\frac{1}{2}$ candy bars.

2. 4 candy bars shared between 3 learners:

$1 + 1 + 1 = 3$ whole bars or $4 \div 3 = 1$ rem 1

$\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1$ whole bar $= 1\frac{1}{3}$

$1\frac{1}{3} + 1\frac{1}{3} + 1\frac{1}{3} = 4$ whole bars

Each learner gets $1\frac{1}{3}$ candy bars.

3. 5 candy bars shared between 4 learners:

$1 + 1 + 1 + 1 = 4$ bars or $5 \div 4 = 1$ rem 1

$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1$ bar $= 1\frac{1}{4}$

$1\frac{1}{4} + 1\frac{1}{4} + 1\frac{1}{4} + 1\frac{1}{4} = 5$ bars

Each learner gets $1\frac{1}{4}$ candy bars.

4. 6 candy bars shared between 5 learners:

$1 + 1 + 1 + 1 + 1 = 5$ bars or $6 \div 5 = 1$ rem 1

$\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} = 1$ bar $= 1\frac{1}{5}$

$1\frac{1}{5} + 1\frac{1}{5} + 1\frac{1}{5} + 1\frac{1}{5} + 1\frac{1}{5} = 6$ bars

Each learner gets $1\frac{1}{5}$ candy bars.

5. 7 candy bars shared between 6 learners:

$1 + 1 + 1 + 1 + 1 + 1 = 6$ bars or $7 \div 6 = 1$ rem 1

$\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = 1$ bar $= 1\frac{1}{6}$

$1\frac{1}{6} + 1\frac{1}{6} + 1\frac{1}{6} + 1\frac{1}{6} + 1\frac{1}{6} + 1\frac{1}{6} = 7$ bars

Each learner gets $1\frac{1}{6}$ candy bars.

6. 9 candy bars shared between 2 learners:

$4 + 4 = 8$ bars or $9 \div 2 = 4$ rem 1

$\frac{1}{2} + \frac{1}{2} = 1$ bar $= 4\frac{1}{2}$

$4\frac{1}{2} + 4\frac{1}{2} = 9$ bars

Each learner gets $4\frac{1}{2}$ candy bars.

7. 5 candy bars shared between 3 learners:

$1 + 1 + 1 = 3$ bars or $5 \div 3 = 1$ rem 2

$\frac{2}{3} + \frac{2}{3} + \frac{2}{3} = 1$ bar $= 1\frac{2}{3}$

$1\frac{2}{3} + 1\frac{2}{3} + 1\frac{2}{3} = 5$ bars

Each learner gets $1\frac{2}{3}$ candy bars.

8. 11 candy bars shared between 4 learners:

$$\begin{array}{lllllll} 2 + & 2 + & 2 + & 2 & = 8 \text{ bars} & \text{or} & 11 \div 4 = 2 \text{ rem } 3 \\ \frac{1}{4} + & \frac{1}{4} + & \frac{1}{4} + & \frac{1}{4} & = 1 \text{ bar} & & = 2\frac{3}{4} \\ \frac{1}{4} + & \frac{1}{4} + & \frac{1}{4} + & \frac{1}{4} & = 1 \text{ bar} & & \\ \frac{1}{4} + & \frac{1}{4} + & \frac{1}{4} + & \frac{1}{4} & = 1 \text{ bar} & & \\ \hline 2\frac{3}{4} + & 2\frac{3}{4} + & 2\frac{3}{4} + & 2\frac{3}{4} & = 11 \text{ bars } (\frac{3}{4} + \frac{3}{4} = \frac{6}{4} = 1\frac{2}{4} = 1\frac{1}{2};\ 1\frac{1}{2} + 1\frac{1}{2} = 3) & & \end{array}$$

Each learner gets $2\frac{3}{4}$ candy bars.

9. 17 candy bars shared between 5 learners:

$$\begin{array}{llllllll} 3 + & 3 + & 3 + & 3 + & 3 & = 15 \text{ bars} & \text{or} & 17 \div 5 = 3 \text{ rem } 2 \\ \frac{1}{5} + & \frac{1}{5} + & \frac{1}{5} + & \frac{1}{5} + & \frac{1}{5} & = 1 \text{ bar} & & = 1\frac{2}{5} \\ \frac{1}{5} + & \frac{1}{5} + & \frac{1}{5} + & \frac{1}{5} + & \frac{1}{5} & = 1 \text{ bar} & & \\ \hline 1\frac{2}{5} + & 1\frac{2}{5} + & 1\frac{2}{5} + & 1\frac{2}{5} + & 1\frac{2}{5} & = 11 \text{ bars } 3\frac{2}{5} & & \end{array}$$

Each learner gets $3\frac{2}{5}$ of the candy bars

10. 15 candy bars shared between 6 learners:

$$\begin{array}{lllllllll} 2 + & 2 + & 2 + & 2 + & 2 + & 2 & = 12 \text{ bars} & \text{or} & 15 \div 6 = 2 \text{ rem } 3 \\ \frac{1}{6} + & \frac{1}{6} + & \frac{1}{6} + & \frac{1}{6} + & \frac{1}{6} + & \frac{1}{6} & = 1 \text{ bar} & & = 2\frac{3}{6} \\ \frac{1}{6} + & \frac{1}{6} + & \frac{1}{6} + & \frac{1}{6} + & \frac{1}{6} + & \frac{1}{6} & = 1 \text{ bar} & & \\ \frac{1}{6} + & \frac{1}{6} + & \frac{1}{6} + & \frac{1}{6} + & \frac{1}{6} + & \frac{1}{6} & = 1 \text{ bar} & & \\ \hline 2\frac{3}{6} + & 2\frac{3}{6} + & 2\frac{3}{6} + & 2\frac{3}{6} + & 2\frac{3}{6} + & 2\frac{3}{6} & = 15 \text{ bars} & & \end{array}$$

Each learner gets $2\frac{3}{6}$ or $2\frac{1}{2}$ candy bars.

Activity 10.1

- The learners solve real-life fraction problems that involve addition and subtraction with the same denominators. Encourage them to make drawings to show their understanding.
- Make sure that all the learners understand the problems and what they are expected to do. You can let them work in groups and present their solutions on A3 paper that they will present to the class and then display on the wall.
- Learners will come up with different strategies. Do not suggest any strategies. If they do not use the strategies below, present these as alternative strategies.
- In question 5 they have to realise that the study involved 10 schools, so the finding cannot be one-sixth, it should be one-tenth.

Solutions

1. a) $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} = \frac{6}{5} = 1\frac{1}{5}$ litre of milk used each day
   b) $1\frac{1}{5} + 1\frac{1}{5} + 1\frac{1}{5} + 1\frac{1}{5} + 1\frac{1}{5} = 5\frac{5}{5} = 6$ litres of milk for five days
   c) $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 3\frac{1}{2}$ tins for 1 cat per week
   d) $3\frac{1}{2} + 3\frac{1}{2} + 3\frac{1}{2} = 10\frac{1}{2}$ tins of cat food per week

2. a) $1\frac{1}{2}$ and $\frac{1}{2}$; $1\frac{1}{4}$ and $\frac{3}{4}$; $1\frac{3}{4}$ and $\frac{1}{4}$

   b) $1\frac{1}{2}$, $1\frac{1}{4}$ and $2\frac{1}{4}$; $1\frac{1}{4}$, $\frac{1}{4}$ and $3\frac{1}{2}$; $\frac{1}{4}$, $2\frac{1}{4}$ and $2\frac{1}{2}$; $2\frac{1}{2}$, $1\frac{3}{4}$ and $\frac{3}{4}$

   c) 2 a): 3 ways
   2 b): 4 ways

3. a) $\frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{15}{4} = 4\frac{3}{4}$ m used

   b) $5 - 4\frac{3}{4} = \frac{1}{4}$ m left

4. 1 plate = $\frac{2}{3}$ cup of oil

   2 plates = $\frac{4}{3} = 1\frac{1}{3}$ cups

   4 plates = $2\frac{2}{3}$ cups

   8 plates = $4\frac{4}{3} = 4 + 1 + \frac{1}{3} = 5\frac{1}{3}$ cups of oil

5. 1 car = $1\frac{3}{5}$

   2 cars = $2\frac{6}{5} = 2 + 1 + \frac{1}{5} = 3\frac{1}{5}$

   4 cars = $6\frac{2}{5}$

   8 cars = $12\frac{4}{5}$ m

   13 m − $12\frac{4}{5} = \frac{1}{5}$ m of wire left

Assessment

The learners work on their own to demonstrate knowledge that they have developed about fractions during this week. They compare fractions, find equivalent fractions, count in and identify fractions, add and subtract fractions, calculate fractions of whole numbers and do equal sharing with remainders in real-life problems.

Assessment Task 11

1. Fill in the relationship signs <, > or = to make the statements true.

   a) $\frac{1}{5} \square \frac{1}{6}$ b) $\frac{4}{8} \square \frac{2}{4}$

   c) $\frac{5}{10} \square \frac{6}{12}$ d) $\frac{2}{3} \square \frac{2}{5}$

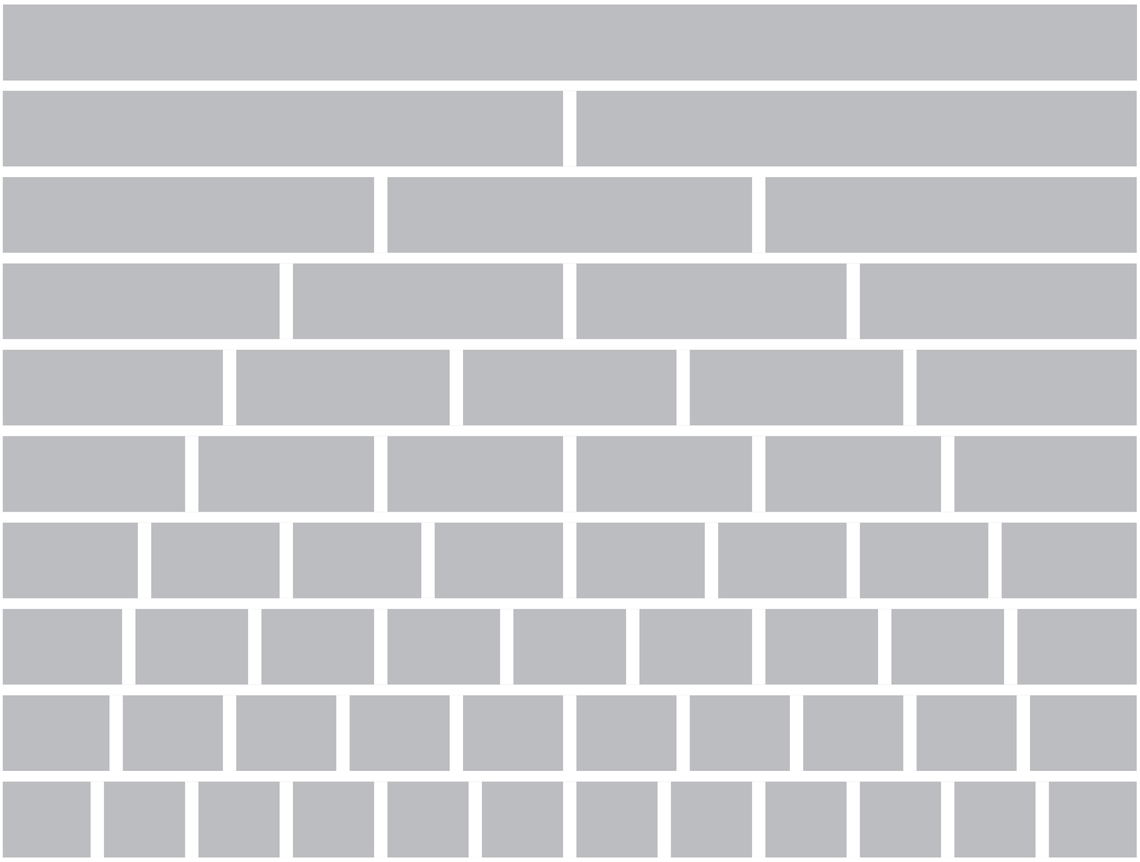
   e $\frac{4}{5} \square \frac{4}{6}$

2. Use the fraction wall to solve the following.

   a) $\frac{1}{2} = \frac{\square}{\square} = \frac{\square}{\square}$ b) $\frac{3}{4} = \frac{\square}{\square} = \frac{\square}{\square}$

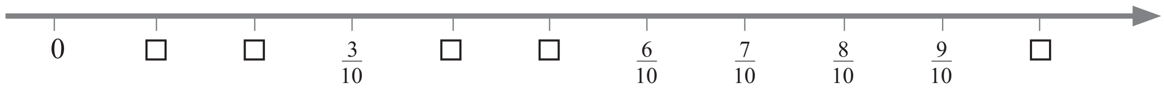
   c) $\frac{1}{3} = \frac{\square}{\square} = \frac{\square}{\square}$ d) $\frac{1}{4} = \frac{\square}{\square} = \frac{\square}{\square}$

   e) $\frac{2}{5} = \frac{\square}{\square} = \frac{\square}{\square}$ f) $\frac{8}{10} = \frac{\square}{\square}$



3. Fill in the missing fractions on the number lines.

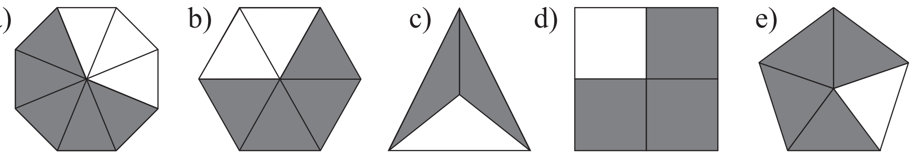
a)



b)

4. Name the fraction parts that are shaded in each diagram.

a) b) c) d) e)



5. Solve the following.

a) $\frac{2}{7} + \frac{3}{7} + \frac{1}{7} = \square$

b) $\frac{3}{10} + \frac{1}{10} + \frac{4}{10} = \square$

c) $\frac{4}{9} + \frac{3}{9} = \square$

d) $\frac{9}{11} - \frac{3}{11} = \square$

e) $\frac{5}{6} - \frac{2}{6} = \square$

6. Calculate:

a) $\frac{1}{3}$ of $9 = \square$

b) $\frac{1}{4}$ of $16 = \square$

c) $\frac{1}{8}$ of $24 = \square$

d) $\frac{2}{5}$ of $20 = \square$

e) $\frac{5}{6}$ of 18 = □   f) $\frac{1}{2}$ of 60 = □

g) $\frac{3}{4}$ of 60 = □

7. Solve the following. You can make drawings to help you.
   a) 6 children share 8 candy bars equally among themselves. How do they do it?
   b) The Smith family eats 1½ loaves of bread per day. How much bread do they eat from Monday to Saturday?

Solutions

1. The learners compare fractions by filling in the relationship signs <, > or = to make the statements true.

a) $\frac{1}{5} > \frac{1}{6}$ b) $\frac{4}{8} = \frac{2}{4}$

c) $\frac{5}{10} = \frac{6}{12}$ d) $\frac{2}{3} > \frac{2}{5}$

e $\frac{4}{5} > \frac{4}{6}$

2. They use the fraction wall to complete the equivalent fractions..

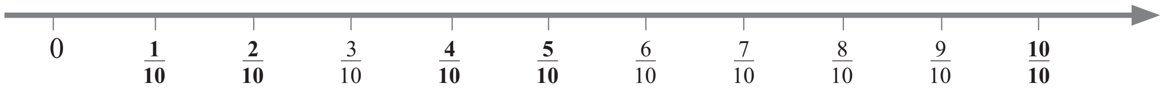
a) $\frac{1}{2} = \frac{\square}{\square} = \frac{\square}{\square}$ b) $\frac{3}{4} = \frac{\square}{\square} = \frac{\square}{\square}$

c) $\frac{1}{3} = \frac{\square}{\square} = \frac{\square}{\square}$ d) $\frac{1}{4} = \frac{\square}{\square} = \frac{\square}{\square}$

e) $\frac{2}{5} = \frac{\square}{\square} = \frac{\square}{\square}$ f) $\frac{8}{10} = \frac{\square}{\square}$

3. The learners count in fractions and fill in the missing fractions in the sequences.

a)



b)

4. They recognise and name the fraction parts that are shaded in each diagram.

a) $\frac{5}{8}$ b) $\frac{2}{6}$

c) $\frac{2}{3}$ d) $\frac{3}{4}$

e) $\frac{4}{5}$

5. The learners solve the addition and subtraction calculations with fractions with the same denominators.

a) $\frac{2}{7} + \frac{3}{7} + \frac{1}{7} = \frac{6}{7}$ b) $\frac{3}{10} + \frac{1}{10} + \frac{4}{10} = \frac{8}{10}$ or $\frac{4}{5}$

c) $\frac{4}{9} + \frac{3}{9} = \frac{7}{9}$ d) $\frac{9}{11} - \frac{3}{11} = \frac{6}{11}$

e) $\frac{5}{6} - \frac{2}{6} = \frac{3}{6}$ or $\frac{1}{2}$

6. They calculate fractions of whole numbers.

a) $\frac{1}{3}$ of 9 = 3

b) $\frac{1}{4}$ of 16 = 4

c) $\frac{1}{8}$ of 24 = 3

d) $\frac{2}{5}$ of 20 = 8

e) $\frac{5}{6}$ of 18 = 10

f) $\frac{1}{2}$ of 60 = 30

g) $\frac{3}{4}$ of 60 = 48

7. They solve real life equal sharing problems with remainders that need to be shared too. Tell them that they can make drawings to show their understanding.

a) 8 candy bars shared among 6 children:

$$1 + 1 + 1 + 1 + 1 + 1 = 6 \text{ bars}$$

$$\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = 1 \text{ bar}$$

$$\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = 1 \text{ bar}$$

$$1\frac{2}{6} + 1\frac{2}{6} + 1\frac{2}{6} + 1\frac{2}{6} + 1\frac{2}{6} + 1\frac{2}{6} = 8 \text{ bars}$$

Each one gets $1\frac{2}{6}$ candy bars.

b) $1\frac{1}{2}$ loaves of bread eaten during 6 days:

$1\frac{1}{2} + 1\frac{1}{2} = 3$ or $1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2} = 6\frac{6}{2}$

$1\frac{1}{2} + 1\frac{1}{2} = 3$ $= 6 + 3$ $(6 \div 2 = 3)$

$1\frac{1}{2} + 1\frac{1}{2} = 3$ $= 9$

They eat 9 loaves of bread during the six days.

Length

In Grade 5 learners do not work with decimal fractions. But many learners will be familiar with the decimal form (0,5) of $\frac{1}{2}$, as they see it in labels on different products (such as 1,5 ℓ bottles of cool drink or 2,5 kg packets of sugar). Allow them to use these decimal fractions in their answers to questions, and remind them where necessary that they should convert any measurement that includes 0,5 to a measurement that includes $\frac{1}{2}$ before they do calculations with it.

Unit 11 What is measurement?

- You might need more time for this unit if the children struggle with the measurement and if they are not well organised. You will need to work out a time plan, say 10 minutes per activity.
- Make sure that you have a builder's tape measure (metal), needlework tape measures, rulers, metre sticks and trundle wheels in class (at least one of each). You could make your own metre stick by tying a rope or thick string

into lengths of 1 metre up to 5 metres in length. This way the learners can measure a distance longer than a metre without using a trundle wheel.

- Allow all the learners in the class to take part in the practical aspects of this unit. They should 'feel' the different distances.
- Demonstrate to the learners how to read the builder's tape, as it can be quite confusing. Give them turns to try it out under your supervision.

MENTAL MATHS

- Tell the learners they will work with measuring length in the next six units. They will firstly estimate the length of objects around them. Ask them to name the units and instruments for measuring length. Ask them to select the closest measurement of the objects. Let them use rulers to measure the objects to check their solutions.

Solutions

1. a) The span of your hand — 15 cm
   b) The height of a tree — 4 000 mm
   c) The length of the board duster — 10 cm
   d) The thickness of your textbook — 20 mm
   e) The length of your arm — 1 m
   f) The height of your desk — 90 cm

2. – 4. Answers will vary.

Activity 11.1

- This activity consists of group exercises that can be performed simultaneously. One group can be busy outside, another group working with the builder's tape, a third group can be busy measuring their lengths, etc.
- You need to plan very well for this activity, as you have to monitor learners that are working outside and inside.
- Outside activities should be done close to your classroom.
- Appoint a leader for each group. When they move from one activity to the next activity another person becomes the leader, so that everybody in the group gets a turn.
- Divide the class into 4 or more groups (depending on the amount of equipment and learners you have).
- Each group must do all the questions from 2 to 4 in rotating order. Use a whistle to indicate the end of each rotation.
- Instruct learners to work on scrap paper first, as they will be outside and their hands and books might become dirty. They can rewrite all the information neatly into their books once back in class.
- Adjust the instructions to suit the layout of your school.
- You could type out the tables in question 2 with 10 lines for the answers of more than one exercise. Learners can then cut it out and paste it in their books – it takes less time than to draw the tables and it is much neater.
- For question 3, be sure to demonstrate the reading of these tapes to all learners before they start with the assignment. Explain to them that they must look for the red reading of the metres, and then follow the black readings of the centimetres and millimetres. Also explain to them that carpenters and builders never measure in m, cm and mm but write their measurements down as mm. We will later work with this again when we convert measurement with problem solving exercises.
- Choose objects to be measured in question 3 that suit the class and immediate environment. These topics can be written on the board and the learners can copy them before doing the measurement exercise.

- For question 4, make sure your measurements are accurate on your height chart. Ask a clinic or pharmacy if they can donate an old chart to the school. They are quite supportive. If you make your own chart, don't start at zero but at 75 cm – then it doesn't have to be fixed to the wall from the floor. Measure the 75 cm from the floor and fix the chart to the wall. It can be fixed semi-permanently as you will measure the learners at the end of the year again to measure by how much they have grown.

Solutions

Solutions in this activity will vary.

Unit 12 The smaller units of measurement

MENTAL MATHS

- Ask the learners again to name the units for measuring length. Write the units on the board and explain the meaning of the prefixes. Ask them to name the number of mm in a cm and in a m, the number of cm in a m and km and the number of m in a km. They should understand that 1 cm is 1/100 of a m and 1 m is 1/1 000 of a km, for example. Check whether they know the abbreviations for the units.
- You should ensure that all learners have rulers and have some builders' tapes available. If the rulers are not enough let them work in pairs or groups. They investigate the calibrations on the rulers to understand or enhance understanding of mm and cm.

Solutions

1. There are 10 mm in 1 cm.
2. a) A: 30 mm; B: 43 mm; C: $4\frac{1}{2}$ cm; D: $3\frac{1}{4}$ cm (be careful)
   b) AB = 16 mm
   c) BC = 2 mm

Activity 12.1

Solutions

1. Butterfly: 30 mm long; fish: 67 mm long
2. a) Length: 70 mm; width: 28 mm
   b) Length and width 19 mm
   c) Length 29 mm; width: 3 mm
3. 1 inch = ±25 mm
4. a) 7 cm + 0 mm = 70 mm + 0 mm = 70 mm
   2 cm + 8 mm = 20 mm + 8 mm = 28 mm
   b) 1 cm + 9 mm = 10 mm + 9 mm = 19 mm
   c) 2 cm + 9 mm = 20 mm + 9 mm = 29 mm
   0 cm + 3 mm = 3 mm
5. a) 6 mm
   b) 60 mm – 4 mm = 56 mm
   c) 7 cm – 2 cm = 5 cm = 50 mm
   d) 5 cm – 2 cm = 3 cm = 30 mm
6. Learners' own work.

Unit 13 The longer units of measurement

MENTAL MATHS

- The learners will work with metres and kilometres. Revise the conversions in the box involving whole numbers and fractions.

Solutions

1. 2 m = 200 cm	2. $1\frac{1}{2}$ km = 1 000 + 500 = 1 500 m
3. 3 km = 3 000 m	4. 500 m = $\frac{1}{2}$ km
5. 20 mm = 2 cm	6. $1\frac{1}{4}$ m = 100 + 25 cm
7. 3 000 km = 3 m	8. 1 km + $\frac{1}{4}$ km = 1 000 + 250 = 1 250 m
9. 400 cm = 4 m	10. $\frac{1}{4}$ km + $\frac{1}{4}$ km = 250 + 250 = 500 m

Activity 13.1

- Explain to the learners how to estimate distance using an object as measuring tool. They can use a pencil, ruler or smaller object to measure the length that is given and then try to see how many of those can go into the truck (question 3), for example.

Solutions

1. Answers will vary.
2. Answers will vary
3. a) The truck is about $2\frac{1}{2}$ times as long as the motorbike, so it is about 5 m long.
   b) The truck is about twice as high as the motorbike, so it is about $2\frac{1}{2}$ m high.
4. a) 1 234 mm = 1 m 234 mm ≈1 m
   b) 5 600 mm = 5 m 600 mm ≈ 6 m
   c) 3 008 mm = 3 m 008 mm ≈ 3 m
   d) 560 mm = 0 m 560 mm ≈ 1 m
5. a) 123 cm = 1 m 23 cm ≈ 1m
   b) 1 386 cm = 13 m 86 cm ≈ 14 m
   c) 20 cm = 0 m 20 cm ≈ 0 m
   d) 1 500 cm = 15 m ≈ 15 m

Activity 13.2

Solutions

1. a) 50 km
   b) 778 km
   c) Stellenbosch
   d) 778 – 62 = 716 km
   e) Colesberg: 778 – 748 = 30 km
   f) Cape Town to PE and back: 748 + 748 = 1 496 km
2. a) 10 times b) 3 000 times
   c) 500 times d) 250 times

3. a) 3 km = 3 000 m
   b) $2\frac{1}{2}$ km = 2 000 m + 500 m = 2 500 m
   c) 13 km 17 m = 13 000 m + 17 m = 13 017 m
   d) 7 000 m = 7 km
   e) 4 321 m = 4 km 321 m
   f) 780 m = 0 km 780 m

4. a) 2 555 m ≈ 3 km
   b) 3 km 499 m ≈ 3 km
   c) 450 m ≈ 0 km
   d) 55 km 50 m ≈ 55 km

Unit 14 Understanding the units of measurement

MENTAL MATHS

- The learners work with conversions between different units of measuring length. Ask them if they know how to change (convert) mm to cm, cm to mm and so on.
- Work with them through the information given and make sure that they understand the strategies for converting between units. Ask them to give the answers for the conversions between mm and cm. Ask individuals to explain their strategies.
- Make absolutely sure that the learners fully understand these concepts. Drill multiplying and dividing by 10 and multiples of 10.

Solutions

a) 3 cm = 30 mm
b) 20 cm = 200 mm
c) $1\frac{1}{2}$ cm = 15 mm
d) $4\frac{1}{2}$ cm = 45 mm
e) 300 mm = 30 cm
f) 35 mm = $3\frac{1}{2}$ cm
g) 50 mm = 5 cm
h) 15 mm = $1\frac{1}{2}$ cm

Activity 14.1

Solutions

1. a) 20 m = 2 000 cm
   b) 100 m = 1 000 cm
   c) $15\frac{1}{2}$ m = 1 550 cm
   d) $2\frac{1}{2}$ m = 250 cm
   e) 100 cm = 1 m
   f) 3 000 cm = 30 m
   g) 750 cm = $7\frac{3}{4}$ m
   h) 150 cm = $1\frac{1}{2}$ m

2. a) 1 km = 1 000 m
   b) 20 km = 20 000 m
   c) 15 km = 15 000 m
   d) $1\frac{1}{2}$ km = 1 500 m
   e) 750 m = $\frac{3}{4}$ km
   f) 8 000 m = 8 km
   g) 2 500 m = $2\frac{1}{2}$ km
   h) 250 m = $\frac{1}{4}$ km

Unit 15 Comparing and ordering lengths

MENTAL MATHS

- Tell the learners they will now compare and order units of length. They will use relation signs to show which lengths are shorter, longer or equal. They answer the questions and write the comparisons on the board.

Solutions

1. 1 234 mm < 1 324 mm
2. 624 mm < 342 m
3. 1 m > 99 cm
4. 2 m = 200 cm
5. 1 m 30 cm < 1 300 cm
6. 10 km > 1 000 m
7. 2 km 360 m > 2 036 m
8. 5 cm = 50 mm
9. $1\frac{1}{4}$ km = 1 250 m
10. 500 m = $\frac{1}{2}$ km

Activity 15.1

Solutions

1. 900 cm; 203 cm; 2 000 mm; $1\frac{1}{2}$ m; 600 mm
2. a) 580 km
   b) 862 km
   c) 1 442 km
   d) 282 km

Unit 16 Calculations with measurement

- Explain to the learners that calculating with measurements is exactly the same as ordinary calculations.
- Do a few examples on the board, including carrying over and borrowing, especially where the two measurements have been separated (for example, 2 km 123 m − 1 km 321 m). Show them that the sum is exactly the same as an ordinary calculation if you take the 'km' out, calculate and then put it back again. Make sure all learners understand before they start working.
- For calculations where there are fractions in measurements, and those where different measuring units are used, show learners how to convert all the measurements to the same unit in a way that eliminates fractions from the calculation (for example, $\frac{3}{4}$ m becomes 75 cm or 750 mm), before they do the calculation.

MENTAL MATHS

- The learners engage in calculations with units of length. Tell them they will apply knowledge of the four basic operations to solve the problems. They can break up numbers or apply the vertical column method. Go through the example with them and ask individuals to solve and explain their strategies.

Solutions

1. $\begin{array}{r} 2\ 000 \\ +\ \underline{1\ 256} \\ 3\ 256 \end{array}$ m

2. $\begin{array}{r} 2\ 000 \\ -\ \underline{1\ 256} \\ 744 \end{array}$ m

3. $\begin{array}{r} 30\,403 \\ -\ \underline{12\,302} \\ 42\,705 \text{ km} \end{array}$

4. $\begin{array}{r} 603\,564 \\ +\ \underline{23\,985} \\ 627\,549 \text{ km} \end{array}$

Activity 16.1

- In this activity you will have to give a lot of individual support.
- You will need to explain and demonstrate how to read a distance table of the kind you would find inside AA travel books or on road maps. Read the horizontal line in combination with the vertical line. It doesn't matter which one is done first, the answer will still be the same. Practise some distances orally before commencing with this question.

Solutions

1. 1 450 km + 608 km + 1 654 km = □

$\begin{array}{r} 1\,450 \\ 608 \\ +\ \underline{1\,654} \\ 3\,712 \text{ km} \end{array}$ Sean flies 3 712 km.

2. 1 654 − 1 450 = □

$\begin{array}{r} 1\,654 \\ -\ \underline{1\,450} \\ 204 \text{ km further} \end{array}$

Activity 16.2

Solutions

1. a) $\begin{array}{r} 235 \\ \times\ \underline{7} \\ 1\,645 \text{ cm} \end{array}$

b) $\begin{array}{r} 15 \\ 35\,\overline{)525\text{ km}} \\ -\ \underline{35} \\ 175 \\ \underline{175} \end{array}$

Answer: 15 km

c) $\begin{array}{r} 493 \\ \times\ \underline{25} \\ 2\,465 \\ +\ \underline{9\,860} \\ 12\,325 \text{ mm} \end{array}$

d) $\begin{array}{r} 4\text{ km }5\text{ m} \\ 15\,\overline{)60\text{ km }75\text{ m}} \end{array}$

Answer: 4 km 5 m

2. 30 m ÷ $2\frac{1}{2}$ m = □

Convert measurements to cm: 3 000 cm ÷ 250 cm = □

= 300 ÷ 25 = 12 tablecloths

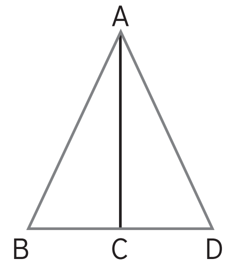
Assessment Task 12

1. Calculate the following.
   a) 1 km 356 m + 568 m = □
   b) 15 km 324 m − 12 km 596 m = □
   c) 25 m − 3 m 40 cm = □
   d) 76 km + 5 km 799 m = □
   e) 237 m × 6 = □
   f) 90 km × 50 = □
   g) 655 km ÷ 5 = □
   h) 68 m ÷ 4 = □

2. Convert the following measurements to the units shown.

a) 21 cm = ☐ mm	b) 5 km = ☐ m
c) $3\frac{1}{2}$ cm = ☐ mm	d) 20 m = ☐ cm
e) 14 km = ☐ m	f) 300 mm = ☐ cm
g) 150 cm = ☐ m	h) 110 m = ☐ cm
i) 175 cm = ☐ m	j) 250 m = ☐ km

3. a) Measure the following lines.



a) i) AC = ☐ cm ☐ mm
   ii) BD = ☐ mm
   iii) 5 times around ACD ≈ ☐ cm
b) Round off all the answers in a) to the nearest cm.

4. My grandmother wants to make a dress for each of my 6 cousins for my sister's wedding. How much material will she need if she uses $3\frac{1}{2}$ m material for each dress?

Solutions

1. a) 1 km 356 m + 568 m = 1 km 924 m
   b) 15 km 324 m − 12 km 596 m = 2 km 728 m
   c) 25 m − 3 m 40 cm = 21 m 60 cm
   d) 76 km + 5 km 799 m = 81 km 799 m
   e) 237 m × 6 = 1 422 m
   f) 90 km × 50 = 4 500 km
   g) 655 km ÷ 5 = 131 km
   h) 68 m ÷ 4 = 17 m = 1 700 cm

2. Convert the following measurements to the units shown.

a) 21 cm = 210 mm	b) 5 km = 5 000 m
c) $3\frac{1}{2}$ cm = 35 mm	d) 20 m = 2 000 cm
e) 14 km = 1 400 m	f) 300 mm = 30 cm
g) 150 cm = $1\frac{1}{2}$ m	h) 110 m = 11 000 cm
i) 175 cm = $1\frac{3}{4}$ m	j) 250 m = $\frac{1}{4}$ km

3. a) i) AC = 2 cm 6 mm
   ii) BD = 25 mm
   iii) 5 × (3 + 1 + 3) = 35 cm
   b) i) 3 cm
   ii) 3 cm
   iii) 35cm

4. 6 × 350 cm = 2 100 cm or 21 m of material for 6 dresses

Whole numbers: multiplication

Tell the learners they will work on multiplication during the next seven units. They will do mental maths before each lesson and write an assessment task at the end of the series of lessons. Remind them of the importance of knowing the multiplication tables by heart and the relationship between multiplication and division facts. They should realise that the recall of known number facts will make work with more advanced calculations much easier.

Unit 17 Multiples

MENTAL MATHS

- Ask the learners to explain what they understand by multiplication. They often have a better understanding of what division means because dividing is more of an everyday human activity than multiplication.
- Give them copies of the grid and explain how it works. You can also draw the grid on the board and let them do it together as a class, but allowing them to do the task individually will give you an opportunity to assess their knowledge of the basic multiplication facts.
- Explain the terminology multiplicand, multiplier, product, multiple and factor. Put these words on your number board.

Solutions

× □	**2**	7	**6**	**3**	10
5	**10**	35	30	**15**	**50**
4	**8**	28	**24**	**12**	**40**
9	**18**	**63**	**54**	**27**	90
8	16	**56**	**48**	**24**	**80**
3	**6**	21	**18**	9	**30**

Activity 17.1

- The learners have heard the term 'multiples' consistently since early in Grade 4. Ask them to write down the multiples of 5. They explain why the numbers are called multiples of 5.
- They should realise that multiples leave no remainder when they are divided. Ask them if they think zero is a multiple of 5. They should understand that zero divided by a number leaves no remainder: 4 ÷ 2 = 2 with no remainder; 2 ÷ 2 = 1 with no remainder; 0 ÷ 2 = 0 with no remainder. So 4, 2 and 0 are multiples of 2.
- The learners study drawings representing division to identify multiples and write multiplication and division calculations for groups with and without remainders.
- They complete number lines by filling in the missing multiples of basic tables and multiples involving numbers up to 100 000s.

Solutions

1. Multiples of 5: 0; 5; 10; 15; 20; 25; 30; 35; 40; …
2. When you divide a multiple of 5, there is no remainder.
3. Yes, 0 ÷ 5 = 0 with no remainder.
4. Drawing c) is not a multiple of 4.
5. 4 × 4 = 16; 4 × 5 = 20; 4 × 4 + 3 = 19
6.

a)	0	8	16	24	**32**	**40**	48	**56**	**64**	**72**	80		
b)	1 250	1 240	**1 230**	**1 220**	**1 210**	**1 200**	**1 190**	1 180	1 170				
c)	84	77	**70**	**63**	**56**	**49**	42	**35**	**28**	21	**14**	**7**	**0**
d)	**0**	**9**	**18**	27	36	**45**	**54**	**63**	72	**81**	**90**	**99**	**108**
e)	80	**72**	**64**	56	**48**	**40**	32	**24**	**16**	8	**0**		
f)	**6**	**12**	18	24	**30**	**36**	**42**	48	**54**	**60**			
g)	100 008	100 006	**100 004**	**100 002**	**100 000**	**99 998**	99 996	99 994	**99 992**				
h)	9 993	9 996	**9 999**	**10 002**	**10 005**	**10 008**	10 011	10 014	**10 017**				

7. The learners apply trial and improvement to find 2 or 3 numbers that they multiply to get the given products with the sums indicated.
   a) 5 × 6 × 2 = 60; 5 + 6 + 2 = 13
   b) 4 × 5 = 20; 4 + 5 = 9
   c) 7 × 5 = 35; 7 + 5 = 12
   d) 1 × 8 × 3 = 24; 1 + 8 + 3 = 12

Unit 18 Multiples and factors

MENTAL MATHS

- The learners work with factors of numbers by looking at the numbers you multiply to get a multiple.
- They use arrays to represent a number in different ways and write multiplication equations involving the commutative property.
- They learn more about factors and name the multiple factor pairs of 24 and 36.

Solutions

1. a) 1 × 35
   5 × 7

   b) 1 × 45
   3 × 15
   5 × 9

c) 1 × 12
2 × 6
3 × 4

d) 1 × 27
3 × 9

e) 1 × 32
2 × 16
4 × 8

f) 1 × 42
2 × 21
3 × 14
6 × 7

2. 1 × 18 = 18 2 × 9 = 18 3 × 6 = 18
18 × 1 = 18 9 × 2 = 18 6 × 3 = 18

3. Factor pairs of 24:
1 and 24 or 24 and 1
2 and 12 or 12 and 2
3 and 8 or 8 and 3
4 and 6 or 6 and 4

Factor pairs of 36:
1 and 36 or 36 and 1
2 and 18 or 18 and 2
3 and 12 or 12 and 3
4 and 9 or 9 and 4
6 and 6

Activity 18.1

- Tell the learners they will continue to work with multiples and factors. They identify multiples and non-multiples of 6 and 8.
- They explore lists of factors and non-factors of various numbers and find the multiples when factors are given.
- They complete multiplication flow diagrams in the form of circles and networks to fill in the missing multipliers and products (multiples).

Solutions

1. a) Ask the learners to count the yellow and green beads in the necklace.
   b) Let them explain how they did the counting. They count in multiples of 3 and 4.
   c) Ask them to explore the learners' counting strategies.
      i) David counted in multiples of 3 and 4.
      ii) Patricia multiplied by 3 and 4 using factors of 18 and 24.
2. a) Learners copy the list of numbers.
   b) Multiples of 6:
      32 **(12)** **(30)** 16 **(84)** **(24)** **(96)** **(54)** **(72)** **(48)** **(96)** 40
   c) Multiples of 8:
      (32) 12 30 **(16)** 84 **(24)** **(96)** 54 **(72)** **(48)** **(96)** **(40)**
   d) They should notice that 24, 48, 72 and 96 are circled in both lists, i.e. these multiples are common in the multiples of 6 and 8; 6 and 8 are common factors of these numbers. You could extend the activity by asking learners to find common multiples of 4 and 5, 6 and 9, and so on. Tell the learners they would apply this knowledge in higher grades when they have to multiply and divide fractions, for example.
3. The learners identify factors and non-factors of different numbers in the lists. They copy the lists stating the correct factors for each multiple.

   Factors of 16: 1; 2; 4; 8; 16

   Factors of 36: 1; 2; 3; 4; 6; 9; 12; 18; 36

   Factors of 20: 1; 2; 4; 5; 10; 20

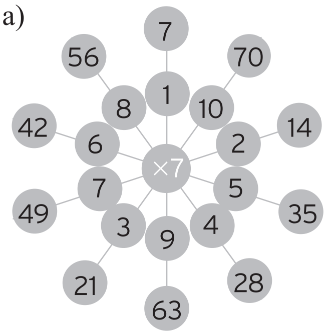
   Factors of 40: 1; 2; 4; 5; 8; 10; 20; 40

4. Tell the learners that the numbers in each square are some of the factors of secret numbers. They establish the multiples for each set of factors.

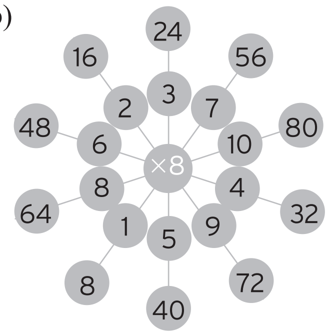
   a) 40 or 80 b) 42 c) 33

5. Give the learners copies of the diagrams fromt the Photocopiable Resources. They fill in the correct multipliers or factors in each diagram.

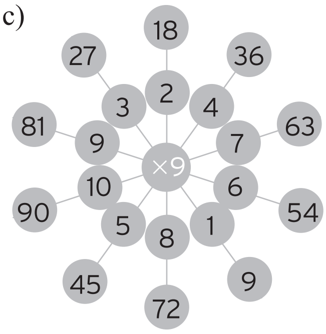
a)



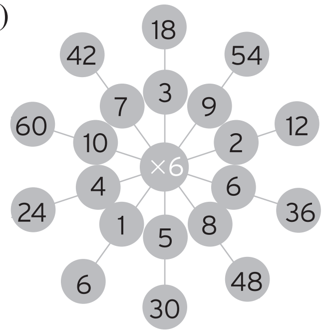
b)



c)



d)



Unit 19 Doubling to multiply by 25, 50 and 75

MENTAL MATHS

- The learners solve problems involving multiplication of multiples of 10 with one-digit numbers.
- They complete as many number sentences as they can involving multiplication with two- to four-digit multiples of 10.
- You should time them to see how many problems they can solve in one minute.

Solutions

1. a) 70 × 4 = 280
   b) 80 × 6 = 480
   c) 90 × 7 = 630
   d) 60 × 8 = 480
   e) 40 × 9 = 360
   f) 700 × 4 = 2 800
   g) 800 × 6 = 4 800
   h) 900 × 7 = 6 300
   i) 600 × 8 = 4 800
   j) 400 × 9 = 3 600

2.

One-minute multiplication	
1. 60 × 30 = 1 800	2. 3 000 × 4 = 12 000
3. 80 × 50 = 4 000	4. 6 000 × 5 = 30 000
5. 90 × 30 = 2 700	6. 8 000 × 3 = 24 000
7. 40 × 60 = 2 400	8. 7 000 × 7 = 49 000
9. 50 × 70 = 3 500	10. 5 000 × 8 = 40 000
11. 300 × 20 = 6 000	12. 2 000 × 20 = 40 000
13. 200 × 80 = 16 000	14. 4 000 × 90 = 360 000
15. 800 × 40 = 32 000	16. 9 000 × 60 = 540 000
17. 700 × 60 = 42 000	18. 8 000 × 70 = 560 000
19. 900 × 90 = 81 000	20. 3 000 × 80 = 240 000

Activity 19.1

- The learners look for relationships amongst numbers when they multiply and double 50s, 25s and 75s. They apply this knowledge in real-life money problems.

Solutions

1. a) 1 × 50 = 50
2 × 50 = 100
4 × 50 = 200
8 × 50 = 400
16 × 50 = 800

b) 3 × 50 = 150
6 × 50 = 300
9 × 50 = 450
12 × 50 = 600
24 × 50 = 1 200

c) 5 × 50 = 250
10 × 50 = 500
15 × 50 = 750
20 × 50 = 1 000
40 × 50 = 2 000

d) 7 × 50 = 350
14 × 50 = 700
21 × 50 = 1 050
28 × 50 = 1 400
42 × 50 = 2 100

2. a) 1 × 25 = 25
2 × 25 = 50
4 × 25 = 100
8 × 25 = 200
16 × 25 = 400

b) 3 × 25 = 75
6 × 25 = 150
9 × 25 = 225
12 × 25 = 300
24 × 25 = 600

c) 5 × 25 = 125
10 × 25 = 250
15 × 25 = 375
20 × 25 = 500
25 × 25 = 625

d) 7 × 25 = 175
14 × 25 = 350
21 × 25 = 525
28 × 25 = 700
42 × 25 = 1 050

3. a) 1 × 75 = 75
2 × 75 = 150
4 × 75 = 300
8 × 75 = 600
16 × 75 = 1 200

b) 3 × 75 = 225
6 × 75 = 450
9 × 75 = 675
12 × 75 = 900
18 × 75 = 1 350

c) 5 × 75 = 375
10 × 75 = 750
15 × 75 = 1 125
20 × 75 = 1 500
40 × 75 = 3 000

d) 7 × 75 = 525
14 × 75 = 1 050
21 × 75 = 1 575
28 × 75 = 2 100
42 × 75 = 3 150

4. Ask the learners to write open number sentences to show how they solve the problems. The learners could apply knowledge of doubling and fractions to calculate the total amount of school fees paid.
School fees: R1 500 + R1 500 + R750 + R375 = R4 125

5. Check that learners use brackets in their calculations.

a) Movie tickets: (3 × R25,50) + (4 × R15,75)
= R75 + R1,50 + R60 + R3
= R139,50

b) R9,50 ÷ 2 = R9 ÷ 2 + 50c ÷ 2
= R4,50 + 12,25c
= R4,75

Unit 20 Round off to estimate to calculate!

MENTAL MATHS

- The learners multiply two-digit multiples of 5 and 10 by one-digit numbers. They apply knowledge of basic multiplication facts and doubling.
- They also apply a multiplication strategy that they have to apply in the main lesson.

Solutions

1.

One-minute multiplication	
1. 70 × 4 = 280 or 140 + 140 = 280	2. 75 × 4 = 280 + 20 = 300 or 150 + 150 = 300
3. 50 × 5 = 250	4. 55 × 5 = 250 + 25 = 275
5. 60 × 3 = 180	6. 65 × 3 = 180 + 15 = 195
7. 70 × 6 = 420 or 140 + 280 = 420	8. 75 × 6 = 420 + 30 = 450
9. 80 × 8 = 640	10. 85 × 8 = 640 + 40 = 680

2. The learners count in 5s to 100 and list the multiples on the board.

3. 0; 5; 10; 15; 20; 25; …

4. Which multiple of 5 is the closest to each of the numbers below?

21	2	7	9	23	71	56	48	92	45	80	34
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
20	0	5	10	25	70	55	50	90	45	80	35

Activity 20.1

- Ask the learners to study the rounding off strategies provided. They check the estimates to find out how close they are to accurate solutions.
- Tell the learners they have practised rounding off to the nearest 5 in Mental Maths. Let them explore the number lines showing rounding off to the nearest 10 and 5. Let them explain the strategies.
- They round off two- and three-digit numbers to the nearest 5 and 10.
- The learners solve the two calculations by rounding off to the nearest 5 and 10. They calculate the accurate solutions and compare these to the estimates. They apply the distributive property.

Solutions

1. a) 46 ➞ 45 ➞ 50 b) 32 ➞ 30 ➞ 30
   c) 64 ➞ 65 ➞ 60 d) 83 ➞ 85 ➞ 80
   e) 95 ➞ 95 ➞ 100 f) 112 ➞ 110 ➞ 110
   g) 206 ➞ 205 ➞ 210 h) 995 ➞ 995 ➞ 200
   i) 341 ➞ 340 ➞ 340 j) 537 ➞ 535 ➞ 540

2. a) 34 × 32 ➞ 35 × 30
   = (30 x 30) + (5 x 30)
   = 900 + 150
   = 1 050
   34 × 32 = (34 × 30) + (34 × 2)
   = (30 × 30) + (4 × 30) + 68
   = 900 + 120 + 68
   = 1 088

   34 × 32 ➞ 30 × 30
   = 900

   Rounding off to the nearest 5 gives an estimate closer to the accurate solution.

b) 56 × 43 ➞ 55 × 45
   = (50 × 40) + (50 × 5) + (5 × 40) + (5 × 5)
   = 2 000 + 250 + 200 + 25
   = 2 475
   56 × 43 = (50 × 40) + (50 × 3) + (6 × 40) + (6 × 3)
   = 2 000 + 150 + 240 + 18
   = 2 000 + 390 + 18
   = 2 408

   56 × 43 ➞ 60 × 40
   = 2 400

   Rounding off to the nearest 10 gives an estimate closer to the accurate solution.

4. The learners explore the learners' reasoning when rounding off to the nearest 5 and 10 to estimate the solution. In this case they should notice that rounding off to the nearest 5 gives the closer estimate to the accurate solution. It does not appear that one could make a generalisation at this stage about the best estimates.

Activity 20.2

- Learners determine the best estimates for calculations.

Solutions

1. $37 \times 26 = \square$

a) Round off to the nearest 10:
$40 \times 30 = 1\ 200$

b) Round off to the nearest 5:
$35 \times 25 = (30 + 5) \times (20 + 5)$
$= 30 \times 20 + 30 \times 5 + 20 \times 5 + 5 \times 5$
$= 600 + 150 + 100 + 25$
$= 875$

The accurate answer is 962.
Difference:
a) 1 200 – 962 = 238
b) 962 – 875 = 87
Rounding off to 5 is the best estimate.

2. $84 \times 35 = \square$

a) Round off to the nearest 10:
$80 \times 40 = 3\ 200$

b) Round off to the nearest 5:
$85 \times 35 = (80 + 5) \times (30 + 5)$
$= 80 \times 30 + 80 \times 5 + 30 \times 5 + 5 \times 5$
$= 2\ 400 + 400 + 150 + 25$
$= 2\ 975$

The accurate answer is 2 940.
Difference:
a) 3 200 – 2 940 = 260
b) 2 975 – 2 940 = 35 Best estimate

3. $76 \times 47 = \square$

a) Round off to the nearest 10:
$80 \times 50 = 4\ 000$

b) Round off to the nearest 5:
$75 \times 45 = (70 + 5) \times (40 + 5)$
$= 70 \times 40 + 110 \times 5 + 5 \times 5$
$= 2\ 800 + 550 + 25$
$= 3\ 375$

The accurate answer is 3 572.
Difference:
a) 4 000 – 3 572 = 428
b) 3 572 – 3 375 = 197 Best estimate

4. $24 \times 25 = \square$

a) Round off to the nearest 10:
$20 \times 30 = 600$

b) Round off to the nearest 5:
$25 \times 25 = 625$

The accurate answer is 600.
Difference:
a) 600 – 600 = 0 Best estimate
b) 625 – 600 = 25

Unit 21 Number rules

MENTAL MATHS

- The learners apply the commutative, associative and distributive properties to solve multiplication and division calculations.

Solutions

1. a) $9 \times 6 = 54$ | $6 \times 9 = 54$ | $54 \div 9 = 6$ | $54 \div 6 = 9$
   b) $90 \times 6 = 540$ | $60 \times 90 = 5\,400$ | $5\,400 \div 90 = 60$ | $5\,400 \div 60 = 90$
   c) $8 \times 7 = 56$ | $7 \times 8 = 56$ | $56 \div 8 = 7$ | $56 \div 7 = 8$
   d) $80 \times 70 = 5\,600$ | $70 \times 80 = 5\,600$ | $5\,600 \div 80 = 70$ | $5\,600 \div 70 = 80$
   e) $6 \times 7 = 42$ | $7 \times 6 = 42$ | $42 \div 6 = 7$ | $42 \div 7 = 6$
   f) $60 \times 70 = 4\,200$ | $70 \times 60 = 4\,200$ | $4\,200 \div 60 = 70$ | $4\,200 \div 70 = 60$

2. a) $5 \times 7 \times 2 = 5 \times 2 \times 7 = 70$
   b) $3 \times 6 \times 2 = 3 \times 2 \times 6 = 36$
   c) $2 \times 3 \times 15 = 2 \times 15 \times 3 = 90$
   d) $4 \times 7 \times 5 = 4 \times 5 \times 7 = 140$
   e) $9 \times 2 \times 5 = 2 \times 5 \times 9 = 90$
   f) $5 \times 3 \times 8 = 5 \times 8 \times 3 = 120$

3. Complete the following equations.
   a) $43 \times 52 = (40 + 3) \times (50 + 2)$
      $= (40 \times 50) + (40 \times 2) + (3 \times 50) + (3 \times 2)$
      $= 2\,000 + 80 + 150 + 6$
      $= 2\,236$
   b) $29 \times 37 = (20 + 9) \times (30 + 7)$
      $= (20 \times 30) + (20 \times 7) + (9 \times 30) + (9 \times 7)$
      $= 600 + 140 + 270 + 63$
      $= 1\,073$
   c) $38 \times 27 = (30 + 8) \times (20 + 7)$
      $= (30 \times 20) + (30 \times 7) + (8 \times 20) + (8 \times 7)$
      $= 600 + 210 + 160 + 56$
      $= 1\,026$
   d) $38 \times 27 = (30 + 8) \times (20 + 7)$
      $= (30 \times 20) + (30 \times 7) + (8 \times 20) + (8 \times 7)$
      $= 600 + 210 + 160 + 56$
      $= 1\,026$

Activity 21.1

- The learners use the distributive property to check solutions with remainders.
- They count to calculate, using number properties.

Solutions

1. a) $(6 \times 8) + 5 = 48 + 5$
      $= 53$
      Check: $53 \div 8 = 6$ remainder 5
   b) $(7 \times 10) + 8 = 70 + 8$
      $= 78$
      Check: $78 \div 10 = 7$ remainder 8
   c) $(4 \times 9) + 8 = 36 + 8$
      $= 44$
      Check: $44 \div 9 = 4$ remainder 8
   d) $(8 \times 4) + 3 = 32 + 3$
      $= 35$
      Check: $35 \div 4 = 8$ remainder 3

2. a) $3 \times 5 \times 6 = (5 \times 6) \times 3$
      $= 30 \times 3$
      $= 90$
   b) $4 \times 5 \times 3 = 20 \times 3$
      $= 60$
   c) $6 \times 4 \times 5 = 6 \times (4 \times 5)$
      $= 6 \times 20$
      $= 120$
   d) $9 \times (3 \times 4) = 9 \times 12$
      $= (9 \times 10) + (9 \times 2)$
      $= 90 + 18$
      $= 108$
   e) $(4 \times 6) \times 3 = 24 \times 3$
      $= (20 \times 3) + (4 \times 3)$
      $= 60 + 12$
      $= 72$

Unit 22 Multiplication strategies

MENTAL MATHS

- The learners work with the area model to develop or enhance understanding of square numbers. They will apply this knowledge in solving problems in the following activity.

Solutions

1. a) 6 × 6 = 36 eggs
   b) 3 × 3 = 9 cupcakes
   c) 8 × 8 = 64 apples
   d) 5 × 5 = 25 chocolates
   e) 4 × 4 = 16 yoghurts
2. Square numbers.
3. We can draw a square pattern with equal number of dots in columns and rows.
4. a) 1 × 1 = 1
   b) 2 × 2 = 4
   c) 3 × 3 = 9
   d) 4 × 4 = 16
   e) 5 × 5 = 25
   f) 6 × 6 = 36
   g) 7 × 7 = 49
   h) 8 × 8 = 64
   i) 9 × 9 = 81
   j) 10 × 10 = 100

Activity 22.1

- Ask the learners to look for relationships between the different calculations. They complete multiplication with two-digit numbers by relating the numbers to multiplication with square numbers.
- They use a strategy involving vertical and horizontal multiplication using breaking up of numbers and use the vertical column strategy to check solutions. They use the strategy to solve problems.

Solutions

1. a) 8 × 8 = 64
   9 × 8 = 72
   b) 9 × 9 = 81
   10 × 9 = 90
   c) 11 × 11 = 121
   12 × 11 = 132
   d) 12 × 12 = 144
   13 × 12 = 156
   e) 15 × 15 = 225
   16 × 15 = 240
   f) 20 × 20 = 400
   21 × 20 = 420
   g) 90 × 90 = 8 100
   91 × 90 = 8 190
   h) 25 × 25 = 625
   26 × 25 = 650
2. a) 278 × 56 = ☐

	200	70	8	
50	10 000	3 500	400	13 900
6	1 200	420	48	+ 1 688
	11 200 +	3 920 +	448	= 15 568

b) 362 × 49 = ☐

	300	60	2	
40	12 000	2 400	80	14 480
9	2 700	540	18	+ 3 258
	14 700 +	2 940 +	98	= 17 738

c) 486 × 37 = ☐

	400	80	6	
30	12 000	2 400	180	14 580
7	2 800	560	42	+ 3 402
	14 800 +	2 960 +	222	= 17 982

d) 509 × 62 = ☐

	500	0	9	
60	30 000	0	540	30 540
2	1 000	0	18	+ 3 563
	31 000 +	0 +	558	= 34 103

e) 784 × 28 = ☐

	700	80	4	
20	14 000	1 600	80	15 680
8	5 600	640	32	+ 6 272
	19 600 +	2 240 +	112	= 21 952

f) 1 234 × 29 = ☐

	1 000	200	30	4	
20	20 000	4 000	600	80	24 680
9	9 000	1 800	270	36	+ 11 106
	29 000 +	5 800 +	870 +	116	= 35 786

Unit 23 Factors and multiplication

MENTAL MATHS

- The learners break two-digit multipliers into factors to multiply more easily. They use the distributive property to solve multiplication problems.

Solutions

1. 36 × 15 = ☐
   36 × 3 × 5 = 6 × 6 × 3 × 5
   = (6 × 5) × (6 × 3)
   = 30 × 6 × 3
   = 180 × 3
   = (100 × 3) + (80 × 3)
   = 300 +240
   = 540

2. 43 × 12 = ☐
   43 × 2 × 6 = 86 × 6
   = (80 × 6) + (6 × 6)
   = 480 + 36
   = 516

3. $27 \times 14 = \square$
$27 \times 2 \times 7 = 54 \times 7$
$= (50 \times 7) + (4 \times 7)$
$= 350 + 28$
$= 378$

4. $52 \times 24 = \square$
$52 \times 2 \times 12 = 104 \times 12$
$= (100 \times 12) + (4 \times 12)$
$= 1\ 200 + 48$
$= 1\ 248$

5. $23 \times 32 = \square$
$23 \times 4 \times 8 = 92 \times 2 \times 4$
$= 184 \times 4$
$= (100 + 80 + 4) \times 4$
$= 400 + 320 + 16$
$= 736$

Activity 23.1

- The learners multiply three-digit by two-digit numbers by breaking up the multipliers into factors.
- They explore a rule for multiplying square numbers and apply the rule to solve problems involving square numbers.

Solutions

1. $123 \times 21 = \square$
$123 \times 3 \times 7 = 369 \times 7$
$= (300 \times 7) + (60 \times 7) + (9 \times 7)$
$= 2\ 100 + 420 + 63$
$= 2\ 583$

2. $245 \times 16 = \square$
$245 \times 2 \times 8 = 490 \times 8$
$= (400 \times 8) + (90 \times 8) + (0 \times 8)$
$= 3\ 200 + 720 + 0$
$= 3\ 920$

3. $314 \times 12 = \square$
$314 \times 2 \times 6 = 628 \times 6$
$= (600 \times 6) + (20 \times 6) + (8 \times 6)$
$= 3\ 600 + 120 + 48$
$= 3\ 768$

4. $523 \times 24 = \square$
$523 \times 2 \times 12 = 1\ 046 \times 12$
$= (1\ 000 \times 12) + (40 \times 12) + (6 \times 12)$
$= 12\ 000 + 480 + 72$
$= 12\ 552$

5. $440 \times 45 = \square$
$220 \times (2 \times 5) \times 5 = (220 \times 10) \times 5$
$= 2\ 200 \times 5$
$= (2\ 000 \times 5) + (200 \times 5)$
$= 10\ 000 + 1\ 000$
$= 11\ 000$

Problem-solving and investigation

- Learners use calculators to check solutions.
- They solve problems involving real-life context multiplication problems involving rate and ratio, for example.

Solutions

1. a) 25 × 25 = ☐
(2 + 1) × 2 = 6 and 5 × 5 = 25
25 × 25 = 625

b) 35 × 35 = ☐
(3 + 1) × 3 = 12 and 5 × 5 = 25
35 × 35 = 1 225

c) 65 × 65 = ☐
(6 + 1) × 6 = 42 and 5 × 5 = 25
65 × 65 = 4 225

d) 75 × 75 = ☐
(7 + 1) × 7 = 56 and 5 × 5 = 25
75 × 75 = 5 625

2. a) 104 cm × 60 seconds = 6 240 cm = 62 metres 40 cm
b) 80 cm × 60 seconds = 4 800 cm
Jabu will be 6 240 − 4 800 = 1 440 cm = 14 metres 40 cm ahead.
c) Jabu: 6 240 × 2 = 12 480 cm
Peter: 4 800 × 3 = 14 400 cm
Peter swims furthest by 14 400 − 12 480 = 1 920 cm = 19 metres 20 cm.

3. One movie per week for 13 weeks: R30 × 13 = R390
R390 − R300 = R90 saving

4. R825 × 60 passengers = R49 500

5. a) 16 ÷ 2 = 8 boys
b) 148 ÷ 4 = 37
37 × 3 = 111 pages

Assessment

Learners work individually to perform an assessment task based on the work they have done on multiplication in the past seven units. They use knowledge of basic multiplication facts and multiplication with multiples of 10. They solve a real-life problem involving rate.

Assessment Task 13

1. Calculate:
a) 40 × 50 = ☐
b) 300 × 70 = ☐
c) 80 × 90 = ☐
d) 700 × 40 = ☐
e) 50 × 80 = ☐

2. Use a shortcut to calculate.
a) 15 × 15 = ☐
b) 85 × 85 = ☐

3. Solve the following.
a) 8 × 9 = ☐ 9 × 8 = ☐ ☐ ÷ 9 = 8 ☐ ÷ 8 = 9
b) 60 × 30 = ☐ 30 × 60 = ☐ ☐ ÷ 60 = 70 ☐ ÷ 70 = 60

4. Complete the following.
a) 10 × 10 = 100
11 × 10 = ☐
b) 13 × 13 = 169
14 × 13 = ☐
c) 14 × 14 = 196
15 × 14 = ☐

5. Use factors to calculate.
a) 23 × 15 = ☐
b) 38 × 12 = ☐

6. Solve the following.
a) 423 × 34 = ☐
b) 365 × 28 = ☐

7. Billy cleans offices to earn pocket money. He earns R15,50 per hour.
a) How much does Billy earn for 6 hours' work?
b) How much does he earn if he works for 12 hours?

Solutions

1. a) 40 × 50 = 2 000 b) 300 × 70 = 21 000
   c) 80 × 90 = 7 200 d) 700 × 40 = 28 000
   e) 50 × 80 = 4 000

2. a) 15 × 15 = ☐
   (1 + 1) × 1 = 2 and 5 × 5 = 25 so 15 × 15 = 225
   b) 85 × 85 = ☐
   (8 + 1) × 8 = 72 and 5 × 5 = 25 so 85 × 85 = 7 225

3. a) 8 × 9 = 72 9 × 8 = 72 72 ÷ 9 = 8 72 ÷ 8 = 9
   b) 60 × 30 = 1 800 30 × 60 = 1 800 4 200 ÷ 60 = 70 4 200 ÷ 70 = 60

4. a) 10 × 10 = 100 b) 13 × 13 = 169 c) 14 × 14 = 196
   11 × 10 = 110 14 × 13 = 182 15 × 14 = 210

5. a) 23 × 15 = ☐
   23 × 3 × 5 = 69 × 5
   = (60 × 5) + (9 × 5)
   = 300 + 45
   = 345

   b) 38 × 12 = ☐
   38 × 2 × 6 = 76 × 6
   = (70 × 6) + (6 × 6)
   = 420 + 36
   = 456

6. a) 423 × 34 = ☐

	400	20	3	
30	12 000	600	90	12 690
4	1 600	80	12	+ 1 692
	13 600	+ 680	+ 102	= 14 382

   b) 365 × 28 = ☐

	300	60	5	
20	6 000	1 200	100	7 300
8	2 400	480	40	+ 2 920
	8 400	+ 1 680	+ 140	= 10 220

7. a) 6 hours' work: R15,50 × 6 = ☐
   1 550 × 2 × 3 = 3 100 × 3
   = (3 000 × 3) + (100 × 3)
   = 9 000 + 300
   = 9 300
   Billy earns R93,00.
   b) 12 hours' work: R93 × 2 = ☐
   (90 × 2) + (3 × 2) = 180 + 6
   = 186
   Billy earns R186.

Properties of 3-D objects

In Grade 5, the learners work with the same 3-D objects as in Grade 4, namely: prisms, cubes, cylinders, cones and pyramids. However, in Grade 5, the learners work with prisms as a particular group of objects, and describe their features in more detail, such as the shapes of faces and number of faces. They also learn how to distinguish between rectangular prisms and cubes. The learners continue to build 3-D models using cardboard cut-outs of polygons and they also begin to explore the concept of nets of 3-D objects. They write about and draw objects in their books, as well as handling real 3-D objects; in this way they begin to grasp the abstract properties of these mathematical objects.

Unit 24 Surfaces of objects

The learners should remember the names of 3-D objects from Grade 4, and how to distinguish between flat and curved surfaces of 3-D objects. Work through the text in the Learner's Book to remind them of this before they do Activity 24.1.

MENTAL MATHS

Solutions

1. Sphere
2. Two
3. Three
4. None
5. No

Activity 24.1

- Explain that the term 'face' applies to flat surfaces only. Use models of 3-D objects you have in the class to indicate the 'faces' to the learners. Also use cardboard boxes and let the learners identify the faces on them. Then let the learners try to identify the faces on the drawings of the 3-D objects in the Learner's Book.

Solutions

1. Rectangular prism: 6 faces
   Cylinder: 3 faces
   Square-based pyramid: 5 faces
   Prism: 7 faces
2. Rectangular prism: rectangles (or 2 squares and 4 rectangles)
   Cylinder: 2 circular faces
   Square-based pyramid: 1 square and 4 triangles
   Prism: 2 pentagons and 5 rectangles

Unit 25 Rectangular prisms and cubes

In this unit, the learners investigate the properties or features of rectangular prisms and cubes in more detail by describing the number of faces and shapes of faces of the objects.

MENTAL MATHS

- The pictures in the Learner's Book show the separate faces that make up two different rectangular prisms and a cube. Make sure that the learners understand this. If necessary, use models of the types of 3-D objects shown in the Learner's Book, and physically take the models apart so that they are made up of the faces shown in the illustrations.
- Learners often get confused when they have to count the number of faces, edges, vertices and angles in 3-D objects abstractly. Encourage them to use effective counting strategies. At this stage they should apply more advanced

strategies than repeated addition. For example, counting the number of angles or corners of a cube or prism:

4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 = 24		(repeated addition)
8 + 8 + 8 = 24		(doubling)
3 × 8 = 24		(multiplication)
(2 × 4) + (2 × 4) + (2 × 4) = 24		(grouping/associative property)
3 × (4 + 4) = 3 × 8 = 24	or	(distributive property)
4 × (2 + 4) = 4 × 6 = 24		

Solutions

1.

	Rectangular prism	Cube
Number of faces	6	6
Shape/s of faces	rectangles (or rectangles and squares)	squares
Number of angles or corners	24	24
Size of angles or corners (equal to, greater than or smaller than a right angle)	right angles	right angles

2. The shape of the faces: cubes have only square faces and rectangular prisms have rectangular and/or square faces.

Activity 25.1

Solutions

1. Cube: A
   Rectangular prism: B
2. 3 faces of each object
3. Each object has 6 faces.
4. Let the learners work with a rectangular box and point out the faces, corners and right angles on the box.

Activity 25.2

- Let the learners work in pairs or small groups for the first part of this activity. Let them help one another in pointing out the examples of 3-D objects they have been learning about. They should then draw the objects on their own.
- Use this activity to check whether learners are able to transfer their concrete knowledge of the objects into an abstract form (the drawings they do).

Solutions

Learners' answers will vary.

Unit 26 Models and nets

In this unit, the learners first make models using cardboard cut-outs of polygon shapes. This will help them to consolidate their understanding of the concept of 'faces' of 3-D objects. Then they are introduced to the concept of 'nets', which are diagrams of flattened shapes that can be folded up to make the 3-D models.

MENTAL MATHS

- Once the learners match the correct faces to the objects, they can choose to make models of one or two of the 3-D objects.

Solutions

1. E	2. D
3. F	4. A
5. B	6. C

Activity 26.1

- Assist the learners where necessary as they make the model of a cube-shaped die.
- They can use dotted paper or grid paper to help them draw the squares for the faces of the die.

Solutions

Learners carry out the practical activity.

Investigation

Let the learners experiment by cutting out paper or cardboard shapes and sticking them together. The learners will find that it is not possible to make a rectangular prism with four squares and two rectangles. If four squares are stuck together, then the remaining two faces must also be squares, not rectangles.

Activity 26.2

- Explain to the learners what a net of a 3-D object is. Show them a few examples of nets of boxes that have different shapes.
- Let the learners spend some time opening up boxes to find the nets. This practical activity is important to help the learners understand the concept of nets and to begin to visualise how the flat shapes can be moved and manipulated into place.
- When they have become familiar with the nets of a rectangular and square prism, let them draw these nets in their books, together with diagrams of the 3-D objects that each net makes up. This will help them to develop a sense of the abstract geometric properties of the nets and 3-D objects.

Solutions

Learners carry out the practical activity.

Activity 26.3

- This activity requires the learners to do the opposite to what they did in Activity 26.3, where they unfolded and flattened a 3-D object. They must now use a net to fold a 3-D object into place.

Solutions

Learners carry out the practical activity.

A challenge

This activity should be done as a fun project by learners working alone or in pairs. Help them to identify the shapes that make up the faces of their chosen objects, and draw the correct number of these faces on a loose sheet of paper. They then cut out the faces and join them together to make a model of the shape. Do not worry too much about how accurately the faces fit together, as long as they are of the correct shape; learners may not be able to draw four triangles or six rectangles of exactly the same size, for example.

Once they have made the model, let them unfold it to make a net, and then trace around it to draw a neat outline of the net on a separate sheet of paper.

This activity can be the starting point for making decorated prisms to hang around the classroom walls, once learners have mastered the basic skills involved.

Project

1. Find an example of a box used for packaging at home. Try to find an unusual box shape.
2. Unfold the box to find the net.
3. Trace around the net on a clean sheet of cardboard.
4. Cut out the net.
5. Fold the net into the box shape so that you know which parts of the net make up which faces.
6. Flatten the box again and then decorate the faces of the net to make your own product. For example, if you used a toothpaste box, make up a name for your own toothpaste and decorate the box with this name. If you used a cereal box, make up your own cereal name and decorate the box with the name you made up.
7. Fold the net into the box shape and stick it in place.
8. Finish decorating the box and display your product in class.

Remedial activities

- Ask the learners to bring examples of boxes to school. The boxes should be of various shapes. Then ask them to sort the boxes into rectangular prisms and cubes.
- Let the learners work with models of various 3-D objects. Get the learners to paint the faces of the boxes that have the same shape the same colour. For example, the learners will paint all six faces of a cube the same colour because they are all squares. Depending on the dimensions of the rectangular boxes you have, the learners will, for example, paint four faces the same colour and two faces another colour (such as the box of Jungle Oats cereal). Or, they will paint three pairs of opposite faces three different colours (such as most other cereal boxes).

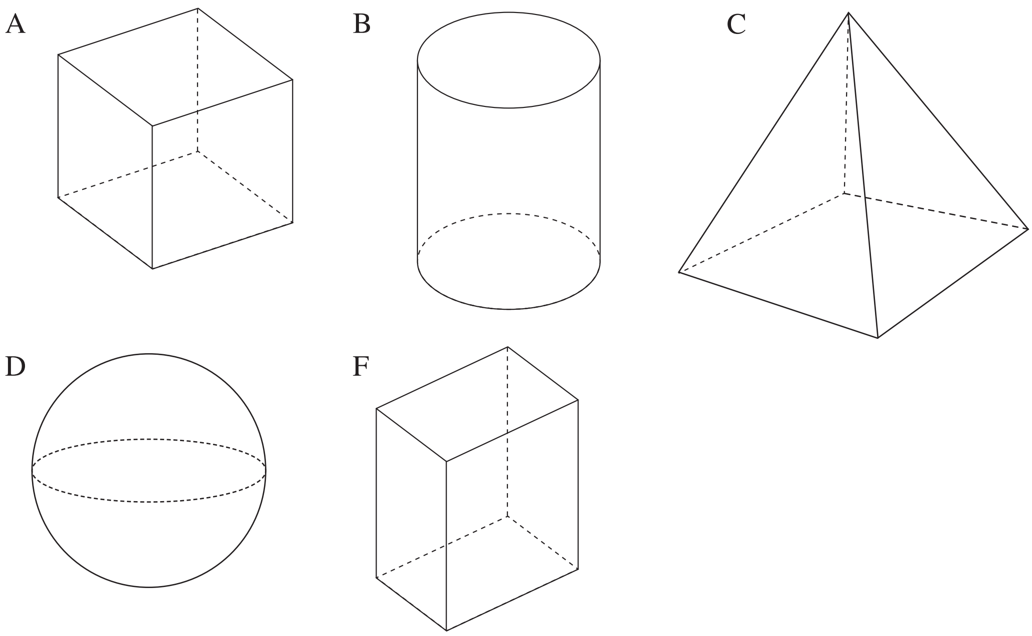
Extension activities

- Let the learners cut out the shapes of faces of various rectangular prisms and cubes. Then ask them to mix up the face shapes in a pile. Let individual learners or pairs of learners then sift through the pile to find a set of faces that can create either a rectangular prism or a cube. You can also develop this activity into a competition among the learners.

- Let the learners build animals by making cubes and rectangular prisms and then gluing them together and decorating them.

Assessment Task 14

1. a) Describe the following objects without naming them, and ask a partner to guess which object you are describing.



   b) Name each object.

2. a) How would you sort the objects above into two groups?
   b) How would you group them into three groups?
   c) How would you group them into four groups?

3. a) How is a cube similar to a rectangular prism?
   b) How is a cube different from a rectangular prism?

Solutions

1. a) The learners can use descriptions such as the following:
   A: It has six faces. All the faces are squares.
   B: It has three surfaces. Two surfaces are flat circles.
   C: It has a square base. It has four triangles that meet at the top.
   D: It has one curved surface.
   E: It has six sides. All the sides are rectangles.
   b) A: cube
   B: cylinder
   C: square-based pyramid
   D: sphere
   E: rectangular prism

2. a) The objects could be divided into:
   - objects with flat faces only: A, C, E
   - objects with at least one curved surface: B, D.
   b) The objects could be divided into:
   - objects with flat faces only: A, C, E
   - objects with curved surfaces only: D
   - objects with flat and curved surfaces: B.

c) The objects could be divided into:
- prisms: A, E
- cylinders: B
- pyramids: C
- spheres: D.

3. a) They both have 6 flat faces.
   b) All 6 faces of a cube are square. The faces of a rectangular prism are rectangular. A rectangular prism may have up to 2 square faces only.

Geometric patterns

Remind the learners that they have worked with geometric patterns in Grade 4. Let them name places where they have seen geometric patterns in their environment, on TV or in books. Ask them what they know about geometric patterns. Ask them what the difference is between number patterns and geometric patterns. They should remember that they have investigated, described, completed and extended patterns, repeating and growing patterns. They have also worked with input and output numbers in tables and flow diagrams. They will build on and extend this knowledge during this week. At the end of the four units they will perform an assessment task and reflect on their learning experiences.

Unit 27 Exploring, describing and creating patterns

MENTAL MATHS

- Ask the learners to explore patterns on the walls of the African home, the honeycomb, floor tiles, beadwork bracelet and baskets.
- They identify and describe objects, shapes, arrangements of shapes, colours and the number of objects or shapes used.
- Learners should understand that a pattern is created by repeating objects or shapes to form a regular pattern, but shapes or objects could also be arranged to form irregular patterns in which repetition is not obvious.
- Explain to them that some patterns form tessellations, i.e. shapes are arranged so that there are no gaps, as in the tiles.
- Patterns are formed by transformations which involve rotation (turns), reflections (flips) and translations (slides). (These concepts are studied in more detail in the sections on Space and Shape in this course.) The learners should realise that these are concepts and terminology used in geometry; therefore the topic is geometric patterns.
- Ask the learners to explore and describe the repeating patterns and find the missing elements in each sequence. They should identify the unit that is being repeated. Let them copy and extend the patterns by filling in the next three elements. Their products should be displayed in the classroom.
- Allow the learners to use informal terminology but also introduce and display new or formal terminology. The learners name the shapes in question 3 and describe, copy and extend the pattern in question 4. Let them draw, colour and cut out the shapes to create their own patterns. They could complete the patterns during the art or technology lessons.

Solutions

1. A: The beads in the bracelet are arranged in big and small triangles and rectangles which are rotated. There are smaller rectangles embedded in the bigger ones. The red, white and blue triangles on top are flipped or reflected below. There is no specific repetition of colours.

   B: The honeycomb consists of hexagons that tessellate.

   C: The tiles are square.

2. Learners' answers will vary. There are a number of different possible patterns for each question.
   One possible answer:
   a) flower, flower, flower, leaf, leaf, flower, flower, flower, leaf, leaf, flower, flower
   b) girl1, boy, girl2, girl1, boy, girl2, girl1, boy, girl2, girl1
   c) across, up, diagonal, across, up, diagonal, across, up, diagonal, across

Activity 27.1

- The learners name the different shapes, i.e. hexagon, trapezium, parallelogram, pentagon, triangle, rectangle, square, triangle, rhombus or square, triangle and circle.
- They explore and describe Jenny's pattern. She used triangles and trapeziums in her pattern. The shapes have been translated or slid and triangles have been flipped or reflected.
- The learners work in groups to create their own repeating patterns. Ask them to make drawings of the shapes shown or they can use draw their own shapes. They can also use pictures from magazines to make repeating patterns. Ask them to leave some spaces in the linear patterns and ask another group to complete and extend their patterns. Let them display their artefacts on the classroom wall.

Solutions

1. a) hexagon b) trapezium
   c) parallelogram d) pentagon
   e) triangle f) square
   g) triangle h) square
   i) triangle j) circle
   k) rectangle

2. Learners copy and extend the pattern.

3. Learners create their own patterns.

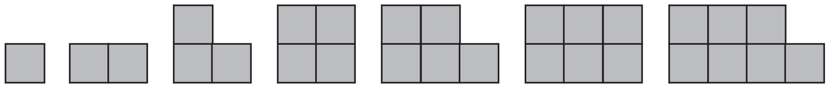
Unit 28 Growing patterns

MENTAL MATHS

- Ask the learners what they notice about the patterns. They identify the shapes and realise that the shapes get more as the pattern gets bigger. They should understand that these patterns are tessellations as described above.

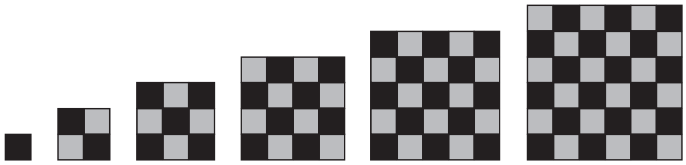
Solutions

In pattern A, the squares increase by one each time. It creates the sequence of natural numbers: 1; 2; 3; 4; … A square is added bottom right and top each time.

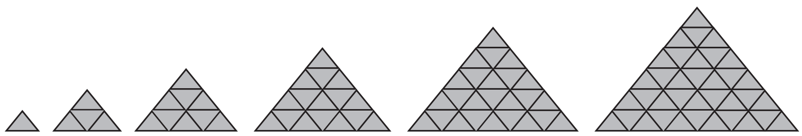


In pattern B the squares consist of a pattern of square numbers, i.e. 1; 4; 9; … The total number of squares in a shape is the product of the number of squares on the length and breadth, i.e. $1 \times 1 = 1$; $2 \times 2 = 4$; $3 \times 3 = 9$; … three squares are added, then five, then seven squares, i.e. the numbers added form the pattern of uneven numbers: 3; 5; 7; … The following series can also be observed:

$1 + 0 = 1$
$1 + 3 = 4$
$4 + 5 = 9$
$9 + 7 = 16$
$16 + 9 = 25$
$25 + 11 = 36$



Pattern C consists of triangles that increase in number. It forms the pattern 1; 4; 9; … i.e. square numbers. You add 3; 5; 7; … i.e. consecutive odd numbers in the bottom row each time. The patterns are formed by reflecting and sliding triangles.

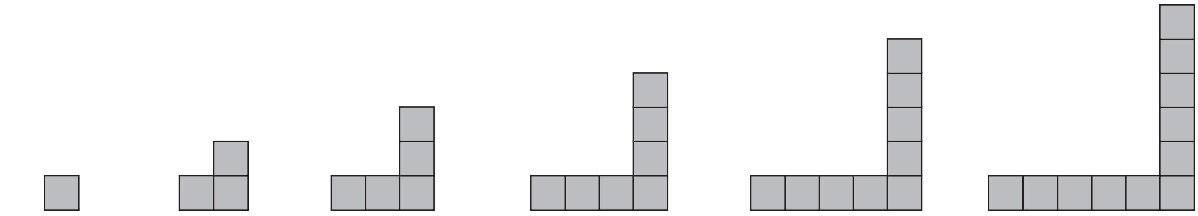


Activity 28.1

- Tell the learners that nations across the world use standard patterns in art and cultural artefacts. Let them search the internet for Islamic, Roman, Indian, etc. patterns. The Greeks called these tessellating squares arranged in a reversed L-shape gnomons.
- Give the learners squared paper to copy and extend the pattern. You could give them cubes to experience the growth of the patterns practically. They should add the next three patterns. They copy the table or you could give them copies of the tables from the Photocopiable Resources. They complete the numbers in the table up to the 10th term. They find out how many squares there would be in the 20th and 30th gnomons. Ask them to explain to the class how they determined the number of squares in the gnomons in the different patterns.
- Learners copy the shapes and extend them by drawing the next three figures in each pattern. Let them explain how the patterns grow and relate the growth to the number of shapes.
- They complete tables based on the number of shapes and look for relationships to develop rules. They explain relationships in their own words.
- Ask the learners to explore and discuss the matchstick patterns. Let them explain how the patterns grow. They should identify the constant number of sticks that is added each time. You could give the learners actual matchsticks to build and extend the patterns practically. Give them copies of the table from the Photocopiable Resources to complete the numbers up to the 10th terms.

Solutions

1. a), b)



Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5	Pattern 6
1	3	5	7	9	11

Learners should notice that you add one square on the horizontal and on the vertical columns each time. The rule is: 2 × pattern number − 1. Let the learners substitute the pattern number by any number to test the rule, for example: 3 × 2 − 1 = 5; 10 × 2 − 1 = 19; 30 × 2 − 1 = 59 and so on. The terms in the sequence form the pattern of uneven numbers.

c)

Pattern number	Number of squares
1	1
2	3
3	5
4	7
5	9
6	11
7	13
8	15
9	17
10	19

d) Pattern 20: 39 gnomons
Pattern 30: 59 gnomons

e) The rule is (2 × pattern number) − 1.

2. a)

A. Pattern number	Number of matchsticks
1	3
2	5
3	7
4	9
5	11
6	13
7	15
8	17
9	19
10	21

B. Pattern number	Number of matchsticks
1	4
2	7
3	10
4	13
5	16
6	19
7	22
8	25
9	28
10	31

b) The rule for finding the number of matchsticks in any pattern number in A is pattern number × 2 + 1, for example:
$1 \times 2 + 1 = 3$; $9 \times 2 + 1 = 19$
The terms in the output numbers form the sequence of odd numbers.
In pattern B the constant ratio is number sequence for the number of matchsticks is + 3 in the sequence 4; 7; 10; … The rule is pattern number × 3 + 1. Let them substitute the pattern numbers to check the rule, for example $1 \times 3 + 1 = 4$; $4 \times 3 + 1 = 13$; $30 \times 3 + 1 = 91$, and so on.
Rule for A: (2 × pattern number) + 1
Rule for B: (3 × pattern number) + 1

Unit 29 Investigating patterns to create rules

MENTAL MATHS

- Ask the learners to identify the shapes in the patterns and look for relationships between the squares and octagons to create a rule or generalisation to calculate the number of shapes in the next patterns. Ask them to name the first 10 numbers in the number sequence that results from the patterns.

Solutions

1. Pattern 4: 13 squares, 4 octagons
   Pattern 5: 16 squares, 5 octagons
2. Pattern 6: 19 squares, 6 octagons
   Pattern 10: 31 squares, 10 octagons
3. Octagons: 1; 2; 3; 4;5 ; 6; 7; 8; 9; 10
   Squares: 4; 7; 10; 13; 16; 19; 22; 25; 28; 31
4. Octagons: pattern number
   Squares: (3 × pattern number) + 1

Activity 29.1

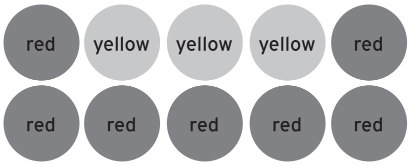
- Ask the learners to explore and describe the arrangements of the yellow and red circles. They should understand that one circle represents one bush (to make the context realistic). They calculate the different numbers of rose bushes if they know one of the colours.

- They copy and extend the table and determine, without drawings, how many rose bushes would be in arrangements with extended patterns. Ask them to copy and complete the table and describe the relationship or rules to get the number of red rose bushes.
- They investigate and describe the tile patterns and look for relationships in the number and arrangements of tiles. Let them use cubes or drawings to create and extend the pattern. They use the rule or generalisation to determine the number of green tiles if the number of black tiles is given. They apply the rule to calculate bigger numbers of green tiles. Allow them to explain how they do the calculations.

Solutions

1. a) i) 2 + 4 = 6 red rose bushes
   ii) 4 + 4 = 8 red rose bushes

   b)



   c) 8 + 4 = 12

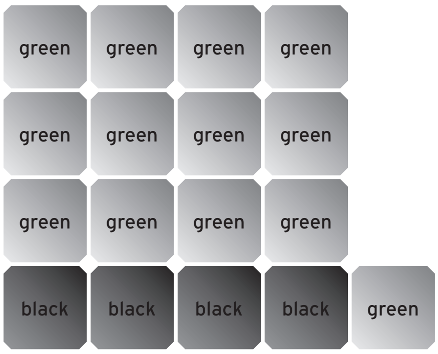
   d) 10 – 4 = 6

   e)

Number of yellow bushes	1	2	3	4	5	6	7	10	50
Number of red bushes	5	6	7	8	9	10	11	14	54

2. a) 10 green tiles

   b)



   c) 6 × 6 + 1 = 37

   d) 10 × 10 + 1 = 101

   e)

Number of black tiles	1	2	3	4	5	6	10	20
Number of green tiles	2	5	10	17	26	37	101	401

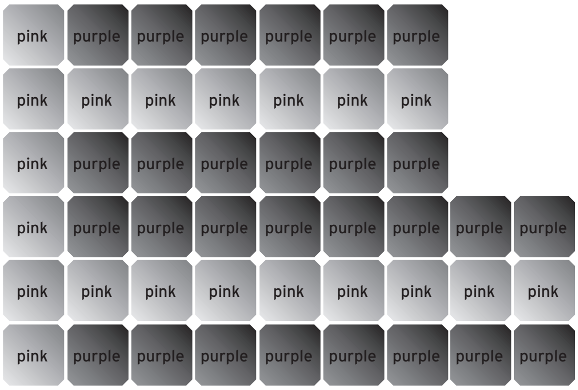
   f) 145 – 1 = 144 therefore 12 black tiles
   145 – 1 = 144 square number
   12 × 12 = 144

Unit 30 Writing pattern rules

MENTAL MATHS

- In this lesson you will take the learners through a step-by-step demonstration of the development of a rule or generalisation in words and calculations to represent the rule. They use cubes (use their own colours if they do not have these colours) to extend the patterns and use the rule to calculate the number of tiles in any pattern if they know the number of tiles for one of the colours.

Solutions

1. Learners discuss the tile pattern.
2. 

3. Pink tiles = (200 ÷ 2) + 3 = 103
4. Purple tiles = (153 – 3) × 2
   = 150 × 2
   = 300

Activity 30.1

- Ask the learners to study the tile stacks and to find out the number of red or yellow tiles as indicated. Guide them to writing the formal rule and introduce the concepts input values and output values.

Solutions

1. Red tiles = (2 × 4) + 3
   = 11
   Red tiles = (1 × 4) + 3
   = 7
   Red tiles = (4 × 4) + 3
   = 19
   a) 5 × 4 + 3 = 23
   c) i) (12 × 4) + 3 = 51
   ii) (60 × 4) + 3 = 243
   d) Number of red tiles = (yellow tiles × 4) + 3
   e) i) red tiles = (25 × 4) + 3 = 103
   ii) red tiles = (40 × 4) + 3 = 163
   f)

Number of yellow tiles	1	2	3	4	5	6	10	20
Number of red tiles	7	11	15	19	23	27	44	84

Unit 31 Input and output numbers

MENTAL MATHS

Solutions

1. 24
2. 32
3. 44
4. 80
5. 120
6. 0
7. 1
8. 3
9. 5
10. 22

Activity 31.1

- The learners determine input or output values in different flow diagrams.

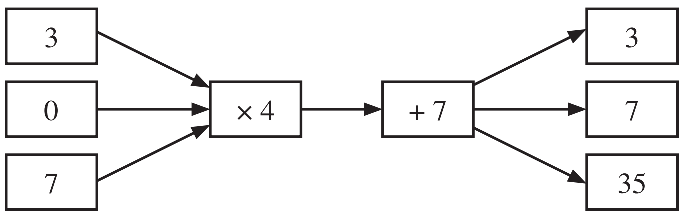
Solutions

1. a)

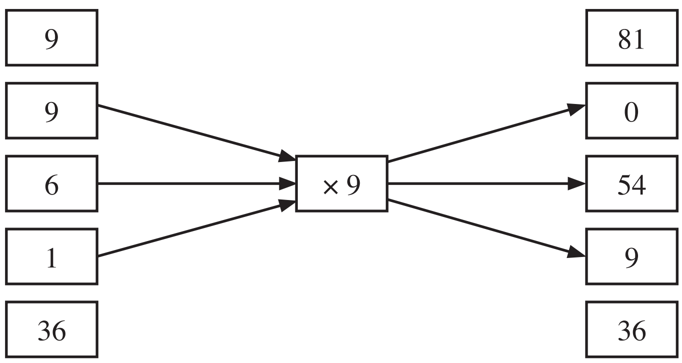
Input	Output
0	9
1	15
4	33
5	39
6	45
8	57
9	63
10	69
18	117
48	297

2.

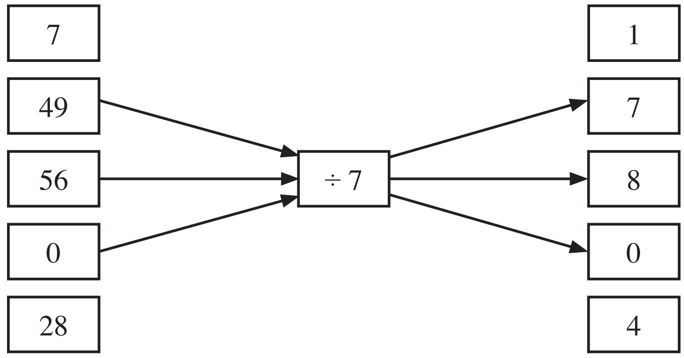
a)



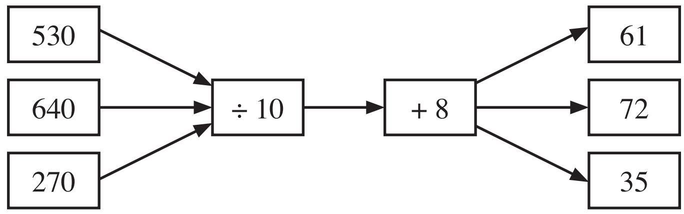
b)



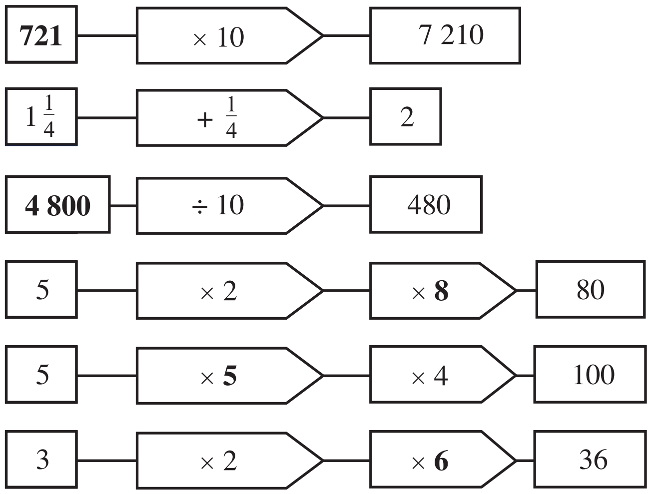
c)



d)



3. a) b) c) d) e) f)

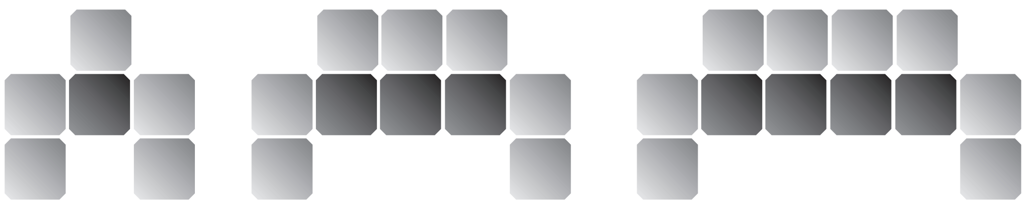


Assessment

Ask the learners to work on their own to complete the assessment task. They have to investigate the numbers of yellow and blue tiles to find the relationship or rule to calculate the different numbers of tiles. They complete function machines and flow diagrams.

Assessment Task 15

1. a) Draw the tile pattern with 5 black tiles.



b) Calculate the number of grey tiles if there are 6 black tiles.
c) Calculate the number of grey tiles if there are 10 black tiles.
d) How many black tiles will there be if there are 19 grey tiles?
e) How many black tiles will there be if there are 24 grey tiles?

2. Fill in the missing numbers in the function machines.

a) ? → ÷ 10 → 845

b) 324 → + ? → 364

c) 4 800 → ÷ ? → 2 400

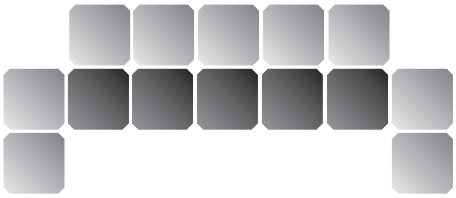
d) 5 → × 5 → × ? → 75

e) ? → × 5 → × 4 → 100

f) ? → × 2 → × 6 → 36

Solutions

1. a)



b) Grey tiles = 6 + 4 or 6 + (2 × 2) = 10
c) Grey tiles = 10 + 4 or 10 + (2 × 2) = 14
c) Black tiles = (20 − 4) ÷ 2 = 8
d) Black tiles = (24 − 4) ÷ 2 = 10

2. a) **8** → ÷ 10 → 845

b) 324 → + **40** → 364

c) 4 800 → ÷ **2** → 2 400

d) 5 → × 5 → × **3** → 75

e) **5** → × 5 → × 4 → 100

f) **3** → × 2 → × 6 → 36

Symmetry

This chapter revises the work done on symmetry in Grade 4. There is nothing new in Grade 5 conceptually relating to symmetry, so the learners get opportunities to practise identifying pictures and shapes with line symmetry.

Unit 32 Symmetrical shapes

Activity 32.1

- Remind the learners what the term 'symmetry' means and what a 'line of symmetry' is.
- Can the learners identify at least one line of symmetry in the pictures?
- Can they draw in lines of symmetry correctly?

Solutions

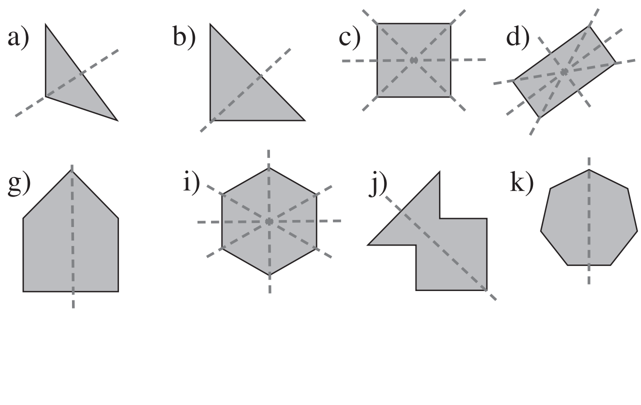
1–3. Some pictures have more than one line of symmetry.

4. A: one; B: one; C: four; D: one; E: one; F: one; G: eight
5. There should be plenty of symmetrical objects in the classroom, from a clothing item to a book, poster, door, table, desk, chair, mat, shelves, cupboards and so on. Make sure that the learners can draw in the lines of symmetry correctly.

Activity 32.2

- The page of shapes appears in the Photocopiable Resources section of this Teacher's Guide. You may give the learners copies of the page for them to work on. Alternatively, you could let the learners copy the shapes onto dotted paper to practise their shape-drawing skills.

Solutions

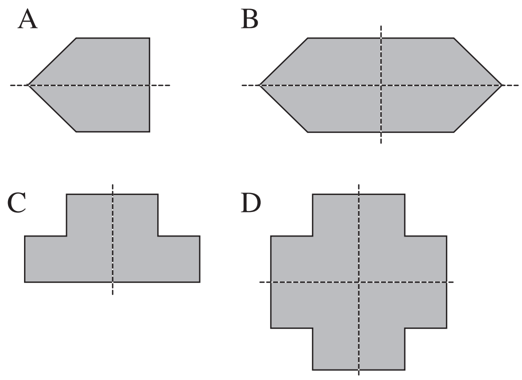
1. a) triangle b) triangle c) square
   d) rectangle e) quadrilateral f) pentagon
   g) pentagon h) hexagon i) hexagon
   j) heptagon k) heptagon
2. a) not symmetrical b) symmetrical
   c) symmetrical d) symmetrical
   e) not symmetrical f) not symmetrical
   g) symmetrical h) not symmetrical
   i) symmetrical j) symmetrical
   k) symmetrical
3. 

Activity 32.3

- How easily are the learners able to recognise symmetry in 2-D shapes?
- Can the learners draw in the lines of symmetry on 2-D shapes?
- How well can they complete mirror images to create symmetrical drawings?

Solutions

1. a)



   b) Shape D: There are also two diagonal lines of symmetry on the completed shape.

2. Learners copy and complete the shapes.

Investigation

1. Draw and cut out a square, a pentagon with all sides equal, and a hexagon with all sides equal.
2. Fold each shape to find out how many lines of symmetry each shape has.
3. Do you notice a pattern that links the number of sides of the shape to the number of lines of symmetry they have? You can use the table to record your findings.

Shape	Number of sides	Number of lines of symmetry
Square	4	
Pentagon	5	
Hexagon	6	

Remedial activities

- If the learners are unable to draw lines of symmetry on shapes, let them cut out simple shapes from paper and then try to fold each shape in order to create a mirror image of the shape. If they can create a mirror image, the fold in the paper will indicate where the line of symmetry should be. Then let the learners draw in the line of symmetry on the shape.
- Let the learners practise completing shapes with one line of symmetry only. Keep the shapes simple. Then let the learners progressively work more detail into the shapes, still with one line of symmetry. Then let them work with simple shapes with two lines of symmetry only.

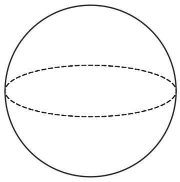
Extension activities

- Let the learners create artwork by creating a symmetrical shape to cover a full A4 sheet of dotted paper. They can draw in one vertical or one horizontal line as the line of symmetry, and then create and colour their symmetrical shapes. If the learners feel up to the challenge, let them draw in both a vertical and a horizontal line and then create a symmetrical shape with two lines of symmetry. Display all the symmetrical shapes on the classroom wall.

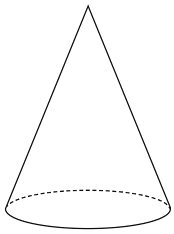
Assessment Task 16

1. a) Name the following 3-D objects.

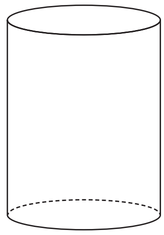
A



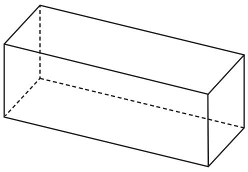
B



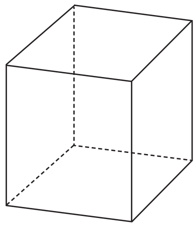
C



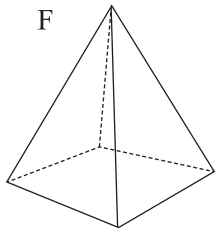
D



E



F

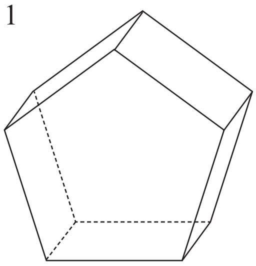


b) Which of the objects have at least one curved surface?

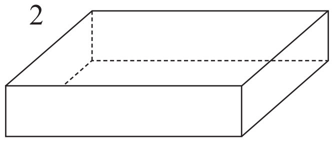
2. Say whether the following are true or false. Correct the false statements.
   a) A rectangular prism has six faces.
   b) A cube has eight faces.
   c) A rectangular prism can have square or rectangular faces.
   d) A cube can have square or rectangular faces.

3. a) Match the nets with the 3-D objects below.

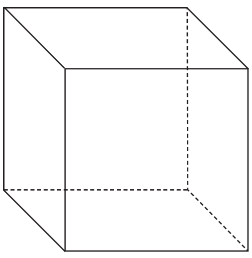
1



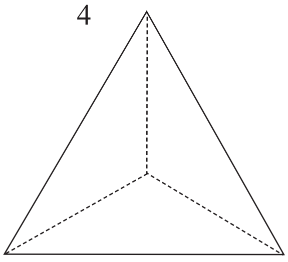
2

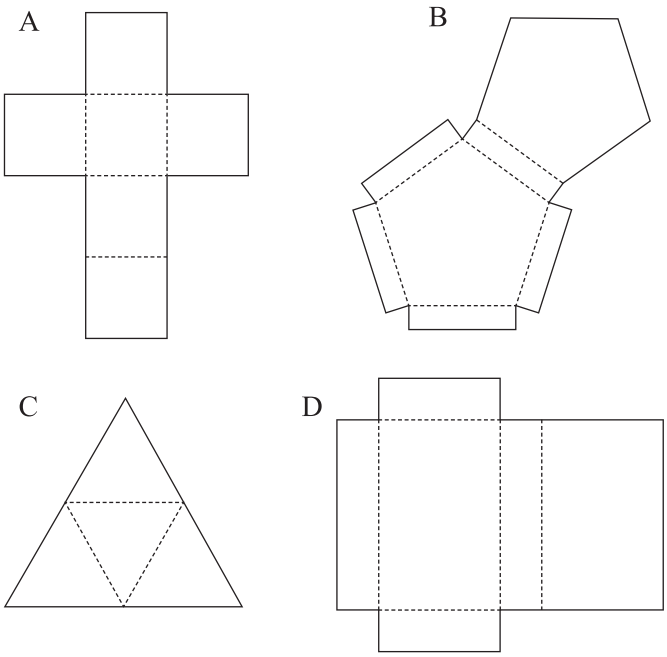


3



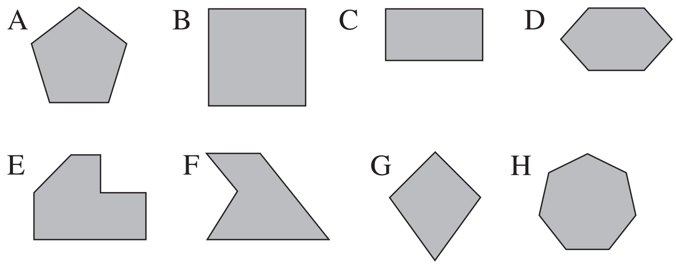
4





b) Give the name of objects B, C and D.

4. a) Which of the following shapes are symmetrical?
   b) How many lines of symmetry are there in the symmetrical shapes?



Solutions

1. a) A: sphere
      B: cone
      C: cylinder
      D: rectangular prism
      E: cube
      F: square-based pyramid
   b) Shapes A and C

2. a) True
   b) False. A cube has six faces.
   c) True
   d) False. A cube has square faces only.

3. a) 1: B
      2: D
      3: A
      4: C
   b) 2: rectangular prism
      3: cube
      4: triangular pyramid

4. a) A, B, C, D, G and H are symmetrical
   b) B: 4; C: 2; D: 4; G: 2; H: 1

Whole numbers: division

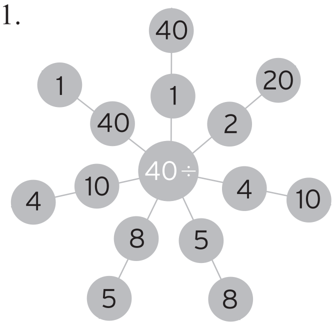
Tell the learners that they will learn more about division in the next seven units. Remind them that it is equally important to know the basic division facts just as they know the multiplication facts. Tell them they will do equal sharing with and without remainders, and divide three-digit numbers by two-digit numbers.

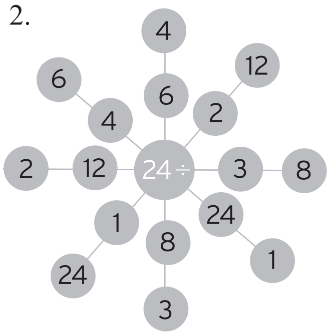
Unit 33 Basic division facts

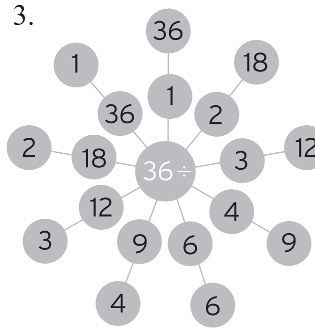
MENTAL MATHS

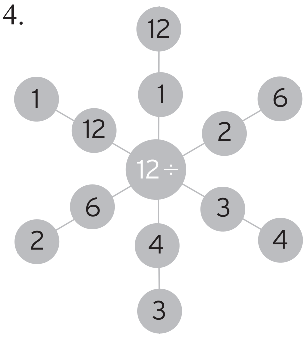
- The learners practise basic division facts using flow diagrams in the form of circles. Draw the diagrams on the board or give the learners copies.
- Check individual learners' knowledge. Explain the terminology dividend, divisor and quotient and revise the terms multiple and factor. Put the words on your number board.

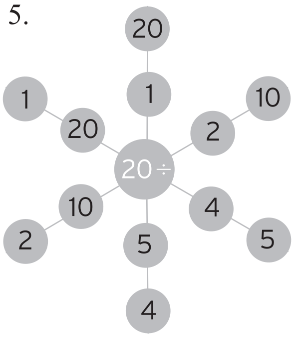
Solutions

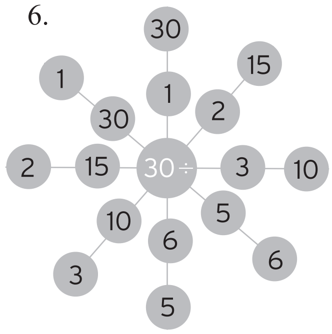
1.


2.


3.


4.


5.


6.


Activity 33.1

- Give the learners copies of the one-minute division table. Ask them to complete as many calculations as they can to show knowledge of basic division facts.
- Give them blank copies or let them copy the tables and complete them by halving and doubling. They should know by now that doubling entails multiplying by 2 and halving is dividing by 2.

Solutions

1.

One-minute division	
1. 9 ÷ 3 = 3	2. 4 ÷ 4 = 1
3. 15 ÷ 5 = 3	4. 28 ÷ 7 = 4
5. 18 ÷ 9 = 2	6. 35 ÷ 5 = 7
7. 14 ÷ 7 = 2	8. 42 ÷ 6 = 7
9. 8 ÷ 4 = 2	10. 48 ÷ 8 = 6
11. 18 ÷ 6 = 3	12. 72 ÷ 9 = 8
13. 16 ÷ 4 = 4	14. 32 ÷ 4 = 8
15. 21 ÷ 3 = 7	16. 45 ÷ 5 = 9
17. 27 ÷ 9 = 3	18. 56 ÷ 7 = 8
19. 25 ÷ 5 = 5	20. 64 ÷ 8 = 8

2.
a) 24 ÷ 8 = 3   24 ÷ 3 = 8
b) 21 ÷ 7 = 3   21 ÷ 3 = 7
c) 18 ÷ 3 = 6   18 ÷ 6 = 3
d) 27 ÷ 9 = 3   27 ÷ 3 = 9
e) 16 ÷ 8 = 2   16 ÷ 2 = 8
f) 28 ÷ 4 = 7   28 ÷ 7 = 4
g) 63 ÷ 7 = 9   63 ÷ 9 = 7
h) 56 ÷ 8 = 7   56 ÷ 7 = 8
i) 54 ÷ 6 = 9   54 ÷ 9 = 6

3.

a)

	18	26	34	38	46	58	76	84	98	104
Halve	9	13	17	19	23	29	38	42	49	52

b)

	16	22	27	35	45	54	63	74	88	92
Double	32	44	54	70	90	108	126	148	176	184

c)

	56	62	68	74	82	94	96	112	202	314
Halve	28	31	34		41		48	56	101	157

d)

	13	17	19	41	53	62	73	85	97	125
Double	26	34	38	82	106	124	146	170	194	250

e)

	50	100	150	200	250	300	350	400	450	500
Halve	25	50	75	100	125	150	175	200	225	250

Unit 34 Equal sharing with remainders

MENTAL MATHS

- The learners use problems in real-life contexts to practise equal sharing without remainders. Allow them to make drawings to demonstrate their understanding, and ask them to write division calculations to show what they understand.

Solutions

1. 15 ÷ 3 = 5	2. 16 ÷ 4 = 4	3. 20 ÷ 5 = 4
4. 24 ÷ ? =	5. 28 ÷ 4 = 7	6. 32 ÷ 8 = 4

Activity 34.1

- The learners solve real-life problems involving equal sharing with remainders that cannot be shared.
- They solve division problems out of context involving two- and three-digit numbers divided by one- and two-digit numbers.

Solutions

1. a) 30 ÷ 4 = (28 ÷ 4) + 2
   = 7 rem 2
   7 groups of 4 rem 2
   b) 40 ÷ 6 = 6 rem 4
   6 boxes 4 remain
   c) 28 ÷ 5 = 5 rem 3
   5 bunches rem 3
   d) 45 ÷ 8 = 5 rem 5
   5 bags rem 5
   e) 23 ÷ 4 = 5 rem 3
   5 blouses and 3 buttons remain

2. a) 63 ÷ 3 = 21
   b) 84 ÷ 4 = 21
   c) 105 ÷ 5 = 21
   d) 126 ÷ 6 = 21
   e) 108 ÷ 9 = 12
   f) 88 ÷ 8 = 11
   g) 147 ÷ 7 = 21
   h) 284 ÷ 4 = 71
   i) 864 ÷ 2 = 432
   j) 234 ÷ 1 = 234

3. a) 12 ÷ 5 = 2 rem 2
   b) 16 ÷ 7 = 2 rem 2
   c) 27 ÷ 4 = 6 rem 3
   d) 35 ÷ 8 = 4 rem 3
   e) 44 ÷ 6 = 7 rem 2
   f) 75 ÷ 9 = 8 rem 3
   g) 65 ÷ 7 = 9 rem 2
   h) 67 ÷ 8 = 8 rem 3
   i) 68 ÷ 9 = 7 rem 5
   j) 32 ÷ 3 = 10 rem 2

Unit 35 Dividing by multiples of 10, with and without remainders

MENTAL MATHS

- The learners solve equal grouping problems involving multiples of 10 and division by powers of 10 with remainders.

Solutions

1. a) 0 b) 2 c) 2
   d) 24 e) 240 f) 2 400

2. a) 0 b) 3 c) 33
   d) 330 e) 3 333

3. a) 0 b) 2 c) 25
   d) 255 e) 1 255

4. a) 5 ÷ 10 = 0 rem 5
   b) 27 ÷ 10 = 2 rem 7
   c) 348 ÷ 10 = 34 rem 8
   d) 1 234 ÷ 10 = 123 rem 4
   e) 63 ÷ 100 = 0 rem 63
   f) 125 ÷ 100 = 1 rem 25
   g) 3478 ÷ 100 = 34 rem 78
   h) 436 ÷ 1 000 = 0 rem 436
   i) 3 089 ÷ 1 000 = 3 rem 89
   j) 14 783 ÷ 1 000 = 14 rem 783

Activity 35.1

- Make sure that the learners understand the groupings of money amounts and what they have to find out. They have to divide and multiply with multiples of 10. They solve real-life contextual problems involving division by 100 and 1 000 with remainders in large numbers.

Solutions

1. a) 2 000 ÷ 10 = 200 × R2 coins
   b) 2 500 ÷ 10 = 250 × R5 coins
   c) 5 550 ÷ 10 = 555 × R100 notes
   d) 7 500 ÷ 10 = 750 × R200 notes
2. a) 200 × 2 = R400
   b) 250 × 5 = R1 250
   c) 555 × 100 = R55 500
   d) 750 × 200 = R150 000
3. a) 826 ÷ 100 = 8 and 26 lights remain
   b) 3 475 ÷ 100 = 34 and 75 lights remain
   c) 56 854 ÷ 100 = 568 boxes and 54 lights remain
   d) 100 216 ÷ 100 = 1 002 boxes and 16 lights remain
4. a) 7 075 ÷ 1 000 = 7 boxes and 75 toothpicks remain
   b) 15 500 ÷ 1000 = 15 boxes and 500 toothpicks remain
   c) 100 568 ÷ 1 000 = 100 boxes and 568 toothpicks remain
   d) 150 507 ÷ 1 000 = 150 boxes and 507 toothpicks remain

Unit 36 Dividing by multiples of 10 and equal sharing

MENTAL MATHS

- You can ask learners to use calculators to check the solutions they get when dividing large numbers involving multiples of 10.
- Ask them to describe the patterns and create rules.

Solutions

1.	25 ÷ 5 = 5	250 ÷ 50 = 5	2 500 ÷ 500 = 5
	250 ÷ 5 = 50	2 500 ÷ 50 = 50	25 000 ÷ 500 = 50
	2 500 ÷ 5 = 500	25 000 ÷ 50 = 500	250 000 ÷ 500 = 500
	25 000 ÷ 5 = 5 000	250 000 ÷ 50 = 5 000	
2.	16 ÷ 4 = 4	160 ÷ 40 = 4	1 600 ÷ 400 = 4
	160 ÷ 4 = 40	1 600 ÷ 40 = 40	16 000 ÷ 400 = 40
	1 600 ÷ 4 = 400	16 000 ÷ 40 = 400	160 000 ÷ 400 = 400
	16 000 ÷ 4 = 4 000	160 000 ÷ 40 = 4 000	
3.	36 ÷ 6 = 6	360 ÷ 60 = 6	3 600 ÷ 600 = 6
	36 000 ÷ 6 000 = 6	360 000 ÷ 6 000 = 60	

Activity 36.1

- Give the learners copies of the blank number chains from the Photocopiable Resources.
- They divide and multiply using powers of 10.

- They share amounts of money equally. Note that they do not add the amounts but rather share each group of coins and notes equally before adding the total amounts. They then use arrays of coins with remainders to write division statements or equations. They use number properties to solve the problems.
- Ask the learners to explore and discuss the children's reasoning for calculating the total amount of R2 coins and sharing them equally. Please note that this is an open question so there are various ways to share the amount equally. The children apply the commutative property to calculate the total amount of coins and they divide by different divisors. Ask the learners how else twenty R2-coins could be divided equally.
- They write multiplication calculations to calculate the total amount of R2 coins in the area models with remainders.
- Ask the learners to share the R2 coins equally so that no coins remain. Tell them that they have to decide amongst how many children they can share the coins so that zero coins remain. They should not use the amounts they calculated in question 2 but divide the coins in the arrays equally so that they get the number of coins and not amounts as solutions. They choose divisors that leave zero remainders. Let them share their strategies and solutions with the class during feedback.

Solutions

1. Complete the number chains.
   a) 450 000 ÷ 10 → 45 000 → ÷ 100 → 450 → ÷ 10 → 45 → ÷ 10 → 5 rem 4
   b) 7 × 10 → 70 → × 100 → 7 000 → × 10 → 70 000
   c) 300 000 ÷ 1 000 → 300 → ÷ 10 → 30 → ÷ 10 → 3
   d) 62 × 100 → 6 200 → × 10 → 62 000 → × 10 → 620 000 → ÷ 1 000 → 620
   e) 9 × 1 000 → 9 000 → ÷ 10 → 900 → × 100 → 90 000 → ÷ 1 000 → 90 → 10 ÷ → 9

2. Sharing equally between 2: (9 × 2) + (1 × 2) = R20 each.
   Sharing equally amongst 4: 5 × 2 = R10 each
   5: 4 × 2 = R8 each
   9: 2 × 2 = R4 rem R4
   10: 2 × 1 = R2 each, and so on.

3. a) (7 × 9 × 2) + (6 × 2) = 63 × 2 + 12
   = 126 + 12
   = R138
   b) (5 × 8 × 2) + (4 × 2) = 80 + 8
   = R88
   c) (3 × 7 × 2) + (2 × 2) = 42 + 4
   = R46
   d) (6 × 9 × 2) + (3 × 2) = 54 × 2 + 6
   = 108 + 6
   = R114
   e) (4 × 7 × 2) + (3 × 2) = 28 × 2 + 6
   = 56 + 6
   = R62

4. a) Dividing among 3: (3 × 7) + 2 = 23 coins each
   b) Dividing between 2: (5 × 4) + 2 = 22 coins each
   Dividing by 4: (2 × 5) + 1 = 11 coins each
   c) You cannot divide 23 coins equally without remainders.
   d) Dividing among 3: (2 × 9) + 1 = 19 coins each
   (6 × 3) + 1 = 19 coins each
   e) You cannot divide 31 coins equally without remainders.

Unit 37 Rounding off to estimate division solutions

MENTAL MATHS

- The learners round off numbers to get estimates of the solutions of division problems they have to solve. They find the rough calculations, solutions and predict whether the solutions would be too small or too big or indicate that it is difficult to say.
- Draw the table on the board and let the class work together to complete the table.

Solutions

Tell the learners that they should round off by choosing multiples of 10 as divisors that would leave zero remainders. Here are some possibilities for estimates. Allow them to use calculators to find the accurate solutions. They compare the estimates to the actual solutions.

Calculation	Rough calculation	Rough solution	Accurate solution
1. 104 ÷ 26 = ☐	100 ÷ 25	4	4
2. 114 ÷ 38 = ☐	120 ÷ 40	3	3
3. 319 ÷ 29 = ☐	300 ÷ 30	10	11
4. 414 ÷ 46 = ☐	400 ÷ 50	8	9
5. 333 ÷ 37 = ☐	330 ÷ 30	11	9
6. 260 ÷ 65 = ☐	280 ÷ 70	4	4
7. 567 ÷ 81 = ☐	560 ÷ 80	7	7
8. 434 ÷ 62 = ☐	420 ÷ 60	7	7
9. 801 ÷ 89 = ☐	810 ÷ 90	9	9
10. 946 ÷ 43 = ☐	960 ÷ 40	19	22

Activity 37.1

- Ask the learners to determine the best estimates for the two calculations given. Then they explore and discuss the division strategy provided. They use the strategy to calculate the accurate solutions of the problems from Mental Maths. Ask them to use the relationship between each of two equations to solve the second one each time. Let them discuss what they observe.

Solutions

1. a) 150 ÷ 10 = 15
   b) 150 ÷ 20 = 7 rem 10
   c) 160 ÷ 20 = 8
   152 ÷ 19 = 8
   The best estimate is c), the correct answer.

   a) 360 ÷ 20 = 18
   b) 370 ÷ 10 = 37
   c) 360 ÷ 10 = 36
   364 ÷ 14 = 26
   The best estimate is a), which is closest to the correct answer.

2. a) 104 ÷ 26 = ☐

~~26 × 10 = 260~~	104	3 × 26 = 78	**104 ÷ 26 = 4**
~~26 × 5 = 130~~	− 78	<u>1</u> × 26 = <u>26</u>	
26 × 1 = 26	26	**4** × 26 = **104**	
~~26 × 2 = 54~~			
~~26 × 4 = 108~~			
26 × 3 = 78			

b) 114 ÷ 38 = ☐

38 × **1** = 38	114 − 76 = 38	**114 ÷ 38 = 3**
38 × **2** = 76	76 + 38 = 114	
~~38 × 4 = 152~~		

c) 319 ÷ 29 = ☐

29 × **10** = 290	319 – 290 = 29	**319 ÷ 29 = 11**
29 × **1** = 29	290 + 29 = 319	

d) 414 ÷ 46 = ☐

~~46 × 10 = 460~~	414 − 368 = 46	**414 ÷ 46 = 9**
46 × 1 = 46		
~~46 × 2 = 92~~	**8** × 46 = 368	
~~46 × 4 = 184~~	**<u>1</u>** × 46 = <u>46</u>	
46 × 8 = 368	**9** × 46 = **<u>414</u>**	

e) 333 ÷ 37 = ☐

~~37 × 10 = 370~~	333 − 185 = 148	**333 ÷ 37 = 9**
37 × 5 = 185		
~~37 × 1 = 37~~	**5** × 37 = 185	
~~37 × 2 = 74~~	**<u>4</u>** × 37 = <u>148</u>	
37 × 4 = 148	**9** × 37 = **<u>333</u>**	

f) 260 ÷ 65 = ☐ **260 ÷ 65 = 4**

~~65 × 1 = 65~~
~~65 × 2 = 130~~
65 × 4 = 260

g) 567 ÷ 81 = ☐

~~81 × 1 = 81~~	**2** × 81 = 162	**567 ÷ 81 = 7**
81 × 2 = 162	**<u>5</u>** × 81 = <u>405</u>	
~~81 × 4 = 324~~	**7** × 81 = **567**	
81 × 5 = 405		

h) 434 ÷ 62 = ☐ **434 ÷ 62 = 7**

62 × 1 = 62	**1** × 62 = 62	
~~62 × 2 = 124~~	**<u>6</u>** × 62 = <u>372</u>	
~~62 × 4 = 248~~	**7** × 62 = **434**	
62 × 6 = 372		

i) 801 ÷ 89 = ☐ **801 ÷ 89 = 9**

89 × 10 = 890
89 × 9 = 801

j) 946 ÷ 43 = ☐ **946 ÷ 43 = 22**

~~43 × 10 = 430~~	**20** × 43 = 860	
43 × 20 = 860	**<u>2</u>** × 43 = <u>86</u>	
~~43 × 1 = 43~~	**22** × 43 = 946	
43 × 2 = 86		
~~43 × 4 = 172~~		

3. Look for relationships to solve the following.

a) 240 ÷ 24 = 10
288 ÷ 24 = 10 + 2
= 12

b) 75 ÷ 25 = 3
150 ÷ 25 = 3 × 2
= 6

c) 560 ÷ 10 = 56
560 ÷ 5 = 56 × 2
= 112

d) 380 ÷ 19 = 20
380 ÷ 38 = 20 ÷ 2
= 10

e) 240 ÷ 16 = 15
240 ÷ 8 = 15 × 2
= 30

Unit 38 Finding relationships

MENTAL MATHS

- Ask the learners to use the equations in the frames to solve the problems. You should make them understand that they do not have to do any calculations. They use the relationships amongst the numbers, e.g. 47 × 17 = 799 because 799 ÷ 17 = 47.

Solutions

1. 47 × 17 = 799	2. 598 ÷ 23 = 26
3. 468 ÷ 36 = 13	4. 598 ÷ 46 = 13
5. 7 990 ÷ 17 = 470	6. 23 × 26 = 598
7. 13 × 18 = 234	8. 5 980 ÷ 260 = 23
9. 468 ÷ 13 = 36	10. 13 × 360 = 4 680

Activity 38.1

- Let the learners discuss the ancient Egyptian method used for dividing numbers. You could have a class discussion about the Egyptians' inventions and contributions to mathematics in the language or social sciences lessons.
- The method involves doubling and addition. The numbers 1; 2; 4; 8; 16; 32;… are called powers of 2. They will learn about powers and exponents in higher grades.
- Make sure that all learners understand the strategy. You should keep in mind that learners are encouraged to practise strategies that are suggested. They should however not be forced to use a prescribed strategy when they solve other problems, but rather be allowed to use their own strategies. If they are comfortable with prescribed strategies and adapt them as their own, it is fine.
- Let them check the solutions using multiplication as the inverse of division. Ask them to explore the solutions and the divisors in each problem. They describe what they observe. They could create their own expressions to find out if the rule always works.

Solutions

1. a) 476 ÷ 28 = □

1	28	✓	448 + 28 = 476	
2	56		1 + 16 = 17	
4	112			
8	224			
16	448	✓		
17	**476**			**476 ÷ 28 = 17**

b) 506 ÷ 23 = □

1	23			
2	46	✓	46	2 + 4 + 16 = 22
4	92	✓	92	
8	184			
16	368	✓	+ 368	**506 ÷ 23 = 22**
22	**506**		506	

c) 468 ÷ 26 = ☐

1	26			
2	52	✓	52	2 + 16 = 18
4	104			
8	208			
16	416	✓	+ 416	**468 ÷ 26 = 18**
			468	

d) 247 ÷ 19 = ☐

1	19	✓	19	
2	38			1 + 4 + 8 = 13
4	76	✓	76	
8	152	✓	+ 152	**247 ÷ 19 = 13**
16	304		247	

e) 406 ÷ 14 = ☐

1	14	✓	14	
2	28			1 + 4 + 8 + 16 = 29
4	56	✓	56	
8	112	✓	112	**406 ÷ 14 = 29**
16	224	✓	+ 224	
			406	

2. a) 260 ÷ 13 = 20
   b) 520 ÷ 26 = 20
   c) 960 ÷ 24 = 40
   d) 480 ÷ 12 = 40
   e) 120 ÷ 3 = 40
   f) 123 ÷ 3 = 41
   g) 615 ÷ 15 = 41

Unit 39 Division strategies

MENTAL MATHS

- Give each pair of learners a set of 13 division dominos cards from the Photocopiable Resources.
- They shuffle the cards and place the stack face down.
- Each one gets a chance to draw a card.
- The second player draws a card. If the card has an expression that has the same answer as one of the expressions on the open card on the table, he/she adds the card to the chain that will be created.
- They should understand that sides of the cards that are shaded or unshaded should fit together. If a player draws a card that does not fit, he/she keeps the card but loses a round.
- The card is then added later when its match is tabled.
- The winner is the one who has played all his/her cards first.

Activity 39.1

- Ask the learners to explore and discuss the strategies suggested for division by 25 and 75. They use the strategies to solve the problems.

Solutions

1. a) 825 ÷ 75 = ☐
   75 ÷ 75 = 1
   150 ÷ 75 = 2
   ~~300 ÷ 75 = 4~~
   600 ÷ 75 = 8
   825 ÷ 75 = 11

   b) 900 ÷ 75 = ☐
   75 ÷ 75 = 1
   150 ÷ 75 = 2
   300 ÷ 75 = 4
   600 ÷ 75 = 8
   900 ÷ 75 = 12

c) 1 050 ÷ 75 = □
~~75 ÷ 75 = 1~~
150 ÷ 75 = 2
300 ÷ 75 = 4
600 ÷ 75 = 8
1 050 ÷ 75 = 14

d) 700 ÷ 25 = □
~~25 ÷ 25 = 1~~
~~50 ÷ 25 = 2~~
100 ÷ 25 = 4
200 ÷ 25 = 8
400 ÷ 25 = 16
700 ÷ 25 = 28

e) 575 ÷ 25 = □
25 ÷ 25 = 1
50 ÷ 25 = 2
100 ÷ 25 = 4
~~200 ÷ 25 = 8~~
400 ÷ 25 = 16
575 ÷ 25 = 23

f) 675 ÷ 25 = □
25 ÷ 25 = 1
50 ÷ 25 = 2
~~100 ÷ 25 = 4~~
200 ÷ 25 = 8
400 ÷ 25 = 16
675 ÷ 25 = 27

2. a) 330 ÷ 30 = □
(330 ÷ 10) ÷ 3 = 33 ÷ 3
= 11

b) 780 ÷ 60 = □
780 ÷ 10 ÷ 6 = 78 ÷ 6
= (60 + 18) ÷ 6
= (60 ÷ 6) + (18 ÷ 6)
= 10 + 3
= 13

c) 272 ÷ 17 = □
1 17
2 34
4 68
8 136
16 272 ✓
16 272
272 ÷ 17 = 16

d) 756 ÷ 28 = □
1 28 ✓
2 56 ✓
~~4 112~~
8 224 ✓
16 448 ✓
27 756
756 ÷ 28 = 27

e) 825 ÷ 33 = □
1 33 ✓
2 66
4 132
8 264 ✓
16 528 ✓
825 ÷ 33 = 25

f) 950 ÷ 25 = □
25 ÷ 25 = 1
50 ÷ 25 = 2 ✓
100 ÷ 25 = 4 ✓
200 ÷ 25 = 8
400 ÷ 25 = 16
800 ÷ 25 = 32 ✓
950 ÷ 25 = 38

Problem-solving and investigation

Ask the learners to use their own methods to solve the problems. They will probably not notice at first that the divisors are consecutive multiples of 3. If they don't, draw their attention to this. They will realise that all the problems give the same solution. Let them experiment with division with other numbers like these. Then ask them to create their own division expressions, which will give the same answer as 120 ÷ 30 = 4 in question 2. They use their own strategies to solve the problems involving real-life contexts.

Solutions

1. a) 444 ÷ 12 = □
1 12 ✓
2 24
4 48 ✓
8 96
16 192
32 384 ✓
444 ÷ 12 = 37

b) 555 ÷ 15 = □
1 15 ✓
2 30
4 60 ✓
8 120
16 240
32 480 ✓
555 ÷ 15 = 37

c) 666 ÷ 18 = □

1	18	✓
2	36	
4	72	✓
8	144	
16	288	
32	576	✓

666 ÷ 12 = 37

Three more calculations:
777 ÷ 21 = 37
888 ÷ 24 = 37
999 ÷ 27 = 37
The pattern always works.

2. 80 ÷ 20 = 4
100 ÷ 25 = 4
160 ÷ 40 = 4
1 200 ÷ 300 = 4
12 000 ÷ 3 000 = 4

3. 300 ÷ 12 = □
300 ÷ 12 = 25 tables

4. 900 ÷ 16 = □
900 ÷ 16 = 56 rem 4
56 passengers per bus and 4 extra fans.

5. 756 ÷ 12 = □

1	12	✓
2	24	
4	48	
8	96	
16	192	
32	384	
64	768	✓

768 – 12 = 756
64 – 1 = 63
} 756 ÷ 12 = 63 boxes

6. R450 + R410 + R365 + R365 = 860 + 730
= R1 590
= R1 590 ÷ 4 = (1 000 ÷ 4) + (560 ÷ 4) + (30 ÷ 4)
= 250 + 140 + 7 rem 2
= R390 + (R2 ÷ 4)
= R390,50 each

Assessment

The learners work on their own to complete the assessment task. Tell them that they will demonstrate knowledge of what they have learnt about division in the past seven units. They will share equally, show knowledge of basic division and multiplication facts using flow diagrams, look for relationships to solve problems and use their own methods to divide three-digit by two-digit numbers.

Assessment Task 17

1. a) Four children share R20 equally amongst them. How much does each child get?
   b) Five friends bought a Lotto ticket together. They won R450. How much does each friend get?
   c) John works 6 days per week after school. If he earns R360 per week, how much does he earn per day?

2. Calculate:
   a) 320 ÷ 40 = □
   b) 6 400 ÷ 80 = □
   c) 81 000 ÷ 900 = □

3. Complete the flow diagrams.

a)

Input	÷ 9	Output
54	➞	□
45	➞	□
0	➞	□
9	➞	□
18	➞	□
81	➞	□
36	➞	□
63	➞	□
27	➞	□
72	➞	□

b)

Input	× 8	Output
□	➞	48
4	➞	□
□	➞	16
5	➞	□
□	➞	24
□	➞	64
10	➞	□
□	➞	8
□	➞	0
□	➞	96

4. Use the calculations in the box to help you solve the problems below.

768 ÷ 16 = 48	37 × 19 = 703	432 ÷ 24 = 18

a) 432 ÷ 12 = □
b) 16 × 48 = □
c) 703 ÷ 19 = □
d) 432 ÷ 18 = □
e) 768 ÷ 32 = □
f) 19 × 37 = □

5. Solve the following.
a) 850 ÷ 25 = □
b) 750 ÷ 750 = □
c) 408 ÷ 34 = □

6. Calculate:
a) 127 ÷ 12 = □
b) 159 ÷ 15 = □

Solutions

1. a) R20 ÷ 4 = R5 each
b) R450 ÷ 5 = R90 each
c) R360 ÷ 6 = R60 per day

2. a) 320 ÷ 40 = 8
b) 6 400 ÷ 80 = 80
c) 81 000 ÷ 900 = 90

3. a)

Input	÷ 9	Output
54	➞	**6**
45	➞	**5**
0	➞	**0**
9	➞	**1**
18	➞	**2**
81	➞	**9**
36	➞	**4**
63	➞	**7**
27	➞	**3**
72	➞	**8**

b)

Input	× 8	Output
6	➞	48
4	➞	**32**
2	➞	16
5	➞	**40**
3	➞	24
8	➞	64
10	➞	**80**
1	➞	8
0	➞	0
12	➞	96

4. a) 432 ÷ 12 = 36
b) 16 × 48 = 768
c) 703 ÷ 19 = 37
d) 432 ÷ 18 = 24
e) 768 ÷ 32 = 24
f) 19 × 37 = 703

5. a) 850 ÷ 25 = 34
b) 750 ÷ 750 = 1
c) 408 ÷ 34 = 12

6. a) 127 ÷ 12 = 10 rem 7
b) 159 ÷ 15 = 10 rem 9

Term 3

Common fractions

Remind the learners that they worked with fractions at the beginning of Term 2. Ask them to tell you what common fractions are. Use the pictures in the Learner's Book to refresh their memory. Ask them questions to revise some of the work they did with fractions earlier in the year. Tell them that they will build on their existing knowledge and learn more about fractions this week.

Unit 1 Counting in fractions

MENTAL MATHS

- Tell the learners to work together as a class to solve the problems without writing anything down. They will have to use multiplication, counting and comparing fraction, find equivalent fractions, a fraction of a whole number, and share equally (and also share a remainder).
- Learners will have to multiply by 2, 10 and 12 to get the number of $\frac{1}{2}$ s, $\frac{1}{10}$ s and $\frac{1}{12}$ s in a whole. Use the questions to develop some of your own problems.
- Let them play the Fraction Snap Card Game in pairs. Make copies of the cards in the Photocopiable Resources. You should copy the cards onto stiff card and laminate them if possible. They find pairs of cards that add up to 2 to practice fraction addition with proper and mixed fractions.

Solutions

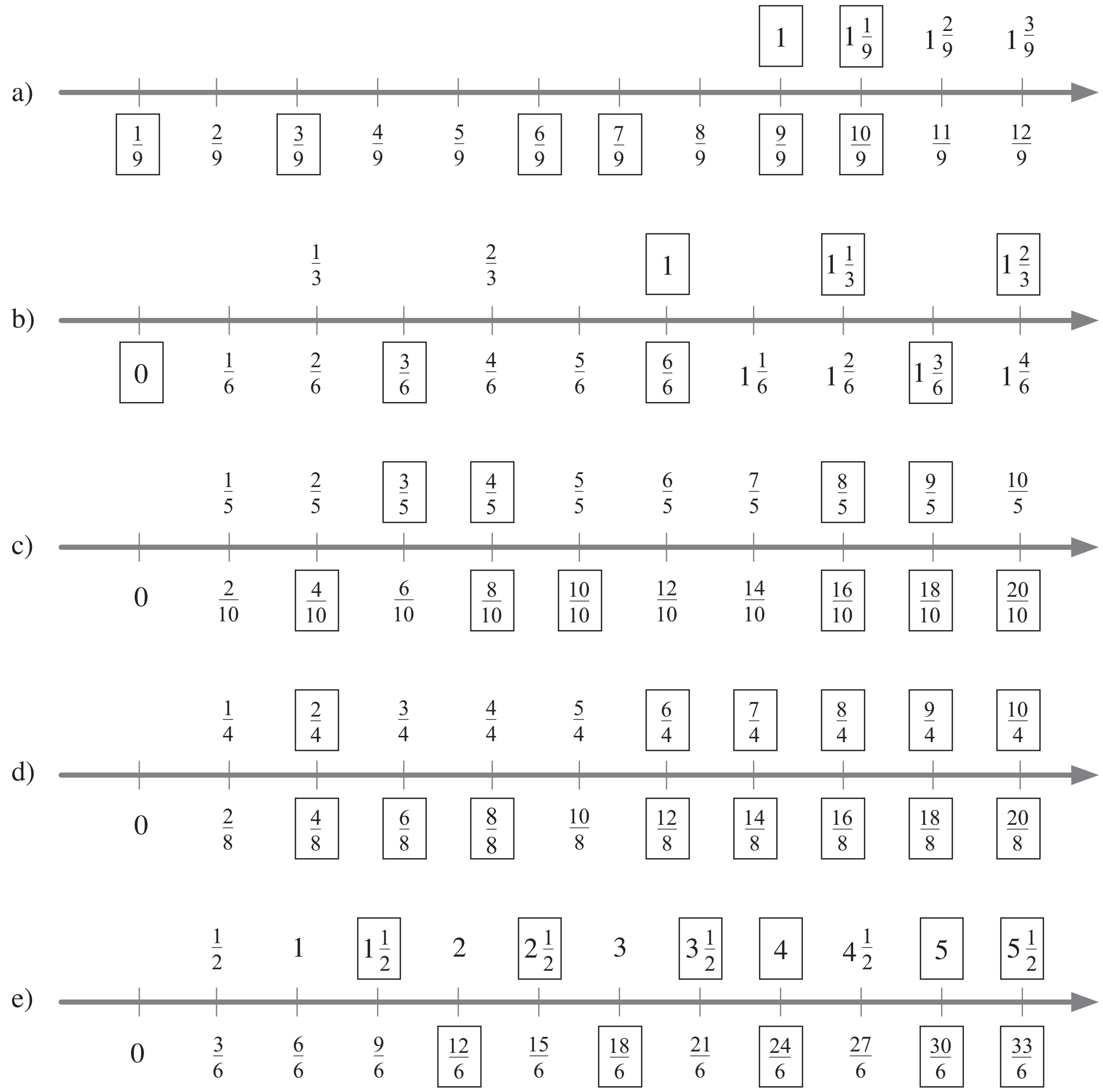
1. a) $2 \times 4 = 8$ halves in 4 wholes
   b) 10 tenths in 1 whole
   c) $2 \times 12 = 24$ twelfths in 2 wholes
   d) $\frac{1}{2} = \frac{3}{6}$; $\frac{4}{8} = \frac{3}{6}$; $\frac{6}{12} = \frac{3}{6}$, etc.
   e) $1\frac{1}{7}$ or $\frac{8}{7}$
   f) $1\frac{1}{11}$ or $\frac{12}{11}$
   g) $\frac{21}{10}$ or $2\frac{1}{10}$
   h) True: $\frac{2}{7} > \frac{2}{8}$
   i) $\frac{1}{4}$ of $12 = 3$
   j) $1\frac{1}{2}$ candy bars each
2. Learners play the Fraction Snap Card Game.

Activity 1.1

- Give the learners copies of blank number lines from the Photocopiable Resources or ask them to make copies of the number lines and fill in the missing fractions. Ask the learners to write down both fractions where solutions are required above and below the number lines.
- The learners work with proper, improper and mixed fractions. They will work with these fractions in a Mental Maths activity too, but you can explain what these fractions are in this lesson.
- Let the learners explain how each sequence works.

Solutions

1.



2. a) $0; \frac{1}{7}; \frac{2}{7}; \frac{3}{7}; \frac{4}{7}; \frac{5}{7}; \frac{6}{7}; \frac{7}{7}; \frac{7}{7}; \frac{8}{7}; \frac{9}{7}; \frac{10}{7}; \frac{11}{7}$

b) $0; \frac{2}{12}; \frac{4}{12}; \frac{6}{12}; \frac{8}{12}; \frac{10}{12}; \frac{12}{12}; \frac{14}{12}; \frac{16}{12}; \frac{18}{12}; \frac{20}{12}; \frac{22}{12}$

c) $0; \frac{2}{2}; \frac{4}{2}; \frac{6}{2}; \frac{8}{2}; \frac{10}{2}; \frac{12}{2}; \frac{14}{2}; \frac{16}{2}; \frac{18}{2}; \frac{20}{2}; \frac{22}{2}$

d) $0; \frac{2}{8}; \frac{4}{8}; \frac{6}{8}; \frac{8}{8}; \frac{10}{8}; \frac{12}{8}; \frac{14}{8}; \frac{16}{8}; \frac{18}{8}; \frac{20}{8}; \frac{22}{8}$

e) $0; \frac{1}{4}; \frac{2}{4}; \frac{3}{4}; \frac{4}{4}; \frac{5}{4}; \frac{6}{4}; \frac{7}{4}; \frac{8}{4}; \frac{9}{4}; \frac{10}{4}; \frac{11}{4}$

Unit 2 Equivalent fractions and fraction calculations

MENTAL MATHS

- Give the learners copies of the blank hexagons from the Photocopiable Resources.

- Let them look at the example to understand how to represent $\frac{1}{3}$ and $\frac{1}{6}$ of a shape. Let them explain why $\frac{1}{3}$ is two shaded parts and $\frac{1}{6}$ is one shaded part of a hexagon.
- Ask them to shade the fraction parts in the hexagons as indicated. They can use a different colour for each pair of fractions.

Activity 2.1

- Make copies of the blank octagons in the Photocopiable Resources.
- Tell the learners that they will use representations of fractions to add and subtract fractions with the same denominators.
- Ask them what they think is represented by the pink, yellow and green shaded parts in the octagons. Make sure they understand that the shaded parts show addition ($\frac{8}{8} + \frac{4}{8} = \frac{12}{8} = 1\frac{4}{8}$ or $1\frac{1}{2}$) and subtraction ($\frac{8}{8} - \frac{4}{8} = \frac{4}{8}$ or $\frac{1}{2}$).
- Ask the learners to name other forms of addition and subtraction shown in the octagons (such as $1 + \frac{1}{2}$).
- The activity allows the learners to develop or enhance understanding of equivalent fractions while they do calculations with fractions.
- Ask them to write addition and subtraction calculations for the diagrams in question 1 and identify and record the equivalent fraction parts represented in the shapes in question 2.
- You can ask the learners to make freehand copies of the shapes. This will help them practise estimating and also drawing sketches. Discuss the solutions with the class.

Solutions

1. a) $\frac{3}{8} + \frac{3}{8} = \frac{6}{8}$

   b) $\frac{4}{8} + \frac{4}{8} = \frac{8}{8} = 1$ or $\frac{1}{2} + \frac{1}{2} = 1$

   c) $\frac{8}{8} + \frac{3}{8} = \frac{11}{8} = 1\frac{3}{8}$ or $1 + \frac{3}{8} = 1\frac{3}{8}$

   d) $\frac{8}{8} + \frac{8}{8} + \frac{7}{8} = \frac{23}{8} = 2\frac{7}{8}$ or $1 + 1 + \frac{7}{8} = 2\frac{7}{8}$

   e) $\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$

   f) $\frac{8}{8} - \frac{7}{8} = \frac{1}{8}$

   g) $\frac{8}{8} + \frac{8}{8} - \frac{6}{8} = \frac{16}{8} - \frac{6}{8} = \frac{10}{8} = 2\frac{2}{8}$ or $2\frac{1}{4}$

   h) $\frac{8}{8} + \frac{4}{8} = \frac{4}{8} = \frac{12}{8} - \frac{4}{8} = \frac{8}{8} = 1$

2. a) $\frac{1}{2}$

   b) $\frac{2}{4} = \frac{1}{2}$

   c) $\frac{4}{6}$ and $\frac{2}{3}$

   d) $\frac{6}{8}$ and $\frac{3}{4}$

   e) $\frac{4}{7}$

   f) $\frac{6}{10}$ and $\frac{3}{5}$

   g) $\frac{8}{12}$ and $\frac{4}{6} = \frac{2}{3}$

Unit 3 Equal sharing

MENTAL MATHS

- Ask the learners to count in fractions using the number lines in Unit 1. They explore the notes on the blackboard to understand what proper, improper and mixed fractions are.
- They will practise conversions from improper to mixed fractions and from mixed fractions to improper fractions.
- Let them explain and describe the different fractions. They should notice that:
  - the numerators are smaller than the denominators in proper fractions
  - the numerators are bigger than the denominators in improper fractions
  - mixed fractions are a mix of whole numbers and fractions.
- Let them look at the rules and apply them when they convert between improper and mixed fractions.

Solutions

1. Learners count the fractions on the number lines.
2. Learners explain what they understand about fractions.
3. Class discussion.
4. a) $1\frac{3}{5}$ b) $1\frac{3}{10}$
   c) $1\frac{1}{3}$ d) $1\frac{3}{6}$ or $1\frac{1}{2}$
   e) $1\frac{3}{8}$ g) $2\frac{1}{7}$
   h) $3\frac{1}{4}$ i) $1\frac{3}{12}$ or $1\frac{1}{4}$
   j) $1\frac{3}{12}$ or $1\frac{1}{4}$
5. a) $\frac{3}{2}$ b) $\frac{13}{4}$
   c) $\frac{8}{3}$ d) $\frac{27}{6}$
   e) $\frac{17}{10}$ f) $\frac{78}{11}$
   g) $\frac{27}{12}$ h) $\frac{24}{5}$
   i) $\frac{43}{4}$ j) $\frac{82}{9}$

Activity 3.1

- Tell the learners that they will work with real-life simulations that involve equal sharing where they also have to share any remainders equally. They will also share objects where the number of objects is fewer than the number of children amongst whom the objects need to be shared. Tell them that they can use drawings if necessary.
- The learners will perform repeated addition of fractions with the same denominators and work with improper and mixed fractions.
- Encourage learners to convert between these types of fraction.

Solutions

One way of solving each problem is illustrated below. The learners might suggest different strategies. They should make drawings before they work with numbers only, but if some learners are able to work with numbers straight away, allow them to do so. They can explain their strategies when you discuss answers with the class. Make sure that learners share less advanced and more advanced strategies in good spirit. You should emphasise that each one's contributions and efforts are valued.

1. a) 1 bunny chow = $\frac{5}{5}$ so each one gets $\frac{1}{5}$

   2 bunny chows = $\frac{10}{5}$ so each one gets $\frac{2}{5}$

   3 bunny chows = $\frac{15}{5}$ so each one gets $\frac{3}{5}$

   4 bunny chows = $\frac{20}{5}$ so each one gets $\frac{4}{5}$

   5 bunny chows = $\frac{25}{5}$ so each one gets $\frac{5}{5}$ or 1 whole

   6 bunny chows = $\frac{30}{5}$ so each one gets $\frac{6}{5}$ or $1\frac{1}{5}$

   7 bunny chows = $\frac{35}{5}$ so each one gets $\frac{7}{5}$ or $1\frac{2}{5}$

   b) 11 ÷ 4 = 2 remainder 3

   Each girl gets two whole Bar Twos. The remainder of 3 is shared equally:

   $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1$
   $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1$
   $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1$

   Each girl gets another $\frac{3}{4}$ of a Bar Two.

   In total, each girl gets: $2 + \frac{3}{4} = 2\frac{3}{4}$ of the 4 Bar Twos.

   c) Show that each child gets $\frac{10}{3} = 3\frac{1}{3}$.

   Also show by one-to-one correspondence that each child gets 3 and the tenth rectangle is divided into thirds so that each one gets $3\frac{1}{3}$.

   d) 5 ÷ 2 = 2 remainder 1; each girl gets two fruit rolls and they share one equally: $\frac{1}{2} + \frac{1}{2} = 1$.

   e) 10 ÷ 7 = 1 remainder 3

   3 wholes divided into 7 equal parts:

	Each sausage roll divided into 7 pieces						
1 sausage roll	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$
1 sausage roll	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$
1 sausage roll	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$
Child	1	2	3	4	5	6	7

   So, each child will get $1\frac{3}{7}$ sausage rolls.

2. Ask the learners how they will share 1 candy bar amongst 2 children, 3 and 4 children. They should realise that the children will now get fraction parts less than one whole. Ask them to make drawings to help them work out the answers. You could then show them using numbers only that $1 \div 2 = \frac{1}{2}$; $1 \div 3 = \frac{1}{3}$ and $1 \div 4 = \frac{1}{4}$. Let them look at the example where 3 candy bars are shared equally among 5 children. Ask them if each one's share will be more or less than a whole. Let them explore the strategy shown. They use the strategy to solve the problems.

a)

1 bar	☐	☐	☐	☐
2 bar	☐	☐	☐	☐
3 bar	☐	☐	☐	☐
	1	2	3	4

1 bar	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
1 bar	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
1 bar	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
Total: 3 bars	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$

Each child gets $\frac{3}{4}$ of the bars.

b)

1 bar	☐	☐	☐	☐	☐	☐
2 bar	☐	☐	☐	☐	☐	☐
3 bar	☐	☐	☐	☐	☐	☐
4 bar	☐	☐	☐	☐	☐	☐
	1	2	3	4	5	6

1 bar	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
1 bar	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
1 bar	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
1 bar	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
Total: 4 bars	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

Each child gets $\frac{4}{6}$ of the bars.

c)

1 bar	☐	☐	☐	☐
2 bar	☐	☐	☐	☐
	1	2	3	4

1 bar	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
1 bar	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
Total: 2 bars	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$

Each child gets $\frac{2}{3}$ of the bars.

d)

1 bar	☐	☐	☐	☐	☐
2 bar	☐	☐	☐	☐	☐
3 bar	☐	☐	☐	☐	☐
4 bar	☐	☐	☐	☐	☐
	1	2	3	4	5

1 bar	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$
1 bar	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$
1 bar	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$
1 bar	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$
Total: 4 bars	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{4}{5}$

Each child gets $\frac{4}{5}$ of the bars.

e)

1 bar	☐	☐	☐	☐	☐	☐
2 bar	☐	☐	☐	☐	☐	☐
	1	2	3	4	5	6

1 bar	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
1 bar	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
Total: 2 bars	$\frac{2}{6}$	$\frac{2}{6}$	$\frac{2}{6}$	$\frac{2}{6}$	$\frac{2}{6}$	$\frac{2}{6}$

Each child gets $\frac{2}{6}$ of the bars.

Unit 4 Fraction calculations

MENTAL MATHS

- Tell the learners that they will work with fractions using measurement and money as contexts. You can have litre bottles and glasses so that they can check that 4 glasses (with a capacity of about 250 ml each) can be filled from 1 ℓ bottle and 2 glasses can be filled from a 500 ml bottle of water. They should know that 250 ml = $\frac{1}{4}$ ℓ, 500 ml = $\frac{1}{2}$ ℓ, and so on.
- Learners have to understand that one glassful = $\frac{1}{4}$ ℓ, so 3 glassfuls = $\frac{3}{4}$ ℓ.

  They can show this by repeated addition: $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$, or $2\frac{3}{4} = 2 \times 4 + \frac{1}{4}$ $= 8\frac{1}{4}$; this gives 8 + 1 = 9 glassfuls.
- The learners should use knowledge of number sense to solve the problems. In question 2 they work with fractions of money amounts. They should realise that 20c = $\frac{1}{5}$ of R1 because there are five 20c coins in R1 – the whole is divided into 5 equal parts so that each part is $\frac{1}{5}$.

Solutions

1. a) $\frac{1}{4}$; $\frac{3}{4}$
   b) 6 glasses
   c) 11 glasses
   d) $1\frac{3}{4}$ ℓ
   e) $2\frac{1}{2}$ ℓ
   f) $1\frac{1}{2}$ glasses
2. 5 20c coins
3. 20c; 40c
4. 4 50c coins
5. R1,50; R3,00
6. R20 compared to R24

Activity 4.1

- Tell the learners they will do calculations with fractions for the cake recipe. Ask them who likes baking cake and which ingredients they use to bake a cake. Tell them to study the ingredients in Akheelah's cake recipe. They have to calculate the amount of ingredients she will need to bake five cakes. Ask them how to do the calculations. They must increase the amount of each ingredient by 5 times. The ideal way to work out the amounts is by using multiplication. They can also, however, use repeated addition.
- For the next problem learners have to work out how much ribbon Thandeka will have left after she has wrapped gifts. They will add and subtract with fractions with the same denominators. Ask them to convert between improper and mixed fractions where necessary.
- For question 3, learners have to work out what fraction of the iceberg is below the sea water if $\frac{1}{7}$ is visible above the surface of the water.
- For question 4, learners determine which length and fraction part of the stakes of a picket fence is in the ground and which fraction is above the ground.
- Learners use addition and subtraction to work out the answers to the fraction problems in question 5.

Solutions

1. $1\frac{1}{4}$ cup margarine
   $7\frac{1}{2}$ cups flour
   $2\frac{1}{2}$ cups sugar
   $12\frac{1}{2}$ teaspoons baking powder
   5 eggs
   $1\frac{1}{4}$ teaspoons salt
   $2\frac{1}{2}$ cups milk

2. red: $\frac{4}{5}$ m
   green: $1\frac{1}{4}$ m
   yellow: $\frac{1}{6}$ m

3. $\frac{6}{7}$

4 a) 80 cm
  b) $\frac{3}{5}$

5. a) 5
   b) $3\frac{6}{10}$
   c) $\frac{5}{7}$
   d) 3
   e) $4\frac{3}{4}$

Unit 5 Fractions of whole numbers

MENTAL MATHS

- Ask the learners to identify the fraction part that is shaded in each diagram. They then have to calculate the fractions of whole numbers where the whole consists of a number of units. Ask them to write subtraction calculations to show which fraction parts are not shaded.
- Learners use the diagrams to determine fractions of 9. They should realise that, if $\frac{1}{3}$ of 9 = 3, then $\frac{2}{3}$ is double 3; so, $\frac{2}{3}$ of 9 = 6 and $\frac{3}{3}$ of 9 = 9.

Solutions

1. a) $\frac{3}{9}$ or $\frac{1}{3}$
   b) $\frac{4}{9}$
   c) $\frac{6}{9}$ or $\frac{2}{3}$
   d) $\frac{7}{9}$

2. a) $\frac{6}{9}$ or $\frac{2}{3}$
   b) $\frac{5}{9}$
   c) $\frac{3}{9}$ or $\frac{1}{3}$
   d) $\frac{2}{9}$

3. $\frac{1}{3}$ of 9 = 3

4. $\frac{2}{3}$ of 9 = 6 (this is double $\frac{1}{3}$)

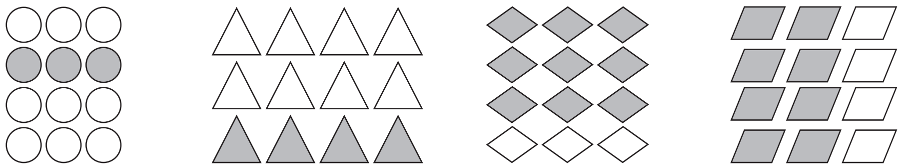
Activity 5.1

- Give the learners copies of the shapes from the Photocopiable Resources. Tell them to shade the fraction parts of the different shapes as indicated for the different groups of 12. They solve the problems using the diagrams if necessary. Ask them to look for relationships.

- They study Sindiwe's strategy to calculate a fraction of a whole number and use the strategy to solve the problems.

Solutions

1.



a) $\frac{1}{4}$ of 12 b) $\frac{1}{3}$ of 12 c) $\frac{3}{4}$ of 12 d) $\frac{2}{3}$ of 12

2. a) $\frac{1}{3}$ of 12 = 4 b) $\frac{1}{8}$ of 16 = 2
   c) $\frac{1}{2}$ of 12 = 6 d) $\frac{7}{8}$ of 16 = 14
   e) $\frac{2}{3}$ of 12 = 8 f) $\frac{2}{4}$ of 16 = 8
   g) $\frac{3}{6}$ of 12 = 6 h) $\frac{3}{8}$ of 16 = 6

3. Learners explain how they worked out the answers.

4. a) $\frac{1}{8}$ of 16 = 2 b) $\frac{1}{10}$ of 20 = 2
   c) $\frac{1}{12}$ of 24 = 2 d) $\frac{2}{8}$ of 16 = 4
   e) $\frac{2}{10}$ of 20 = 4 f) $\frac{1}{8}$ of 24 = 3
   g) $\frac{1}{4}$ of 16 = 4 h) $\frac{1}{5}$ of 20 = 4
   i) $\frac{1}{6}$ of 24 = 4 j) $\frac{4}{8}$ of 16 = 8
   k) $\frac{4}{10}$ of 20 = 8 l) $\frac{1}{4}$ of 24 = 6
   m) $\frac{2}{4}$ of 16 = 8 n) $\frac{2}{5}$ of 20 = 8
   o) $\frac{1}{3}$ of 24 = 8 p) $\frac{6}{8}$ of 16 = 12
   q) $\frac{8}{10}$ of 20 = 16 r) $\frac{1}{2}$ of 24 = 12
   s) $\frac{3}{4}$ of 16 = 12 t) $\frac{4}{5}$ of 20 = 16

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Ask the learners to work on their own to complete the assessment task. They will use the knowledge they have practised and developed to solve fraction sequences, identify fraction parts that are shaded, do addition and subtraction calculations, compare fractions, solve equal sharing problems and find fractions of whole numbers. Tell them they will write a letter to their parents or a family member to tell them what they have learnt about fractions, what they still struggle with and what they need to learn more about.

Assessment Task 18

1. Write down the next four fractions for each pattern.

a) $0; \frac{1}{2}; 1\frac{1}{2}; 2$

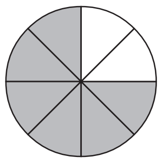
b) $2; 1\frac{3}{4}; 1\frac{2}{4}; 1\frac{1}{4}; 1$

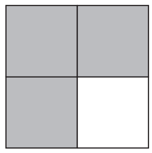
c) $0; \frac{2}{6}; \frac{4}{6}; \frac{6}{6}$

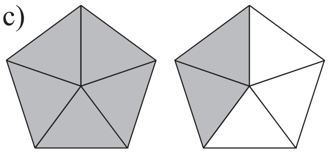
d) $0; \frac{1}{7}; \frac{3}{7}; \frac{5}{7}$

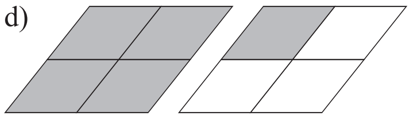
e) $2\frac{3}{8}; 2\frac{2}{8}; 2\frac{1}{8}$

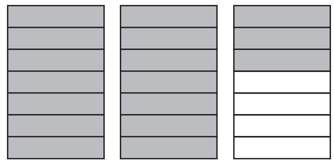
2. Which fraction of each whole is shaded?

a) 

b) 

c) 

d) 

e) 

3. Calculate each answer.

a) $1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2}$

b) $2\frac{1}{4} + 2\frac{1}{4} + 2\frac{1}{4}$

c) $1\frac{1}{3} + 1\frac{1}{3} + 1\frac{1}{3}$

d) $1\frac{2}{7} + 1\frac{3}{7}$

e) $2\frac{2}{5} + 2\frac{2}{5}$

4. Write <; > or = between each pair of fractions when you write the down.

a) $\frac{2}{5} * \frac{2}{7}$

b) $\frac{1}{3} * \frac{2}{6}$

c) $\frac{7}{10} * \frac{7}{9}$

d) $\frac{8}{12} * \frac{4}{6}$

e) $\frac{11}{10} * \frac{10}{11}$

5. Solve each problem. You can make drawings to help you.
   a) Five friends share six fruit rolls equally amongst themselves. How much does each one get?
   b) Four friends share two and a half pizzas equally among themselves. What fraction of the pizzas does each one get?
   c) If five oranges are cut into quarters, how many pieces are there?
   d) Three children share four sausage rolls equally amongst themselves. What fraction does each one get?
   e) Tasneem uses $1\frac{3}{4}$ cups of orange juice to bake an orange cake. How many cups will he need to bake three cakes?

6. Work out the answers.

a) $\frac{1}{2}$ of 18

b) $\frac{1}{6}$ of 30

c) $\frac{2}{5}$ of 20

d) $\frac{2}{7}$ of 21

e) $\frac{1}{9}$ of 27

Solutions

1. a) $0; \frac{1}{2}; 1\frac{1}{2}; 2; 2\frac{1}{2}; 3; 3\frac{1}{2}; 4; 4\frac{1}{2}$

   b) $2; 1\frac{3}{4}; 1\frac{2}{4}; 1\frac{1}{4}; 1; \frac{3}{4}; \frac{2}{4}; \frac{1}{4}; 0$

   c) $0; \frac{2}{6}; \frac{4}{6}; \frac{6}{6}; \frac{8}{6}; \frac{10}{6}; \frac{12}{6}; \frac{14}{6}$

   d) $0; \frac{1}{7}; \frac{3}{7}; \frac{5}{7}; \frac{7}{7}; \frac{9}{7}; \frac{11}{7}; \frac{13}{7}$

   e) $2\frac{3}{8}; 2\frac{2}{8}; 2\frac{1}{8}; 2$ (or $1\frac{8}{8}$); $1\frac{7}{8}; 1\frac{6}{8}; 1\frac{5}{8}$

2. a) $\frac{6}{8}$ b) $\frac{3}{4}$

   c) $\frac{7}{5}$ d) $\frac{5}{4}$

   e) $\frac{17}{7}$

3. a) $1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2} = 3\frac{3}{2} = 4\frac{1}{2}$

   b) $2\frac{1}{4} + 2\frac{1}{4} + 2\frac{1}{4} = 6\frac{3}{4}$

   c) $1\frac{1}{3} + 1\frac{1}{3} + 1\frac{1}{3} = 2\frac{3}{3} = 3$

   d) $1\frac{2}{7} + 1\frac{3}{7} = 2\frac{5}{7}$

   e) $2\frac{2}{5} + 2\frac{2}{5} = 4\frac{4}{5}$

4. a) $\frac{2}{5} < \frac{2}{7}$ b) $\frac{1}{3} = \frac{2}{6}$

   c) $\frac{7}{10} < \frac{7}{9}$ d) $\frac{8}{12} = \frac{4}{6}$

   e) $\frac{11}{10} > \frac{10}{11}$

5. a) $\frac{6}{5} = 1\frac{1}{5}$

   Each friend gets one roll and $\frac{1}{5}$ of a roll.

   b) Two pizzas divided into 4 pieces gives the friends each $\frac{1}{2}$ of a pizza; $\frac{1}{2}$ a pizza divided into 4 pieces gives $\frac{1}{8}$th each. So, each friend gets $\frac{1}{2} + \frac{1}{8} = \frac{4}{8} + \frac{1}{8} = \frac{5}{8}$

   c) $5 \times 4 = 20$ pieces

   d) $\frac{4}{3} = 1\frac{1}{3}$

   Each child gets one and a third sausage.

   e) $1\frac{3}{4} + 1\frac{3}{4} + 1\frac{3}{4} = 3\frac{9}{4} = 5\frac{1}{4}$

   He will need $5\frac{1}{4}$ cups of orange juice

6. a) $\frac{1}{2}$ of 18 = 9 b) $\frac{1}{6}$ of 30 = 5

   c) $\frac{2}{5}$ of 20 = 8 d) $\frac{2}{7}$ of 21 = 6

   e) $\frac{1}{9}$ of 27 = 3

Mass

Unit 6 Exploring mass

MENTAL MATHS

- The learners work with scale readings for measuring mass. They should remember that scales are similar to number lines. They estimate positions of numbers on scales and estimate the mass of objects. Ask them to answer the questions requiring knowledge of halving.

Solutions

1. 150 g
2. 300 g
3. 275 g
4. 750 g
5. 500 g
6. 750 g
7. $1\frac{1}{2}$ kg or 1 500 g
8. 250 g
9. 150 g
10. $\frac{1}{2}$ kg or 500 g

Activity 6.1

- If possible copy the tables for the activities in this unit and let learners paste them into their workbooks, as this will save time.
- Explain to learners that size can sometimes play a role in mass. For example, if you compare two containers of the same material filled with liquid, the bigger one will be heavier. However, this may not be true if the materials are different: if a small metal piece is compared to a huge bag of feathers, the metal piece will be heavier, as metal is a material heavier than a bag of feathers.
- Take a few examples of different materials to class, and allow the learners to experiment with the balancing scale to compare their masses.

Solutions

1. a) 1 kg b) 20 g
   c) 42 kg
2. a) $1\frac{1}{2}$ kg b) 450 g
   c) 16 g d) 87 kg
3. a) 320 g b) 190 g
   c) 96 kg

Activity 6.2

- Divide your class into three groups. The first group will use a scale that works with grams (they can use a kitchen scale that is calibrated from 0 g –1 000 g); the second group can use a kitchen scale that is calibrated from 0 g to 5 kg or 10 kg, and the third group can use a bathroom scale). Let the groups rotate after 15 minutes so that each group works with each scale.

Solutions

1–3. Answers will differ. They depend on the items learners weigh.

Unit 7 Working with kilograms and grams

MENTAL MATHS

- Learners should memorise the main fraction conversions as shown in the red frame in the Learner's Book, as this will help them to do conversions and calculations more quickly.
- Do lots of these conversions orally, and allow learners to do some of them on the board. Make sure the learners understand the concept of division when converting the fractions.

Solutions

a)	1 kg = 1 000 g	b)	$\frac{1}{2}$ kg = 500 g
c)	$\frac{1}{4}$ kg = 250 g	d)	$\frac{3}{4}$ kg = 750 g
e)	1 kg 16 g = 1 016 g	f)	2 kg 400 g = 2 400 g
g)	5 kg 4 g = 5 004 g	h)	$3\frac{1}{2}$ kg = 3 500 g

Activity 7.1

- Explain to the learners how fractions work with kilograms. For example:
  - $\frac{1}{2}$ kg = 1 000 g ÷ 2 = 500 g
  - $\frac{1}{8}$ kg = 1 000 g ÷ 8 = 125 g
  - $\frac{5}{8}$ kg = 125 g × 5 = 625 g
  - $\frac{1}{4}$ kg = 250 g
  - $\frac{3}{4}$ kg = 250 g × 3 = 750 g

Solutions

1. a) five 10 g pieces — b) ten 100 g pieces
   c) five 50 g pieces — d) 20 25 g pieces
2. a) 2 346 g = 2 kg 356 g — b) 10 298 g = 10 kg 298 g
   c) 534 g = 0 kg 534 g — d) 2 008 g = 2 kg 8 g
3. a) 500 g = $\frac{1}{2}$ kg — b) 3 100 g = $3\frac{1}{10}$ kg
   c) 2 250 g = $2\frac{1}{4}$ kg — d) 1 750 g = $1\frac{3}{4}$ kg
4. a) cookies — b) herbs and a packet of sweets
   c) cat food — d) sugar
   e) herbs — f) sugar
   g) cake flour

5.

Product	Mass in grams	Mass in kilograms
Tin of coffee	750 g	$\frac{3}{4}$ kg
Packet of sugar	2 500 g	2,5 kg
Tub of yoghurt	500 g	$\frac{1}{2}$ kg
Tin of cool drink	300 g	$\frac{3}{10}$ kg
Bag of oranges	5 000 g	5 kg
Bananas	1 500 g	$1\frac{1}{2}$ kg

Activity 7.2

- Revise fractions as covered in whole numbers. Explain to learners that we do mass calculations in exactly the same way as other calculations with fractions, but that they must remember to add grams or kilograms in their answers.
- Learners do multiply fractions in Grade 5. To find the fractions of whole numbers in question 2 they must use methods such as dividing 18 kg into thirds, and calculating the mass of one third (18 ÷ 3 = 6) and two-thirds will be 2 × 6 = 12 kg. Use any methods the learners already know to calculate the value of fraction parts of a whole number. For fractions such as eighths, learners should first convert the mass in kilograms to the mass in grams, then convert their answers back to kilograms and grams at the end.

Solutions

1. a) $1\frac{1}{4}$ kg + $3\frac{3}{4}$ kg = 4 kg + $\frac{4}{4}$ kg = 5 kg

   b) 27 kg – 12 kg = 5 kg; 5 – $\frac{7}{12}$ = $11\frac{5}{12}$ kg

   c) 250 g + $1\frac{1}{4}$ kg = $\frac{1}{4}$ kg + $1\frac{1}{4}$ kg = $1\frac{1}{2}$ kg

2. a) $\frac{2}{3}$ of 18 kg = 12 kg　　b) $\frac{3}{7}$ of 49 g = 21 g

   c) $\frac{5}{6}$ of 30 kg = 25 kg　　d) $\frac{3}{8}$ of 1 kg = 375 kg

   e) $\frac{7}{10}$ of 2 kg = 1 400 g　　f) $\frac{5}{8}$ of 10 kg = 6 250 kg

Unit 8 Estimating with mass

MENTAL MATHS

- Ask the learners to round off the numbers to the nearest 10, 100 and 1 000. Draw a table like the one below on the board. Ask the learners to explain their solutions.

Solutions

	Rounding off to the:	nearest 10	nearest 100	nearest 1 000
1.	14	10	0	0
2.	76	80	100	0
3.	143	140	100	0
4.	558	560	600	1 000
5.	921	920	900	1 000
6.	1 672	1 670	1 700	2 000
7.	4 034	4 030	4 000	4 000
8.	10 503	10 500	10 500	11 000
9.	29 416	29 420	29 400	29 000
10.	9 999	10 000	10 000	10 00

Activity 8.1

- Revise the words that are used with estimating: more or less, almost, approximately, roughly and close to.
  Examples:
  - I have **more or less** 2 kg of sugar left
  - There is **approximately** 1 kg of sugar left in the container
  - The horse must weigh **close to** 400 kg
- To help learners understand rounding up, you can tell them about the boy who wanted to swim across the river but when he was halfway across the river he became tired and he turned around and swam back. They will probably tell you that he has not chosen wisely – as it is the same distance to the other side and he could have crossed the river. Then you can tell them that when you see the halfway number, you don't turn around, you carry on – they never forget it!
- Explain to them that the same rules apply to mass that apply to whole numbers.

Solutions

1. a) 1 kg
   b) 47 kg

2.

	Round off to the nearest:			
a)	10 grams	80 g	370 g	2 500 g
b)	100 grams	100 g	1 000 g	1 600 g
c)	kilogram	0 kg	7 kg	17 kg

3.

	Round off to the nearest:			
a)	10 grams	2 kg 170 g	1 kg 20 g	7 kg 250 g
b)	100 grams	4 kg 500 g	6 kg 100 g	14 kg
c)	kilogram	3 kg	6 kg	0 kg

Unit 9 Mixed calculations with mass

MENTAL MATHS

- Encourage the learners to do the calculations without writing anything down. It is very good for them to stimulate their thinking processes and improve their memory and lateral thinking skills if they work answers out in their heads.
- You can give the learners a copy of the table or let them copy it before they start working. If you give them copies of the table, their work will be neater and they will not waste time making a copy.

Solutions

1. Answers will differ – discuss learners' solutions with the class.

2. a) 200 g × 5 = 1 kg
   b) 2 kg – $1\frac{1}{2}$ kg = 500 g
   c) 125 g × 8 = 1 kg
   d) 1 kg ÷ 4 = 250 g
   e) 500 g + 250 g = 750 g
   f) 1 000 – 750 g = 250 g

Activity 9.1

- Remind learners that they must write masses in grams under each other and masses in kilograms under each other when adding or subtracting.

Solutions

1. a)
```
   12 kg 315 g
 +  3 kg 249 g
   15 kg 564 g
```
b)
```
   14 kg 024 g
 + 13 kg 396 g
   27 kg 420 g
```
c)
```
   37 kg 149 g
 –  9 kg 352 g
   27 kg 797 g
```
d)
```
   44 kg 000 g
 – 25 kg 235 g
   18 kg 765 g
```

2. a)
```
     351 kg
 ×     8
   2 808 kg
```
b)
```
     55 kg
 ×   16
    330
 +  550
    880 kg
```
c)
```
       472 g
 ×      24
     1 888
 +   9 440
    11 328 g
```
d)
```
       678
 ×      91
       678
    61 020
    61 598 g
```
e) 363 kg ÷ 3 = 121 kg
f) 600 g ÷ 25 = 24 g
g) 722 kg ÷ 19 =38 kg
h) 484 g ÷ 22 = 22 g

Unit 10 Mixed calculations

MENTAL MATHS

- The learners will work with the four basic operations in solving problems in context. They will multiply by 25, 75, 125 and 250. They have worked with shortcuts to multiply by 25 and 125 before.

- Let them explore the shortcuts. Ask them to use the shortcuts to solve the problems. You should emphasise why it is important to be able to work with powers of 10. We basically apply this knowledge and skills in all content areas of mathematics.

Solutions

1. 24 × 25 = (24 × 100) ÷ 4
   = 2 400 ÷ 4
   = 600
2. 32 × 25 = (32 × 100) ÷ 4
   = 3 200 ÷ 4
   = 800
3. 24 × 75 = (24 × 300) ÷ 4
   = 7 200 ÷ 4
   = 1 800
4. 32 × 75 = (32 × 300) ÷ 4
   = 9 600 ÷ 4
   = 1 400
5. 24 × 125 = (24 × 1 000) ÷ 8
   = 24 000 ÷ 8
   = 3 000
6. 32 × 125 = (32 × 1 000) ÷ 8
   = 32 000 ÷ 8
   = 4 000
7. 24 × 250 = (24 × 1 000) ÷ 4
   = 24 000 ÷ 4
   = 6 000
8. 32 × 250 = (32 × 1 000) ÷ 4
   = 32 000 ÷ 4
   = 8 000

Activity 10.1

Solutions

1. a) 2 500 g + 750 g + 1 350 g = 4 600 g
   b) Number of parcels: 4 600 ÷ 200 = 46 ÷ 2 = 23
   Delivery charge for 23 parcels: 23 × R2,50 = R57,20
2. 500 ÷ 20 = 50 ÷ 2 = 25 boxes
3. a) 375 g puffed rice
   225 g coconut
   75 g syrup
   750 g marshmallows
   $\frac{3}{5}$ cup butter

   b) 625 g puffed rice
   375 g coconut
   125 g syrup
   1 kg 250 g marshmallows
   1 cup butter
4. a) 2 000 g ÷ 8 = 250 g

   b) 250 g = $\frac{1}{4}$ kg
5. 78 kg 350 g – 36 kg 420 g = 41 kg 930 g

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 19

1. Which instruments below can you use to measure mass?

   a) a baby scale   b) a tape measure   c) a beaker

   d) a balancing scale   e) a syringe   f) a scale hanging with a hook

2. Fill in the missing information to convert each mass – from grams to kilograms or from kilograms to grams.

   a) ☐ g = 1 kg   b) ☐ g = $2\frac{1}{2}$ kg

   c) 4 kg = ☐ g   d) ☐ kg = $\frac{1}{2}$ kg

   e) 2 kg 16 g = ☐ g   f) ☐ kg = 750 g

3. Choose the most likely mass below for each object.

100 g	1 000 kg	1 kg	35 kg	250 g	2,5 kg

   a) a truck   b) a child
   c) a brick   d) a tub of margarine
   e) a slab of chocolate   f) a packet of sugar

4. Would you use grams or kilograms to measure the mass of each object?
   a) a pencil
   b) a pair of glasses
   c) a cat
   d) a large packet of apples

5. Round off each mass.
   a) 135 g to the nearest 10 g.
   b) 2 kg 650 g to the nearest 100 g.
   c) 13 kg 499 g to the nearest kilogram.
   d) 247 g to the nearest 5 g.
   e) 2 kg 378 g to the nearest 100 g.
   f) 7 kg 534 g to the nearest kilogram.

6. Fill in <; > or = to make each statement true.
   a) 1 kg 415 g * 1 514 g
   c) 2 kg 16 g * 2 160 g
   b) $3\frac{1}{10}$ kg * 3 100 g
   d) $15\frac{1}{2}$ kg * 15 250 g

7. Calculate the answers.
   a) 14 kg 357 g + 259 g + $3\frac{1}{2}$ kg
   b) 6 kg – 2kg 499 g
   c) 356 g × 14
   d) 648 kg ÷ 18

8. Mr Tladi has $3\frac{1}{2}$ kg sugar, $2\frac{1}{2}$ kg flour and $\frac{1}{2}$ kg butter in a bag.
   What is the total mass in the bag?
9. Ms Barnard wants to cook apricot jam for Christmas gifts. For every kilogram of apricots she has to use 500 g of sugar and 20 ml of lemon juice. This recipe will fill three 350 g bottles.
   a) How many grams of sugar and apricots must she cook to double the recipe?
   b) What will the total grams of jam be if she doubles the recipe?
   c) Write the answer in kilograms using a fraction.
10. The total mass of Haroon and his sister Aysha is 74 kg.
    If Haroon weighs 39 kg, what is his sister's mass?
11. An elephant weighs 5 000 kg and a rhinoceros weighs 2 000 kg.
    a) How much more does the elephant weigh than the rhinoceros?
    b) Write down the ratio of the elephant's mass to the rhinoceros's mass.

Solutions

1. a), d) and f)
2. a) 1 000 g = 1 kg
   b) 2 500 g = $2\frac{1}{2}$ kg
   c) 4 kg = 4 000 g
   d) 0,5 kg = $\frac{1}{2}$ kg
   e) 2 kg 16 g = 2 016 g
   f) $\frac{3}{4}$ kg = 750 g
3. a) 1 000 kg
   b) 35 kg
   c) 2,5 kg
   d) 250 g
   e) 100 g
   f) 1 kg
4. a) grams
   b) grams
   c) kilograms
   d) kilograms
5. a) 140 g
   b) 2 kg 700 g
   c) 13 kg
   d) 245 g
   e) 2 kg 400 g
   f) 8 kg
6. a) 1 kg 415 g < 1 514 g
   c) 2 kg 16 g < 2 160 g
   b) $3\frac{1}{10}$ kg = 3 100 g
   d) $15\frac{1}{2}$ kg > 15 250 g
7. a) 14 kg 357 g + 259 g + $3\frac{1}{2}$ kg = 18 kg 116 g
   b) 6 kg – 2kg 499 g = 3 kg 501 g
   c) 356 g × 14 = 4 984 g
   d) 648 kg ÷ 18 = 36 kg
8. Mr Tladi has $3\frac{1}{2}$ kg sugar, $2\frac{1}{2}$ kg flour and $\frac{1}{2}$ kg butter in a bag.
   What is the total mass in the bag?
   $3\frac{1}{2}$ kg + $2\frac{1}{2}$ kg + $\frac{1}{2}$ kg = $6\frac{1}{2}$ kg
9. a) 2 kg of apricots and 1 kg of sugar
   b) 6 × 350 g = 2 100 g of jam
   c) $2\frac{1}{10}$ kg of jam
10. Aysha's mass = 74 kg – 39 kg = 35 kg
11. a) 5 000 kg – 2 000 kg = 3 000 kg
    b) 5 000: 2 000 = 5 : 2

Whole numbers: counting, ordering, comparing, representing and place value

Tell the learners that they will work with whole numbers in the next six units. They will apply what they learnt about whole numbers in the first two terms and they will build on this knowledge. They will count, order, compare, estimate and represent numbers and work with place value, addition, subtraction and multiplication. Remind them that they have to know the basic addition, subtraction and multiplication facts. As they may have noticed, they need to be able to use facts in different topics in Mathematics.

Unit 11 Place values

MENTAL MATHS

- The learners identify five- and six-digit odd and even numbers, count in and identify the number of multiples of 25 and 50 between numbers and determine how many 100s, 1 000s, 10 000s and 100 000s there are in the given numbers.

Solutions

1. 99 998; 99 999; 100 000; 100 001; 100 002
2. 10 878; 10 880; 10 882; 10 884; 10 886; 10 888; 10 890
3. 125 990; 125 995; 126 000; 126 005; 126 010; 126 015
4. 10
5. 8
6. 100
7. 55
8. 34
9. 57
10. 10

Activity 11.1

- Ask the learners to write down the place value of the underlined digits in the different numbers. Let them calculate the difference between the values of the digits in the two digits in each number. They then calculate the difference between the place values of the digits.
- For question 4, learners have to work out how to change the number on the calculator screens by changing the value of one digit without removing any other digits. They should realise that, for example, to change 43 to 23 they have to subtract 20. They thus apply knowledge of place value and add and subtract the values of the indicated digits to change the numbers.
- For question 5, learners compare the distances of planets from the sun and the diameters of planets, and they order the names of the planets according to their distances from the sun and their sizes in ascending and descending order. (You could tell the learners that there were previously nine planets but Pluto is no longer recognised as a planet.) Question 5 integrates with Natural Sciences, so learners could learn more about planets in those lessons.
- Assist the learners in identifying and reading the numbers that involve millions and billions. Tell them they will learn more about big numbers in higher grades. Let them share their solutions with the class when you discuss the answers with the class.

Solutions

1. a) first 6: 6 000; second 6: 60
   b) first 4: 4 000; second 4: 4
   c) first 9: 90 000; second 9: 90
   d) first 7: 70 000; second 7: 700
   e) first 1: 100 000; second 1: 1 000
2. a) 6 060 b) 4 004
   c) 90 090 d) 70 700
   e) 101 000
3. a) 5 940 b) 3 996
   c) 89 910 d) 69 300
   e) 99 000
4. a) subtract 20 b) add 400
   c) add 3 000 d) subtract 50 000
   e) add 200 000
5. a) smallest: Mercury; largest: Jupiter
   b) Saturn c) Neptune
   d) Mercury
   e) Diameters in brackets: Mercury (4 880 km), Mars (6 790 km), Venus (12 100 km), Earth (12 756 km), Neptune (48 400 km), Uranus (62 000 km), Saturn (120 860 km), Jupiter (142 800 km)
   f) Distances in brackets: Neptune (4 497 000 000 km), Uranus (2 870 000 000 km), Saturn (1 427 000 000 km), Jupiter (778 000 000 km), Mars (228 000 000 km), Earth (150 000 000 km), Venus (108 000 000 km), Mercury (58 000 000 km)

Problem-solving and investigation

Tell the learners that they will play the Thirteen Coin Game. They need 13 coins to form the number 13. Each player gets a turn to pick up one or two coins at a time. The player who picks up the last coin is the loser.

Whole numbers

Unit 12 Addition and doubling

Tell the learners that they will work with addition and subtraction again during the next few units. They will solve problems in real-life contexts and also just number problems. They will add and subtract five-digit numbers.

MENTAL MATHS

- Ask the learners to study the numbers in the magic square. Let them find out why the square is magic. Ask them to add the numbers in the rows, columns and diagonals. They should find that the sum of the numbers in every row, column and diagonal is the same – that's what makes the square magic. They work together to find the missing numbers in the two magic squares.

Solutions

1. a) 15
   b) 15
   c) 15

2. a)

6	7	2
1	5	**9**
8	**3**	4

b)

8	**3**	**4**
1	5	9
6	**7**	2

Activity 12.1

- Ask the learners to copy and complete the magic squares or give them copies to complete.
- For question 2, the learners study the strategies to solve problems. Ask them to estimate the total costs before they calculate. They use doubling and knowledge of multiples of 10 to solve the problems. They round off the numbers to the nearest 100 and 1 000 and take away the amounts added (using compensation).
- Help learners to understand that it is more effective to leave out the decimal comma while doing calculations and insert it again in the solution to show cents. They calculate the total amounts that learners would pay for an excursion, the cost of 15 kg of chops and 8 CDs. They use compensation to solve these and the other problems.

Solutions

1. a)

6	**1**	**8**
7	5	**3**
2	9	4

b)

67	**1**	**43**
13	37	**61**
31	**73**	7

c)

67	**13**	**31**
1	**37**	**73**
43	61	7

d)

43	**61**	**7**
1	**37**	73
67	**13**	**31**

3. a) R11 400
   b) R981,75
   c) R1 028,00

4. a)
367 × 8 = ☐
367 × 2 = 734
734 × 2 = 1 468
1 468 × 2 = 2 936
367 × 8 = 2 936

b)
845 × 12 = ☐
845 × 4 = 3 380
3 380 × 3 = 10 140
845 × 12 = 10 140

c)
1 376 × 6 = ☐
1 376 × 3 = 4 128
4 128 × 2 = 8 256
1 376 × 6 = 8 256

d)
5 499 × 4 = ☐
5 499 × 2 = 10 998
10 998 × 2 = 21 996
5 499 × 4 = 21 996

e)
697 × 9 = ☐
697 × 3 = 2 091
2 091 × 3 = 6 273
697 × 9 = 6 273

f)
7 275 × 16 = ☐
7 275 × 2 = 14 550
14 550 × 4 = 58 200
58 200 × 2 = 116 400

Unit 13 Subtraction

MENTAL MATHS

- Ask the learners to discuss the strategy proposed by the learners in the picture.
- They have to realise that adding the same number to both numbers in the calculation will make no difference to the solution.
- Let the whole class work together and use the strategy to solve the problems. They should see if the rule works.
- Ask them to apply the inverse operation to check the solutions, and then explore whether the rule works for addition also.

Solutions

1. 86 − 44 = ☐
   92 − 50 = 42
   Check: 42 + 44 = 86
2. 97 − 52 = ☐
   105 − 60 = 45
   Check: 45 + 52 = 87
3. 74 − 26 = ☐
   78 − 30 = 48
   Check: 48 + 26 = 74
4. 98 − 39 = ☐
   99 − 40 = 59
   Check: 59 + 39 = 98
5. 63 − 24 = ☐
   69 − 30 = 39
   Check: 39 + 24 = 63
6. 179 − 36 = ☐
   183 − 40 = 143
   Check: 143 + 36 = 179
7. 184 − 62 = ☐
   192 − 70 = 122
   Check: 122 + 62 = 184
8. 167 − 78 = ☐
   169 − 80 = 89
   Check: 89 + 78 = 167
9. 231 − 145 = ☐
   236 − 150 = 86
   Check: 86 + 145 = 231
10. 246 − 98 = ☐
    248 − 100 = 148
    Check: 148 + 98 = 246

Ask the learners to find out whether the rule works for addition, for example:

86 + 44 = ☐
90 + 48 = 138
Check: 138 − 44 = 94
86 + 44 = 86 + 4 + 40
= 130
86 + 44 ≠ 90 + 48

184 + 62 = ☐
190 + 68 = 258
Check: 258 − 62 = 190
184 + 62 = 246
184 + 62 ≠ 190 = 68

The rule does not work with addition.

Activity 13.1

- Ask the learners to use the rule for subtraction they used in the Mental Maths activity to solve the subtraction problems. Tell them to always try to add numbers that will give a multiple of 10 as the total. Let them use the inverse operation to check the solutions.

Solutions

1. 675 − 268 = ☐
   677 − 270 = 407
2. 923 − 456 = ☐
   927 − 460 = 467
3. 1 346 − 1 137 = ☐
   1 349 − 1 140 = 209
4. 4 794 − 3 282 = ☐
   4 797 − 3 285 = 1 512

5. 5 681 − 2 491 = ☐
5 690 − 2 500 = 3 190

6. 12 845 − 8 754 = ☐
12 851 − 8 760 = 4 091

7. 24 563 − 13 474 = ☐
24 569 − 13 480 = 11 089

8. 37 213 − 30 007 = ☐
37 216 − 30 010 = 7 206

9. 53 567 − 43 244 = ☐
53 573 − 43 250 = 10 323

10. 25 348 − 5 259 = ☐
25 349 − 5 260 = 20 089

Ask the learners to do the inverse operations to check the solutions. If they have calculators you could also allow them to use them to check solutions.

Unit 14 Problem-solving

MENTAL MATHS

- Ask the learners if they remember that they dealt with the difference between reading numbers and dates in different ways. We use spaces in numbers to separate 100s and 1 000s and 100 000s and millions. We do not leave spaces in years in dates. We also read years in dates differently, for example 'twenty-ten' for 2010 but we read it 'two thousand and ten' as a number and write it 2 010. They have to write the numbers and the years correctly in the exercise. They could use the subtraction strategy they applied in Unit 13.

Solutions

Grandma: 2 013 − 68 = 2 015 − 70
= 2 015 − 15 − 55
= 1 945
Grandma was born in 1945.

Grandpa: 2 013 − 64 = 2 020 − 71
= 2 020 − 20 − 51
= 1 949
Grandpa was born in 1949.

Retha: 2 013 − 9 = 2 014 − 10
= 2 004
Retha was born in 2004.

Mr Jones: 2 013 − 46 = 2 017 − 50
= 2 017 − 17 − 33
= 1 967
Mr Jones was born in 1967.

Matthew: 2 013 − 16 = 2 017 − 20
= 2 017 − 17 − 3
= 1 997
Matthew was born in 1997.
Alice: 2 013 − 18 = 2 015 − 20
= 2 015 − 15 − 5
= 1 995
Alice was born in 1995.

Mrs Jones: 2 013 − 43 = 2 020 − 50
= 2 020 − 20 − 30
= 1 970
Mrs Jones was born in 1970.

Activity 14.1

- The learners solve contextual problems. In question 1, they use the dates on the gravestones to solve the problems.
- In question 2, learners perform addition and subtraction calculations with five-digit numbers to find the answers (the prices for second-hand cars). Ask them to use strategies that they are comfortable with.

Solutions

1. a) 108 years
   b) Answers depend on dates of birth.
   c) 79 years
   d) 72 years
   e) 50 years
2. a) R20 451
   b) R92 725
   c) R23 225
   d) R40 505

Unit 15 Addition and subtraction without carrying and decomposing

MENTAL MATHS

- Learners solve problems involving multiples of 100, 1 000 and 10 000.

Solutions

1. 10 000 + 3 000 – 500 = 12 500
2. 23 000 – 17 000 = 6 000
3. 14 200 – 3 200 = = 11 000
4. 9 000 – 300 = 8 700
5. 5 000 – 700 = 4 300
6. 7 000 + 8 000 = 15 000
7. 15 300 + 15 300 = 30 600
8. 1 500 + 1 500 = 3 000
9. 7 500 + 7 500 = 15 000
10. 10 000 + 8 000 + 4 000 = 22 000

Activity 15.1

- The learners will now work with vertical column addition and subtraction calculations without carrying and decomposition. Ask them to check their solutions with the inverse operations.

Solutions

1. a) 1 234 + 2 123 = 3 357
   b) 4 567 + 1 221 = 5 788
   c) 5 326 + 3 563 = 8 889
   d) 88 345 + 43 235 = 131 580
   e) 94 060 + 4 939 = 98 999
   f) 78 724 + 11 273 = 89 997
2. a) 5 678 – 2 434 = 3 244
   b) 9 947 – 7 030 = 2 917
   c) 7 809 – 2 809 = 5 000
   d) 17 800 – 12 400 = 5 400

e) $\begin{array}{r} 15\,867 \\ -\ \underline{10\,807} \\ 5\,060 \end{array}$

f) $\begin{array}{r} 99\,678 \\ -\ \underline{56\,050} \\ 43\,628 \end{array}$

Unit 16 Addition

MENTAL MATHS

- Ask the learners to investigate the solutions in the problems that Zanele solved. Do not tell them the solutions are incorrect at first. Let them find it out. They should explain what is wrong with the calculation in each problem. They should notice that there is no carrying performed.
- In the subtraction problems, the bottom number is subtracted from the top number. Ask them to correct the mistakes.

Solutions

1. $\begin{array}{r} 58 \\ +\ \underline{29} \\ 87 \end{array}$ 2. $\begin{array}{r} 78 \\ +\ \underline{94} \\ 172 \end{array}$ 3. $\begin{array}{r} 94 \\ -\ \underline{76} \\ 18 \end{array}$ 4. $\begin{array}{r} 86 \\ -\ \underline{29} \\ 57 \end{array}$ 5. $\begin{array}{r} 128 \\ +\ \underline{83} \\ 211 \end{array}$ 6. $\begin{array}{r} 234 \\ -\ \underline{178} \\ 56 \end{array}$

Activity 16.1

- The learners solve problems that involve addition with carrying. If possible, give them Dienes blocks or copies of the Dienes block cards from the Photocopiable Resources. Let the learners discuss what they observe in the Dienes block illustration for adding 56 + 76.
- Remind the learners that they have worked with the ancient addition strategy invented by Gemma Frisius in the year 1600. The method is highly effective in developing understanding of addition with carrying. Let them use the method to solve the problem illustrated by the Dienes blocks. Learners explore Matthew's short method of showing the numbers carried and shown using superscripts. Ask the learners to use the method they prefer to solve the addition problems.

Solutions

1. a) 181 b) 153
   c) 124 d) 226
   e) 733 f) 1 622
   g) 2 131 h) 9 515
   i) 24 602 j) 57 521
   k) 42 501 l) 101 240
   m) 79 222 n) 68 027

Remedial work

Simple numbers can be used to assist learners who struggle to understand how to build up 10s and 100s and use carrying. Use more simple examples and ask the learners to explain what they are doing.

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 20

1. Calculate:
   a) 89 – 64 = ☐
   b) 145 – 36 = ☐
   c) 367 – 248 = ☐
   d) 1 248 – 462 = ☐
   e) 3 454 – 1 347 = ☐

2. Work out the answers.

   a) 15 678 – 2 435

   b) 36 104 – 25 103

   c) 49 872 – 25 050

   d) 76 523 – 74 512

   e) 86 500 – 80 300

3. Calculate:
   a) 234 + 234 = ☐
   b) 700 + 500 = ☐
   c) 750 + 750 = ☐
   d) 10 000 + 8 000 + 200 = ☐
   e) 15 000 + 6 000 + 4 000 = ☐

4. Work out the answers.

   a) 546 + 233

   b) 357 + 368

   c) 4 865 + 4 269

   d) 12 568 + 27 473

   e) 56 527 + 29 483

5. Solve the problems.
   a) I paid R11,50 for an apple juice for my brother and an orange juice for myself. The orange juice cost R3,25. What is the price of the apple juice?
   b) The price of a cellphone that cost R1 675 was reduced (discounted) to R1 385. How much discount was given?
   c) A train ticket costs R195. For an extra R35 you can travel in first class. How much is a first class ticket?

6. Write a letter to a friend to tell him or her what you learnt about addition and subtraction this week. Tell your friend what you found easy or difficult, what you enjoyed doing and what you want to learn more about.

Solutions

1. a) 89 – 64 = 25
   b) 145 – 36 = 109
   c) 367 – 248 = 119
   d) 1 248 – 462 = 786
   e) 3 454 – 1 347 = 2 107

2. a) 15 678 – 2 435 = 13 243

   b) 36 104 – 25 103 = 11 001

   c) 49 872 – 25 050 = 24 822

   d) 76 523 – 74 512 = 2 011

   e) 86 500 – 80 300 = 6 200

3. a) 234 + 234 = 468 b) 700 + 500 = 1 200
c) 750 + 750 = 1 500 d) 10 000 + 8 000 + 200 = 20 000
e) 15 000 + 6 000 + 4 000 = 25 000

4. a)
$$\begin{array}{r} 546 \\ +\underline{233} \\ \underline{779} \end{array}$$
b)
$$\begin{array}{r} 357 \\ +\underline{368} \\ \underline{725} \end{array}$$
c)
$$\begin{array}{r} 4\ 865 \\ +\underline{4\ 269} \\ \underline{9\ 134} \end{array}$$
d)
$$\begin{array}{r} 12\ 568 \\ +\underline{27\ 473} \\ \underline{40\ 041} \end{array}$$
e)
$$\begin{array}{r} 56\ 527 \\ +\underline{29\ 483} \\ \underline{86\ 010} \end{array}$$

5. a) R11,50 – R3,25 = R8,25
The apple juice cost R8,25.
b) R1 675 – R1 385 = R290
The discount is R290.
c) R195 + R35 = R220
A first class ticket costs R220.

Viewing objects

In Grade 4, the learners matched different views of single objects. In Grade 5 they will work with single objects and groups of objects. They will learn how the view of an object or a group of objects will differ depending on the position of the viewer.

Unit 17 Different views of objects

MENTAL MATHS

- To explain what the term viewpoint means, bring a cereal box to school and place it on the table. Show learners how looking at it from positions or viewpoints affects the parts of the box you can see.
- Assess how well learners are able to match different views of single objects with different viewer positions.

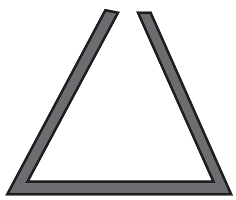
Solutions

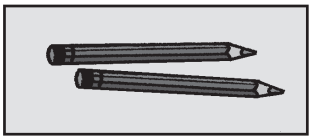
1.	front: A	back: D	left side: C	top: B
2.	A: Jessica	B: Mark	C: Sindiswe	D: Prakesh

Activity 17.1

Solutions

1. a) Derek: View 2 Thandi: View 3 Isaac: View 1
b) The top view of the file would look like this:



2. A:  B: 

C:  D: 

3. a) A: View 2 B: View 3 C: View 1
   b) The cat is behind the tree and so we cannot see it.
4. a) A: View 3 B: View 2 C: View 1 D: View 4
   b) View 5 shows the top view.

Unit 18 More views

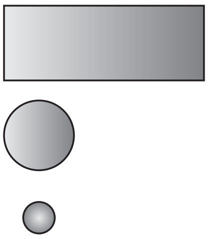
In this unit learners continue to practise recognising and drawing objects from different viewpoints. The groups of objects increase in variety, and learners must begin to think about different views of objects that have geometric shapes (cubes), which they will study in detail in Grade 6.

MENTAL MATHS

- Tell the learners that they will work with different views of cube stacks or constructions in this unit. Ask the learners to count the number of cubes in each cube stack. They should apply effective grouping, counting strategies and properties of number. Remind them that they should count the hidden cubes in each stack.

Solutions

1. View 1: D View 2: A View 3: B View 4: C
2. A top view of the objects would look like this:

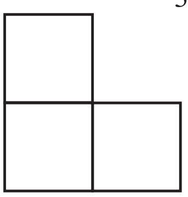
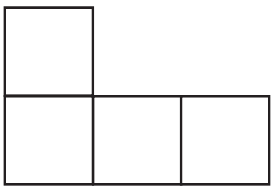
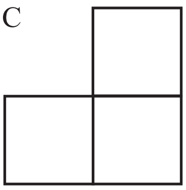
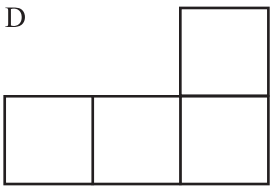


Activity 18.1

Solutions

1. a) A: View 4 B: View 3 C: View 1 D: View 2
   b) You must stand at the top looking down (or at the bottom looking up).

3.

A  B  C  D 

Investigation

Check that the learners are standing in different positions around their groups of objects before they start drawing the viewpoints. If the objects they choose are all the same shape help them vary the shapes and sizes of items they choose. Their drawings need not show accurate details of every object, but they should show understanding of which objects are closer and further away, from their viewpoint, which objects are hidden by other objects on the table, which can be seen sticking out above another object, and so on. The outline shapes of the objects that they see from their particular viewpoints should also be recognisable in the drawings they do.

When they compare their drawings they can all stand in a group at the viewpoint from which each drawing was made, and comment on how well the drawing shows the views and positions of the objects from that position.

- Assess how well learners are able to match views of a group of objects to different viewpoints.
- Assess how well learners can draw a group of objects from different viewpoints.

Learners can complete a copy of the following rubric.

Self-assessment

How well are you able to do the following?

I can	Yes, easily	Most times	Sometimes	I need a lot of help
Match different views of single objects.				
Match different views of a collection of objects.				
Match views of objects with different viewpoints.				

Remedial activities

- Learners who struggle to identify views from different viewpoints will need a lot of practice in which they are able to physically move to different positions and compare the different views. Let them practise placing one or more simple objects in the middle of a table and then moving to different positions around the table, and drawing the views they see. They can also stand on a chair to get a direct top view of the objects.

Extension activities

- Let the learners construct their own cube stacks using building blocks and test one another to see if they can correctly draw the views of the cube stacks as they would be seen from different positions.

Properties of 2-D shapes

The learners should be able to describe shapes according to the type of sides (curved, straight or both), number of sides, and length of sides. The learners should also be able to identify right angles in shapes.

Unit 19 Describing and drawing shapes

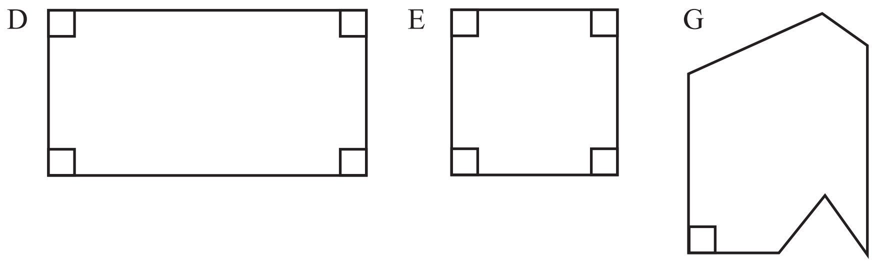
The work in this unit revises and consolidates the work done on 2-D shapes in Term 1.

MENTAL MATHS

- If learners struggle to recall the answers to these questions you may need to repeat the activity later in this unit. Add questions to the activity and repeat it a few times if you notice that learners have trouble recalling particular facts, such as the names of different 2-D shapes.

Solutions

1. a) One; curved
   b) H
2. a) Rectangle
   b) A square has four sides that are the same length, and shape D does not have four sides that are the same length.
3. a) Five
   b) Pentagon
4. a) G
   b) Heptagon
   c) The learners can draw any seven-sided shape with straight lines.
5. a) D, E and G
   b)



6. D: opposite sides are the same length
   E: all four sides are the same length

Activity 19.1

- Make sure that the learners have sufficient time to work concretely with shapes on a geoboard. As they manipulate the elastic band to create the various shapes, they get a better sense of the geometrical properties of each shape.
- Assess how well learners are able to name 2-D shapes, how well they can describe the different properties of the given shapes and how well they can describe the differences and similarities between squares and rectangles.

Solutions

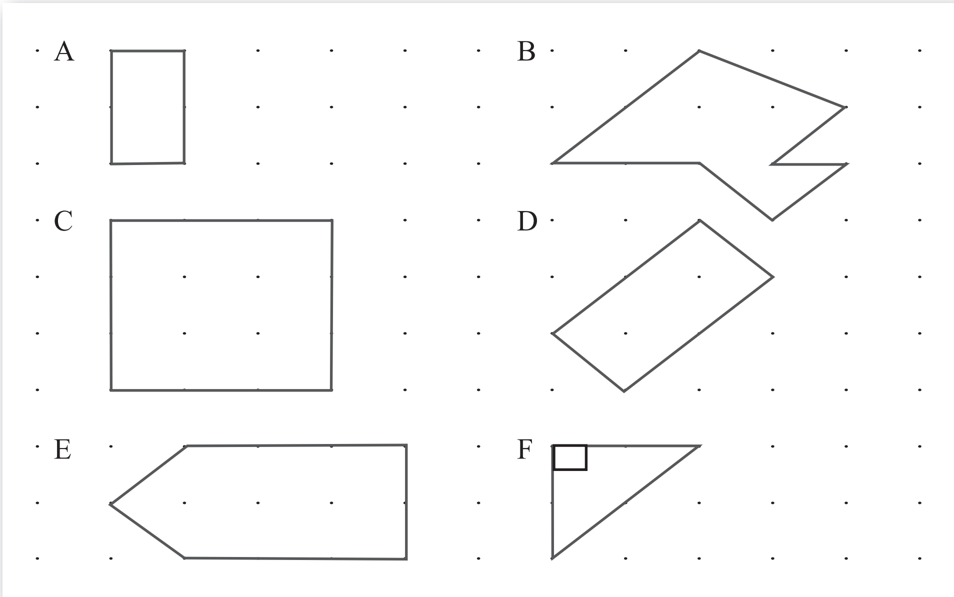
Learners use geoboards to work with different shapes.

Activity 19.2

- Assess how well the learners are able to draw simple shapes when given their names or descriptions and how easily they are able to build composite shapes from smaller shapes.

Solutions

The learners could complete the shapes in various ways. Here are some of the possible answers.

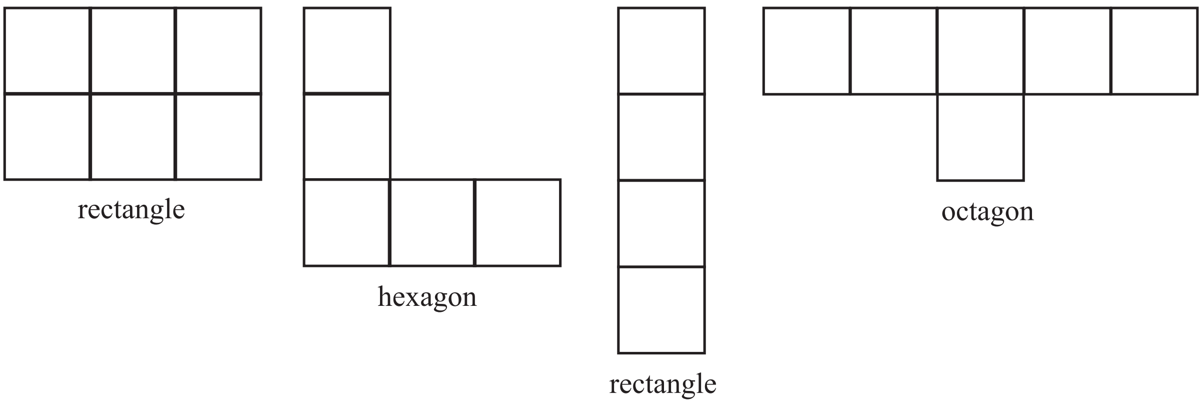


Activity 19.3

- Let the learners practise making the composite shapes given in the Learner's Book.

Solutions

There are various possible answers. Below are a few examples.



Unit 20 Shape games

As this unit provides revision of the concepts learned in Term 1, let the learners practise and consolidate their understanding by playing the games described in the Learner's Book.

MENTAL MATHS

- For the game Shape Draw, you will have to demonstrate how to describe different shapes if the players have not played this game before. Give learners two minutes to draw the shape. Once they are more experienced at playing the game, give them less time.

Activity 20.1

In the game of Shape Snap, you will have to demonstrate how to find features that different shapes have in common.

Assess the following.

- How well are the learners able to describe the properties of shapes such as:
  - straight and/or curved sides
  - number of sides
  - length of sides
  - angles (right angles and bigger or smaller than right angles)?
- Are they able to identify properties that different shapes have in common?
- Do they know what right angles are?
- Can they say if an angle is smaller or bigger than a right angle?

Activity 20.2

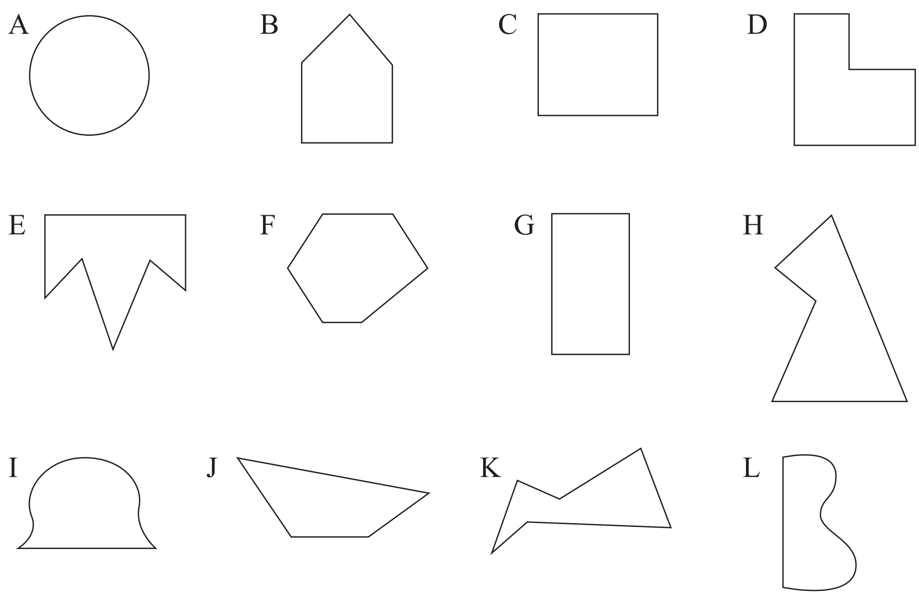
For the game 'What am I?', either set aside time for learners to first make and cut out 2-D shapes on stiff card, or give each group a set of these shapes. The shapes should be large enough so that learners can hold them in one hand and use the fingers on the other hand to feel the edges of the shape. Use cloth, plastic or paper bags so that learners cannot see the shapes. (See the Photocopiable Resources section at the back of this Teacher's Guide for shapes.)

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 22

1. Name each shape.



2. Look at the shapes.
   a) Divide the shapes into two groups. Explain how you grouped them.
   b) Divide the shapes into three groups. Explain how you grouped them.
   c) Divide the shapes into five groups. Explain how you grouped them.
3. Use six triangles to build four different bigger shapes. Make drawings to show the shapes you made.

Solutions

1. A: circle
   B: pentagon
   C: rectangle
   D: hexagon
   E: heptagon
   F: hexagon
   G: rectangle
   H: pentagon
   I: simple, closed curve
   J: polygon
   K: hexagon
   L: simple, closed curve
2. a) The learners may choose any valid property and group the shapes accordingly. For example, the two groups could be polygons and not polygons:
      - polygons: B, C, D, E, F, G, H, J, K
      - not polygons: A, I, L

      The two groups could be those with right angles and those that have no right angles:
      - shapes with right angles: B, C, D, E, G, K
      - shapes with no right angles: A, F, H, I, J, L
   b) The three groups could be:
      - shapes with straight sides only: B, C, D, E, F, G, H, J, K
      - shapes with curved sides only: A
      - shapes with both straight and curved sides: I, L
   c) The five groups could be:
      - shapes with at least one curved line: A, I, L
      - shapes with four sides: C, G, J
      - shapes with five sides: B, H
      - shapes with six sides: D, F, K
      - shapes with seven sides: E
3. The learners could build any composite shapes with the six triangles.

Self-assessment

How well are you able to do the following?

I can	Yes, easily	Most times	Sometimes	I need a lot of help
Tell the difference between straight and curved sides.				
Say which shapes are triangles, rectangles, squares, other quadrilaterals, pentagons, hexagons, heptagons and circles.				
Describe polygons according to the type of sides and number of sides they have.				

Say what is the same and different about squares and rectangles.				
Draw polygons on grid paper or dotted paper.				
Say which angles are right angles.				
Say which angles are bigger or smaller than right angles.				
Build bigger shapes using smaller squares or rectangles.				

Transformations

Unit 21 Translation (sliding)

In this unit, the focus is on the different ways in which we can move a shape in order to create composite shapes and patterns. The learners will become familiar with the terms translation, reflection and rotation as they transform shapes in these ways. This is a very practical unit and the learners should be given sufficient time to work with various shapes in the different ways required. At the same time, they begin to use the language that describes transformations, in spoken and written forms.

MENTAL MATHS

- Explain that translating a shape means keeping it flat on a surface and moving it to another position on that surface. Work through the explanations and illustrations in the Learner's Book and also do enlarged demonstrations on the board.

Solutions

1. A triangle was translated to the right.
2. A quadrilateral was translated down the page.
3. A rectangle was translated down and to the right.
4. A rectangle was translated across the page in three rows.
5. A square was translated across the page in two rows.

Activity 21.1

- Assess how well learners can describe what translating or sliding a shape means and how well they can translate shapes and trace around them in order to create composite shapes.

Solutions

1. Let the learners do the translations on their own in order to recreate the composite shapes and patterns given.
2. Let the learners further explore with various translations. Let them work with big shapes on A3 sheets as working with smaller shapes can be tricky at first. Give learners the opportunity to work with other 2-D shapes they have used before, such as pentagons and hexagons.

Unit 22 Reflection (flipping)

MENTAL MATHS

- Ask the learners to describe the pattern they observe in the shape. They should notice that the triangles have been flipped (reflected) downwards and to the left and right. They should also notice that the number of triangles increases by two in the rows and forms the pattern 1; 3; 5; 7, i.e. uneven numbers. Ask them how many triangles there would be in rows 5, 6, 7, and so on.
- The learners count the total number of triangles in the shape. First observe how they do this. They might not realise that there are more triangles embedded in the shape. Tell them that they should explore the bigger triangles hidden in the shapes.

Solutions

1. Learners describe the pattern.
2. Small triangles = 1 + 3 + 5 + 7
   = 7 + 3 + 5 + 1
   = 16
   Medium triangles = 4
   Large triangle = 1
   Total number of triangles: 16 + 4 + 1 = 21.

Activity 22.1

- Let the learners explore the different ways in which to reflect a shape by copying the composite shapes and patterns in the Learner's Book.
- Explain that reflecting a shape means flipping the shape over in order to get a mirror image of it. The shape does not remain flat on the surface when you change its position. We can flip a shape along any of its sides or corners.

Solutions

Learners cut out and copy the pattern at the beginning of the unit.

2. a) Learners copy the given shapes.
   b) A: A triangle was reflected to the right.
   B: A quadrilateral was reflected down the page.
   C: A quadrilateral was reflected in different directions.
   D: A hexagon was reflected down the page.
   E: A triangle was reflected in different directions.
   F: A triangle was reflected in different directions.
   c) All of the shapes have at least one line of symmetry.

Activity 22.2

- Assess how well learners can describe what reflecting or flipping a shape means, how well they can reflect shapes and trace around them in order to create composite shapes and how well they can describe the ways in which they have moved a shape to create a pattern.

Solutions

1. It will be best for the learners to choose simpler rather than more complex shapes. Once they are able to reflect the simple shapes comfortably, they can be challenged to work with more complex shapes.

2. a) Let learners develop their skills by working with different shapes, and combining translation and reflection in one pattern.
   b) Lead a class discussion in which you help one or two learners describe their patterns to the class. Do this in learners' home languages as well as in English, so that they become fluent at describing how their shapes move. Then let each learner describe his or her pattern to a partner or small group.

Unit 23 Rotation (turning)

MENTAL MATHS

- Explain that rotating a shape means that the shape remains flat on the surface while we turn it in a circular motion around a point on the shape. Demonstrate this with different 2-D shapes that learners have worked with so far.

Activity 23.1

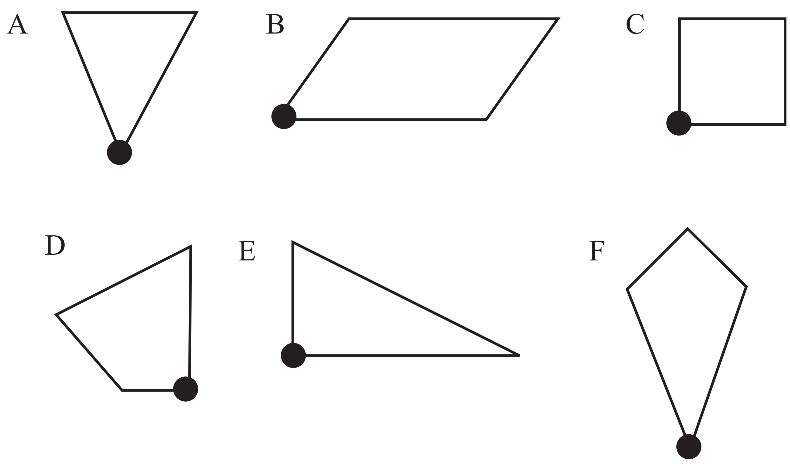
- Let the learners explore the different ways in which to rotate a shape by copying the composite shapes and patterns in the Learner's Book.

Solutions

- Learners copy and cut out a triangle and use it to copy the patterns at the beginning of the unit.
- Assess how well the learners can describe what rotating or turning a shape means and how well they can rotate shapes and trace around them in order to create composite shapes.

Solutions

1. a) The learners further explore rotating different shapes.
   b) The big dot in each drawing below shows the point around which the shape was rotated. Note that for the square in C, the learners' dots may be at any of the four corners depending on which of the four squares they chose to start the rotation.



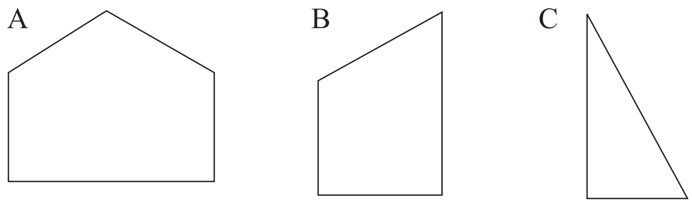
2. It will be best for the learners to choose simpler rather than more complex shapes. Once they are able to reflect the simple shapes comfortably, they can be challenged to work with more complex shapes. Help learners improve their vocabulary as they write a sentence about their transformation.

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

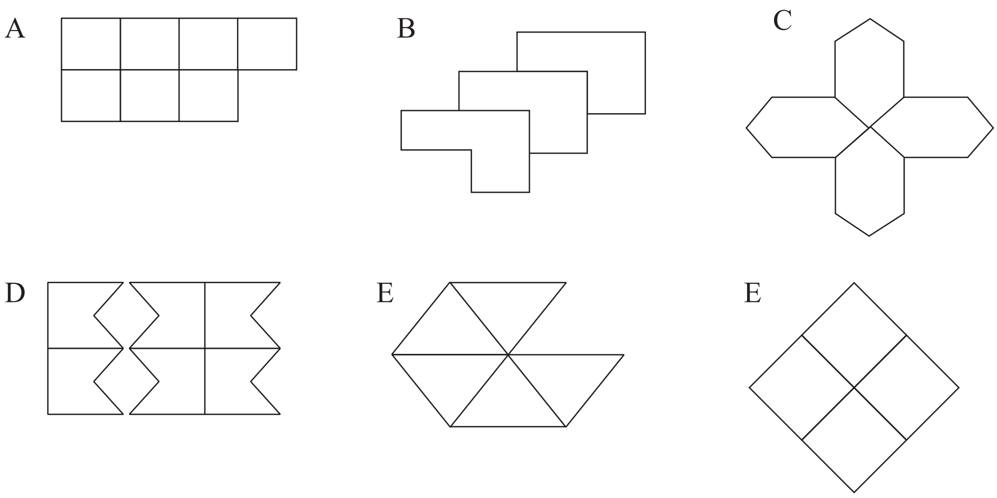
Assessment Task 23

1. Work on dotted paper.



   a) Copy shape A and then translate it five times in any direction.
   b) Copy shape B and then reflect it six times in any direction.
   c) Copy shape C and then rotate it three times around any of its corners.

2. Look at the shapes and answer the questions.



   a) Which smaller shapes were used to make each shape?
   b) Describe how the smaller shapes were moved to make each big shape. Use words such as translated, reflected and rotated.
   c) Make a copy of each shape by cutting out and tracing around the smaller shapes.
   d) Which bigger shapes are symmetrical?

Solutions

1. Translations, reflections and rotations can look quite different because no directions are specified for the translations and reflection and no point is specified for the rotation.

2. a) A: square B: hexagon
   C: pentagon D: hexagon
   E: triangle F: square
   b) A: The squares were translated. (They could also have been reflected.)
   B: The hexagons were translated.
   C: The pentagons were reflected.
   D: The hexagons were rotated.

E: The triangles were translated, reflected or rotated. Any of three types of transformation could have been used.
F: This is a challenging one for the learners. Give them time to work it out. A combination of reflection, translation and rotation was used.

c) The learners copy the composite shapes by tracing around the smaller shapes.
d) Shapes C, D and F are symmetrical (any two).

Self-Assessment

How well are you able to do the following?

I can	Yes, easily	Most times	Sometimes	I need a lot of help
Explain what translation, reflection and rotation mean.				
Make bigger shapes by tracing and translating, reflecting and rotating smaller shapes.				
Say whether or not a bigger shape is symmetrical.				
Describe how bigger shapes were made.				

Remedial activities

- Let the learners do translations, reflections and rotations using only a right-angled triangle. This shape produces simple and clearly defined composite shapes when translated, reflected and rotated, so learners should be able to distinguish the differences between the three types of movement clearly.
- Smaller shapes can be difficult to manipulate and working with them can cause a lot of frustration. So let the learners work with big cardboard shapes on large sheets of newsprint paper to practise translating, reflecting and rotating shapes.
- Language may be a problem. If the learners find the terminology difficult, let them use words such as sliding (translating), flipping (reflecting) and turning (rotating).

Extension activities

- Let the learners choose their own shape and translate, reflect or rotate it to create composite shapes. (They choose one of the three types of transformation.) Let them repeat their composite shapes to fill an A4 page with a pattern.
- Encourage the learners to create composite shapes using a combination of translation, reflection and rotation of a single simple shape, or of two or more shapes if they are confident working with one shape. This is a challenging activity and the learners will have to experiment on scrap paper first before presenting their final composite shape.

Temperature

Unit 24 What is temperature?

Activity 24.1

- It is extremely important to have atlases available to show the weather maps to the learners. Explain how they work and how to read the keys. Also use the weather maps printed in daily newspapers to let learners read about the weather where they live. Talk about how the temperature changes from low to high and then to low again, on any given day – you can relate this to the minimum and maximum temperatures given on most daily weather maps.
- Also have thermometers available (both analogue and digital ones). Try to get hold of the digital thermometer that is used in the ear and take a few of the learners' temperatures so that they can read what these temperatures are. Also read a few temperatures under learners' arms (using non-digital thermometers, with the red line facing the learners' bodies) and allow the learners to read their own temperatures. These readings are on number lines with intervals of one degree. Refer to work done on capacity and volume again, where learners read the numbering on measuring jugs.
- If your school has an outside thermometer, appoint learners to take the readings every day for a month and report back to the class. Make sure every learner gets a turn to do this.
- Make a weather calendar for the month. Add the daily temperatures to the calendar and complete it by adding a sun, wind, rain, clouds and so on. If a thermometer is not available, you could watch the morning weather forecast on television every day before coming to school and give this information to learners to add to the calendar. If learners watch television at home, let them take turns to collect this information.
- Collect newspaper pages with weather forecasts to cut out in class or ask the learners to bring weather forecasts from newspapers they have at home, and let them paste these into their workbooks.
- Make sure learners understand the danger of testing the temperature of water with their hands, and also educate them about the dangers when working with hot water in the kitchen and the bathroom. If learners come from homes and neighbourhoods where fire is a constant danger, talk about ways to stay safe at home, and what to do if someone is burnt by fire. Be sensitive to the fact that some learners may have had very traumatic experiences with fire or other burns in their home environments.

Solutions

1. a) The sun was shining on: 1, 2, 4, 5, 6, 13, 14, 15, 18, 20, 21, 25, 26, 27, 28, 30, 31 May
   b) It was probably warm on these days.
   c–e) Answers will depend on local circumstances.
2. a) 20 °C; warm b) 17 °C; cool
   c) 0 °C; freezing d) 28 °C; hot
   e) 37 °C; very hot
3. a) 37 °C b) 40 °C
   c) 20 °C d) 4 °C
   e) 100 °C f) 0 °C
   g) 13 °C h) 38 °C
   i) 5 800 °C j) 58 °C

Unit 25 Working with temperature

MENTAL MATHS

- Discuss words used to describe weather again: thunder showers, sunny. overcast, partly cloudy, cloudy, and so on. Talk about the temperatures that are usually associated with these types of weather in South Africa (use weather maps to guide you here). Focus on the range of weather conditions that learners will have experienced in your region, and the related temperatures for these conditions. Explain to learners that the temperature on a rainy day can be warm in summer, but very cold in winter because the temperature depends on more than one aspect of weather conditions. Sunny days in winter can be freezing cold; cloudy days in summer can be very hot and uncomfortable.
- Ask learners to record minimum and maximum temperatures in the classroom or the school grounds during the course of one school day so that they can answer question 6. Lead a class discussion about why the temperature inside the classroom could change during the day (reasons can include: the temperature outside rises, and our body heat warms up the room). Ask the learners how they feel, as the room heats up – do they get more sleepy or more energetic? Talk about how important it is to have good ventilation (fresh air) where we work and sleep.

Solutions

1.

City/Town	Weather	Minimum temperature	Maximum temperature
Cape Town	Thunder showers	11 °C	16 °C
Port Elizabeth	Partly cloudy	12 °C	23 °C
Durban	Sunny	19 °C	31 °C
Bloemfontein	Partly cloudy	11 °C	26 °C
Pretoria	Thunder showers	19 °C	28 °C
Musina	Sunny	24 °C	38 °C
Port Nolloth	Overcast	8 °C	14 °C
Sutherland	Overcast	3 °C	15 °C
Upington	Sunny	24 °C	41 °C

2. The minimum temperature is the lowest temperature on a day and the maximum is the highest temperature on a day. Both temperatures are rounded off to a whole number.
3. a) Maximum: Upington
   b) Minimum: Musina and Upington
4. 41 °C – 24 °C = 17 °C
5. Upington
6. The answers depends on local conditions.

Activity 25.1

- In Grade 5 learners do not work with negative numbers. Give each learner a copy of the number line from the Photocopiable Resources to paste into their books. They need to read the answers from the number line for question 1.

- Explain to the learners that the word ‘rises’ in the table of temperatures means increases and so we add degrees. The word ‘falls’ means decreases, and so we subtract degrees. Show them how to use the number of degrees to work out what the new temperature readings in question 1 are.
- Explain that we can do calculations with temperature measurements just as we with other measuring units, and with whole numbers and common fractions. Remind learners how to use familiar methods to calculate (for example, $\frac{3}{10}$ of 40 °C = [3 × $\frac{40}{10}$] = 12 °C).
- Also hand out a copy of six thermometers from the Photocopiable Resources for question 2 that learners must paste into their books. Learners have to colour in the thermometers to show the given temperatures.

Solutions

1.

	Temperature in °C	Change in °C	New temperature in °C
a)	20 °C above 0 °C	rises 9 °C	29 °C above 0 °C
b)	15 °C below 0 °C	rises 10 °C	5 °C above 0 °C
c)	41 °C above 0 °C	falls 14 °C	27 °C above 0 °C
d)	11 °C above 0 °C	rises 15 °C	26 °C above 0 °C
e)	3 °C above 0 °C	rises 20 °C	23 °C above 0 °C
f)	4 °C below 0 °C	falls 6 °C	10 °C below 0 °C
g)	0 °C	falls 10 °C	10 °C below 0 °C
h)	10 °C below 0 °C	rises 8 °C	2 °C below 0 °C
i)	6 °C below 0 °C	rises 6 °C	0 °C
j)	31 °C above 0 °C	falls 9 °C	22 °C above 0 °C

2. a) D
   b) C
   c) A
   d) B and F
   e) E

3. a) 10 °C
   b) 6 °C
   c) $13\frac{1}{2}$ °C
   d) 150 °C
   e) 420 °C

4. a) 80 °C
   b) 50 °C
   c) 0 °C
   d) 5 820 °C
   e) 30 °C
   f) 40 °C

Data handling

The work on data handling for this term revises the work introduced in Term 1. The learners will practise collecting, organising, representing and analysing data again, but they will also extend their analysis of graphs by comparing different graphs of data collected at different times or from different contexts. They will also revise and practise identifying the mode of a given data set.

In making comparisons of graphs and charts of data, the learners will develop their ability to look critically at data, and understand how the time or place at which the data are collected can affect data. They will also use series of data sets collected over two or more time periods to predict what could happen in the future.

Unit 26 Collecting and organising data

The activities in this unit help the learners to practise drawing and using tally tables by grouping data, and also to order data from smallest groups to largest groups.

MENTAL MATHS

Solutions

12 hotdogs, 14 chip rolls and 18 chicken burgers

Activity 26.1

- Assess how well the learners are able to read a tally table, how well they can use a tally table to organise data, how well they use a tally table to collect data, how well they order data groups from smallest to largest and how well they compare data and suggest reasons for any differences.

1. a)

Types of food	Tally marks	Number of each food item sold
Chicken burgers	~~||||~~ ~~||||~~ ~~||||~~ |||	18
Hotdogs	~~||||~~ ~~||||~~ ||	12
Chip rolls	~~||||~~ ~~||||~~ ||||	14

b) Chicken burgers
c) Hotdogs
d) Hotdogs, chip rolls, chicken burgers

2. a) 5 flavours

b)

Juice flavours	Tally marks	Number of children
Orange	~~||||~~ ~~||||~~	10
Mango	||||	4
Grape	~~||||~~ ||||	9
Apple	~~||||~~ |||	8
Guava	~~||||~~	5

c) 10 children
d) 9 children
e) Mango, guava, apple, grape, orange

3. a) 6 countries

b)

Country	Tally marks	Number of stamps
Britain	~~||||~~ ||	7
Nepal	~~||||~~ ||||	9
Canada	~~||||~~ |||	8
Denmark	|||	3
Botswana	~~||||~~		6
Switzerland	~~||||~~	5

c) Nepal
d) Denmark
e) Denmark, Switzerland, Botswana, Canada, Britain, Nepal
f) 38

4. a) 3 sources

b)

Source of lighting	Tally marks	Number of children
Electricity	𝍸 𝍸 III	13
Candles	𝍸 III	8
Paraffin	𝍸 IIII	9

c) 13 children
d) 8 children
e) Electricity
f) Candles, paraffin, electricity

5. Let the learners do this activity as a homework assignment.

6. This activity needs to be done at least twice, preferably on the same school day, so that learners can compare data based on the time of day when data is collected.

a)–d) Learners use methods for collecting and recording data that they learned to use. You may want to adapt the categories of data to suit your local school context. For example, if many workers usually pass the school at a certain time of day, and elderly people (pensioners) at another time of day, replace *adults* with one or more of these categories for which learners must collect data.

e)–h) Lead a class discussion before learners write their explanations. Let them suggest why there may be more children early in the morning than later in the day (when the children are at school), more adults/pensioners and so on later in the day – perhaps they first do the housework, then later they go out shopping. Help learners identify patterns of behaviour amongst the people in the data that relate to your local school/neighbourhood environment.

Unit 27 Representing data

This unit gives learners more practice to draw pictographs and bar graphs to represent given data.

In Term 1, the learners were introduced to pictographs where one picture represented more than one item. This unit revises and consolidates pictographs with many-to-one correspondence. Work through the example with the learners as it illustrates the process they can follow when drawing pictographs from given data.

MENTAL MATHS

Solutions

1–2. Learners count in 500s and 1 000s.

3. a) $8\frac{1}{2}$ million

   b) $7\frac{1}{4}$ million

   c) $5\frac{3}{4}$ million

4–5. Learners count in 200 000s and 10 000s.

Activity 27.1

- For those who struggle to draw pictographs, first show them a complete one and let them read from the pictograph. For example:
  - One picture represents 1 000 schools.
  - Half a picture represents 500 schools (half of 1 000 schools).
  - Mpumalanga has 2 000 schools.
  - Free State has 1 500 schools (1 000 + 500)
  - Eastern Cape has 5 500 schools (5 000 + 500)
  - North West has 1 500 schools (1 000 + 500)
  - The data show that, of the four provinces, Mpumalanga has the fewest schools and Eastern Cape has the most schools. Free State and North West have the same number of schools.

Solutions

1. a)

Province	Number of schools
Gauteng	2 000
KwaZulu-Natal	6 000
Limpopo	4 000
Northern Cape	500
Western Cape	1 500

b)  = 1 000 schools

Province	Number of pictures
Gauteng	
KwaZulu-Natal	
Limpopo	
Northern Cape	
Western Cape	

2.  = 500 schools

Province	Number of pictures
Gauteng	
KwaZulu-Natal	
Limpopo	
Northern Cape	
Western Cape	

3. a)  = 1 million people

Province	Number of people
Eastern Cape	
Gauteng	
Mpumalanga	
KwaZulu-Natal	
Western Cape	

b)  = $\frac{1}{2}$ million people

Province	Number of people
Eastern Cape	
Gauteng	
Mpumalanga	
KwaZulu-Natal	
Western Cape	

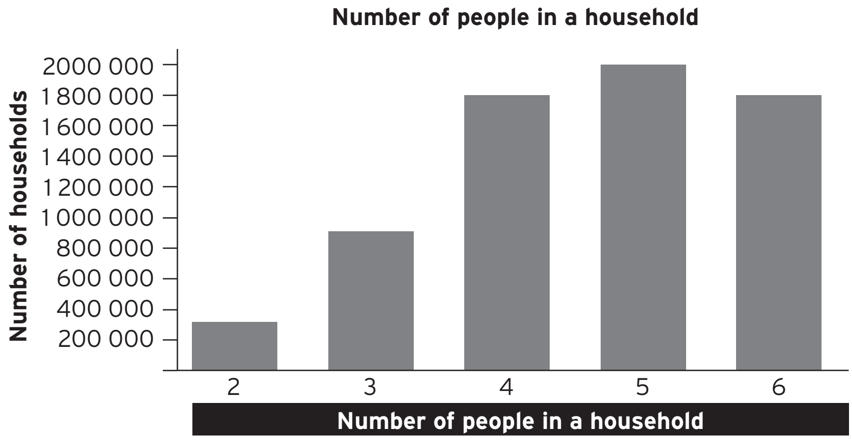
c)–d) There is no single correct answer to this question. Let learners explore possible reasons for the increase or decrease in population in the provinces. You may want to confine this discussion just to your province if learners do not have a sense of broader national realities. Talk about whether the learners know people who have moved into the province, or to another province, and why they think people have done this. Reasons might include wanting to live in a big city, looking for work, or wanting to join other family members.

Activity 27.2

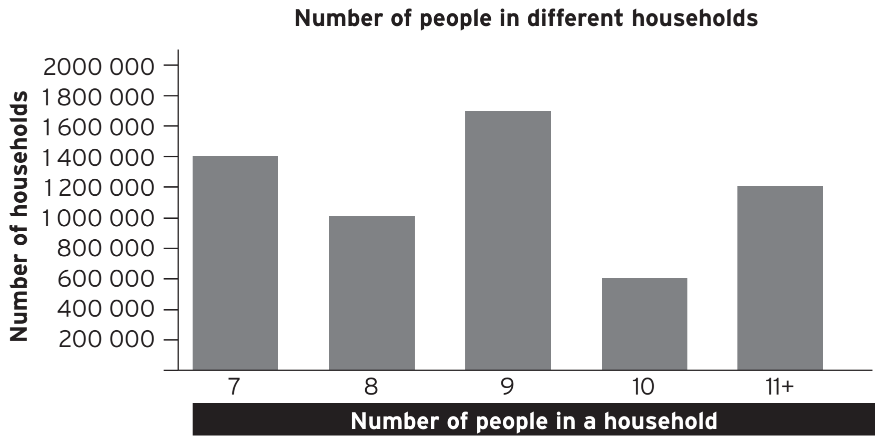
- In this section, the learners will work with regional or national data, so the numbers are very large. Do not let the learners be put off by the large numbers. Remind them that the principles of bar graphs are still the same, and that they have learned to work with big numbers in Grade 4. Where relevant, remind them of how we round numbers to the nearest 1 000, 10 000, 100 000 and so on.
- To familiarise the learners with the large numbers they will work with, you could let them practise counting aloud in 100 000s, while you point to the numbers on a number chart or on the blackboard.
- Assess how accurately the learners are able to draw and label the vertical axis of a bar graph, label the horizontal axis and draw the bar graphs on the set of axes.

Solutions

1. a) Learners read the numbers on the vertical axis. This helps them to focus on the numbers used.
   b) 100 000, 300 000, 500 000, and so on.
   c) This further helps the learners to ensure that they understand the numbering on the vertical axis.
   d) The number of people in a household.
   e)

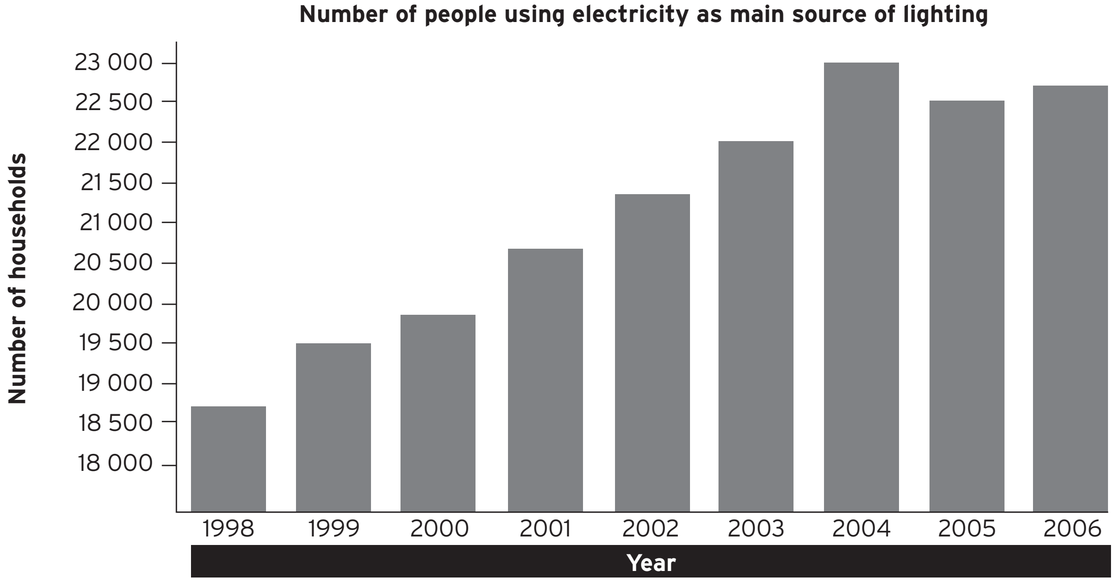


2.



3. a) Make sure that the learners are can read numbers on the vertical axis with ease.

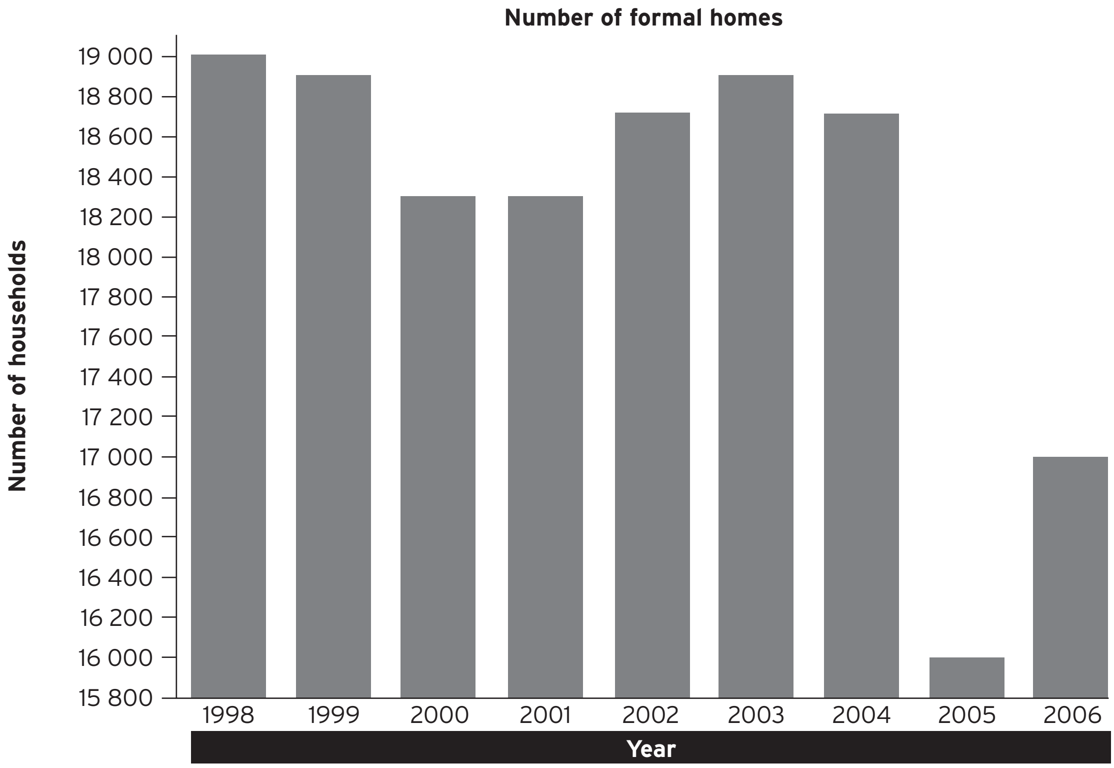
b)



Some learners may ask why the numbers on the vertical axis start at 18 000 and not at 0. Explain that, had you labelled the vertical axis from 0, it would have created a very tall bar graph. The data would still be the same. To demonstrate the explanation, do the following:

- Draw a large copy of the complete bar graph on a large sheet of paper, with the vertical axis starting at the 18 000 mark.
- Draw the same data on a bar graph with the same intervals, but with the starting point being 0.
- Cut the second sheet horizontally at the 18 000 mark. Then place the sheet next to the first bar graph. The learners should see that the bars on both graphs look exactly the same.

4. a)–b)



Unit 28 Analysing data

In this unit, the learners will practise analysing data presented as paragraphs, pictographs, bar graphs and pie charts. They will compare data from different contexts and they will also practise identifying the modes of different data sets.

Learners interpret data described in paragraphs and presented as pictographs, bar graphs and pie charts.

MENTAL MATHS

- The learners count in 2 000s and 1 500s, they find the sum of the value of pictures that represent numbers into the millions, they fill in the missing fractions in fraction addition number sentences and place numbers in ascending order. They engage in these concepts in preparation for the data handling concepts to be develop in the following lessons.

Solutions

1–2. Learners count in 2 000s and 1 500s.

3. a) $4\frac{1}{2}$ million people
   b) $7\frac{1}{2}$ million people

Activity 28.1

- Assess how well learners understand a paragraph of data, they show the data in the paragraph in the form of a table and use the data in a table or paragraph to answer questions about related data.
- Assess how well the learners are able to understand pictographs with many-to-one correspondence, how comfortable they are working with numbers into the millions, how accurately they can calculate the number that each figure in a pictograph represents and how well they are able to draw conclusions and make predictions using the given data.

Solutions

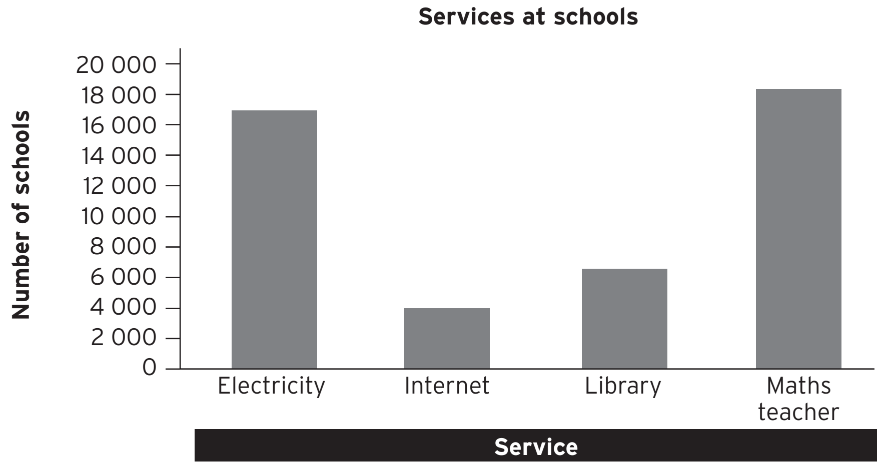
1. a) The data describe the number of teachers in different provinces of South Africa.
   b)

Province	Number of teachers
KwaZulu-Natal	85 000
Eastern Cape	65 000
Northern Cape	10 000
North West	25 000
Free State	25 000

   c) Northern Cape, North West, Free State (or Free State and then North West), Eastern Cape, KwaZulu-Natal
   d) Limpopo, Mpumalanga, Gauteng, Western Cape
   e) 65 000 is the second-highest number of teachers, so the other provinces would have fewer than this number of teachers.
   f) 10 000 is the lowest number of teachers, so the other provinces will have more than this number of teachers.

   g) Department of Basic Education, in 2010
   h) Accept any logically reasoned answers – for example, to see if there are enough teachers for all the children.

2. a) 4 services
   b) Electricity: 17 000 schools
      Internet: 4 000 schools
      Library: 6 000 schools
      Maths teacher: 18 000
   c) Internet, library, electricity, Maths teacher
   d) 2009
   e) The pictograph shows some of the services or teachers that a number of schools had. The service that most schools had was a Maths teacher and the service that the fewest schools had was access to the internet.
   f)



3. a) Gauteng
   b) Northern Cape
   c) Eastern Cape: 6 500 000 people; Free State: 3 000 000 people; Gauteng: 10 500 000 people; KwaZulu-Natal: 10 000 000 people; Limpopo: 5 000 000 people; Mpumalanga: 3 500 000 people; Northern Cape: 1 000 000 people; North West: 3 500 000 people; Western Cape: 5 500 000
   d) Northern Cape, Free State, Mpumalanga, North West (or North West and then Mpumalanga), Limpopo, Western Cape, Eastern Cape, KwaZulu-Natal, Gauteng
   e) 2007
   f) Northern Cape has the fewest people living there.
   g) The paragraph in Activity 27.1 states that the Northern Cape has the fewest schools.

Activity 28.2

- Assess how accurately the learners are able to read values on a bar graph and how well they are able to compare data from different contexts.

Solutions

1. a) Graph A
   b) Graph B
   c) centimetres
   d) Let the learners familiarise themselves with the numbers used on the vertical axis of the bar graph.

e)–f)

Age	Height of boys	Height of girls
9	137	136
10	142	142
11	147	148
12	152	151
13	157	154
14	162	158
15	166	158

g) • Yes, there is a difference of only about 1 cm between the girls and boys of those ages.
  • No, boys seem to grow faster than girls during those ages because the boys are taller by 3 to 6 cm.

2. a) Learners use their data collection and presentation skills to collect, group and present the data for boys and girls in their class.
   b, d) Help learners to find the data on the bar graphs or tables for South African girls and boys that they must compare with their own data – they must identify the national age groups that are the same as the ages in their own class, and compare the data for those age groups.
   e) Accept any logical answers. For example, not all children grow at the same rate and children's height is related to their parents' height.

3. a) Flush toilet, chemical toilet, pit latrine, bucket toilet, no toilet
   b) Flush toilet
   c) Flush toilet
   d) Chemical toilet, bucket toilet, no toilet, pit latrine, flush toilet
   e)

Type of toilet	Number of households with this toilet in 2001	Number of households with this toilet in 2007
Flush toilet	128 000	150 000
Chemical toilet	5 000	3 000
Pit latrine	70 000	70 000
Bucket toilet	10 000	5 000
No toilet	35 000	20 000

   f) More households
   g) Flush toilet: increase
      Chemical toilet: decrease
      Pit latrine: no increase or decrease
      Bucket toilet: decrease
      No toilet: decrease
   h) The learners' paragraphs may differ, depending on what they choose to write about. Remind them to give a summary of the data. Any other detail would be what they think is important to mention. For example, the bar graphs show the different types of toilets used by households in

2001 and 2007. In both years, flush toilets were most common and chemical toilets were least common. More people used flush toilets in 2007 than in 2001. More people had access to toilets in 2007 than in 2001 because the number of households with 'no toilets' decreased.

i)
- More flush toilets: there was an increase from 2001 to 2007, so we would expect a further increase.
- Fewer bucket toilets: there was a decrease from 2001 to 2007, so we would expect it to decrease further.
- Fewer households with no toilet: there was a decrease from 2001 to 2007, so we would expect it to decrease further.

Activity 28.3

- Assess how well the learners are able to read data presented as pie charts and how well they are they able to compare and analyse pie charts that show data from different contexts.

Solutions

1. a) $\frac{1}{6}$ b) $\frac{5}{6}$
   c) All the plastics used in South Africa.
2. a) $\frac{4}{6}$ b) $\frac{2}{6}$
   c) All the cans used in South Africa.
3. a) No, they are better at recycling cans than plastics. They recycle $\frac{1}{6}$ of plastics and $\frac{4}{6}$ of cans.
   b) No, no information is provided.
   c) No, the data is not provided.
   d) Learners should answer this question by estimating whether they recycle similar fractions of the plastic and cans they use, to those shown in the pie chart. No accurate answers are possible; this is an opportunity for the learners to think about whether the data shown by the pie charts describes their own lives as well. You could also extend the activity by asking learners to draw their own rough pie charts to show what fraction of cans, plastic or other materials they recycle; they have not yet learned to draw accurate pies, but should be able to do sketches that show approximations of these fractions, based on their work with fractions in Grades 4 and 5.
4. a) 1900, 1950 and 2000 b) $\frac{1}{5}$
   c) $\frac{2}{5}$ d) $\frac{3}{5}$
   e) The pie charts show an increase of $\frac{1}{5}$ every 50 years, so we could expect $\frac{4}{5}$ by 2050.
   f)
   - Yes, $\frac{3}{5}$ is more than $\frac{1}{5}$.
   - No, more than half the circle of the pie chart shows rural areas.
   - Yes, more than half of the circle of the pie chart shows cities.

Investigation

You may already have explained the concept that the learners will investigate here. However, let the learners do the activity themselves to consolidate their understanding.

The important point is that the numbering on the vertical axis does not have to start at 0.

Activity 28.4

- In this activity, the learners will work through the whole data cycle.
- Assess how well the learners are able to work through each step of the data cycle, whether there are any fundamental problems in their understanding of any part of the data cycle, how accurately they organise (group) and display the data and how well they are able to analyse the data.

Solutions

The learners should be confident enough in their data handling skills to be able to carry out this activity on their own.

As this activity will take place over a period of time, it is a good idea to set aside time on a number of days for each part of the activity, either during class or as homework. For example, set dates for when the data will be:

- collected
- organised in the form of a table
- shown as a bar graph
- analysed (by the questions being answered).

Once learners have chosen their topics, work with all the learners who have chosen each topic to help them choose sensible ways to group the data they collect. For example, learners collecting data about mass could group (categorise) the data in mass intervals of 1 kg, 2 kg or 5 kg, depending on how wide the range of masses is. Learners collecting data about shoe size could use each shoe size as a separate data category.

Activity 28.5

- The learners practise finding the number that occurs most often in a data set.
- Assess how accurately the learners can order the data from smallest to largest and how well they can identify the mode in data sets.

Solutions

1. a) 17, 18, 18, 19, 19, 20, 21, 22, 23, 24, 24, 24, 25, 25, 26
   b) 24 (it occurs three times)
   c) 7 (24 – 17 = 7)
   d) 2 (26 – 24 = 2)
2. a) 18, 19, 23, 23, 24, 24, 24, 24, 25, 25, 25, 26, 26, 26, 26, 27, 27, 27, 27, 27, 27, 28, 28, 28, 29, 29, 30, 30, 32, 34
   b) 27 (it occurs six times)
   c) 9 (27 – 18 = 9)
   d) 7 (34 – 27 = 7)
3. a) 128, 135, 135, 136, 136, 138, 138, 139, 140, 140, 140, 140, 140, 141, 141, 141, 141, 141, 141, 142, 142, 142, 143, 143, 145, 145, 146, 146, 146, 148, 148, 149, 150, 153, 160
   b) 141 (it occurs six times)
   c) 13 (141 – 128 = 13)

d) 19 (160 – 141 = 19)
e) The mode of Alwyn's data is very close to this figure of 140.

4. a) 100, 100, 101, 102, 102, 102, 104, 104, 105, 105, 105, 105, 106, 106, 106, 106, 107, 107, 107, 108
b) 105 and 106 (both occur four times)
c) 5 (105 – 100 = 5)
6 (106 – 100 = 6)
d) 3 (108 – 105 = 3)
2 (108 – 106 = 2)
e) Help learners understand that it is often possible to have two or more modes in a data set. If there are two modes, this means that both number values (such as temperatures and running times) occur the same number of times, and are, therefore, equally common.

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 24

1. The following data shows the favourite flavours of sweets of a Grade 5 class.

strawberry, orange, mint, lemon, mint, strawberry, mint, apple, mint, strawberry, lemon, mint, strawberry, orange, mint, apple, mint, mint, apple, strawberry, orange, strawberry, apple, lemon, strawberry, mint, strawberry, strawberry, apple, orange, apple, orange, apple, strawberry, orange, lemon, apple, strawberry, lemon

a) How many flavours are there?
b) Make a tally table of the data.
c) How many children like mint sweets?
d) How many children like orange sweets?
e) Order the flavours of sweets from the least popular to the most popular.

2. The following paragraph describes the number of households in each province that use solar energy for lighting.

About 4 000 households in the Eastern Cape use solar energy for lighting. The Free State and Northern Cape each has half of this number. Gauteng has about 3 500 households that use solar energy for lighting. In North West and Western Cape there are about 1 500 households each that use solar energy for lighting. Mpumalanga has about 1 000 households that use solar energy for lighting. Limpopo has about 3 000 households and KwaZulu-Natal has about 5 000 households that use solar energy for lighting.

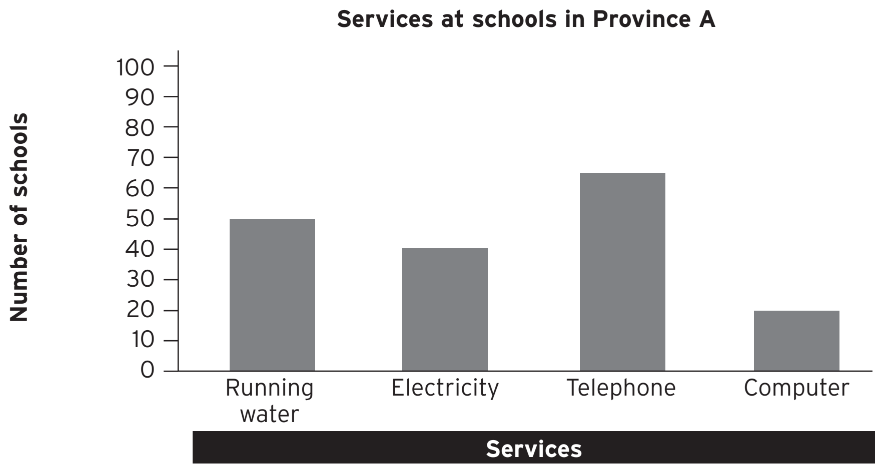
(Based on data from *Census 2001: Census in brief,* Statistics South Africa)

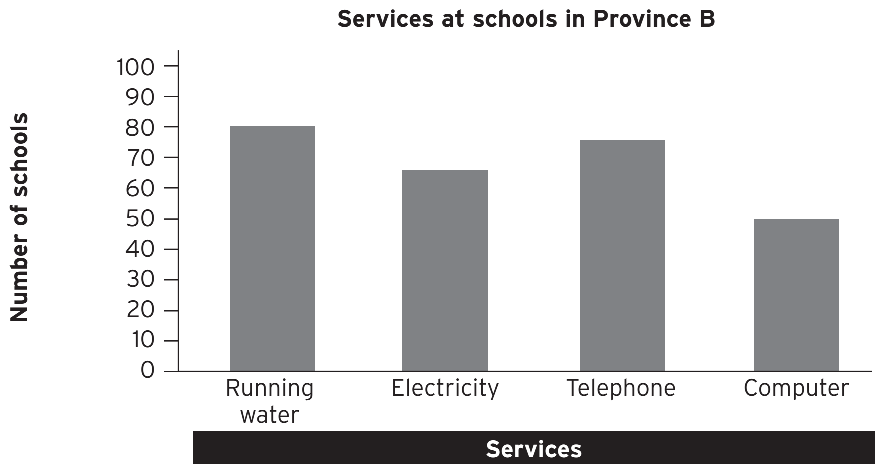
a) Copy and complete the following table to show the data in the paragraph above.

Province	Number of households using solar energy
Eastern Cape	
Free State	
Gauteng	
KwaZulu-Natal	
Limpopo	
Mpumalanga	
Northern Cape	
North West	
Western Cape	

b) Which organisation collected the data?
c) In which year did the organisation collect the data?
d) Draw a pictograph of the data. Let one picture stand for 1 000 households.
e) Draw a bar graph of the data.

3. The following bar graphs show the services at 100 schools in Province A and 100 schools in Province B.





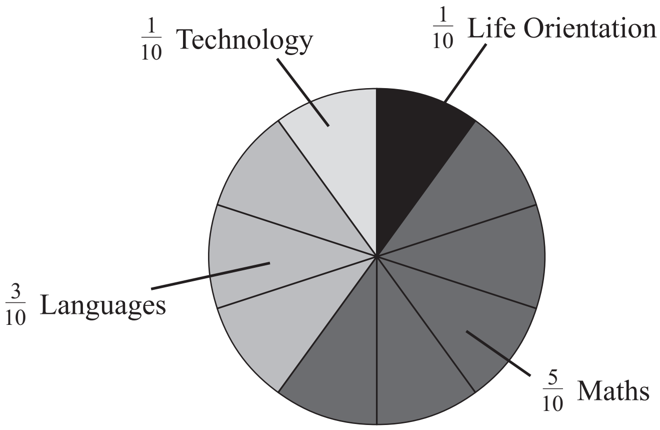
a) Which four services do the graphs show?
b) Copy and complete the following table using the data in the bar graphs.

Service	Number of schools in Province A	Number of schools in Province B
Running water		
Electricity		
Telephone		
Computer		

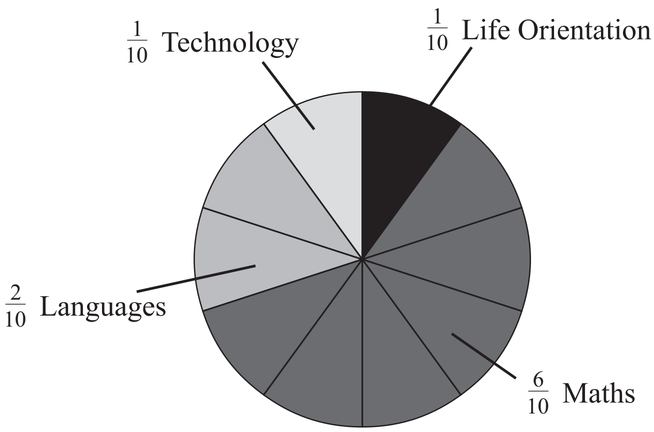
c) Which province has running water at more schools?
d) Which province has computers at fewer schools?

4. The pie charts below show the favourite subjects of girls and boys across South Africa.

Girls



Boys



(Based on data from *Census at School Results 2009*, Statistics South Africa, 2010)

a) Which subjects do the pie charts show?
b) Do both pie charts show the same subjects?
c) What fraction of girls like Maths best?
d) What fraction of boys like Maths best?
e) What fraction of girls like Technology best?
f) What fraction of boys like Technology best?
g) Say whether you agree or disagree with the following statements. Explain your answer each time:
   A Maths is the favourite subject of the boys.

B Technology is the favourite subject of the girls.
C A bigger fraction of boys than girls liked Maths.
D A bigger fraction of boys than girls liked Languages.

h) In which year was the data collected?

5. Tamsyn recorded the following temperatures every day for a month, in degrees Celsius.

8, 9, 10, 11, 13, 14, 14, 15, 15, 16, 19, 18, 11, 12, 10, 13, 14, 14, 15, 15, 12, 13, 9, 14, 14, 15, 13, 12, 9, 8

a) Write down the temperatures in order from lowest to highest.
b) What is the mode of the data? How many times is this number in the data set?
c) What is the difference between the mode and the lowest temperature?
d) What is the difference between the mode and the highest temperature?

Solutions

1. a) 5 flavours

b)

Flavours	Tally marks	Number of learners
strawberry	~~IIII~~ ~~IIII~~ I	11
orange	~~IIII~~	5
mint	~~IIII~~ ~~IIII~~	10
lemon	~~IIII~~	5
apple	~~IIII~~ III	8
Total		39

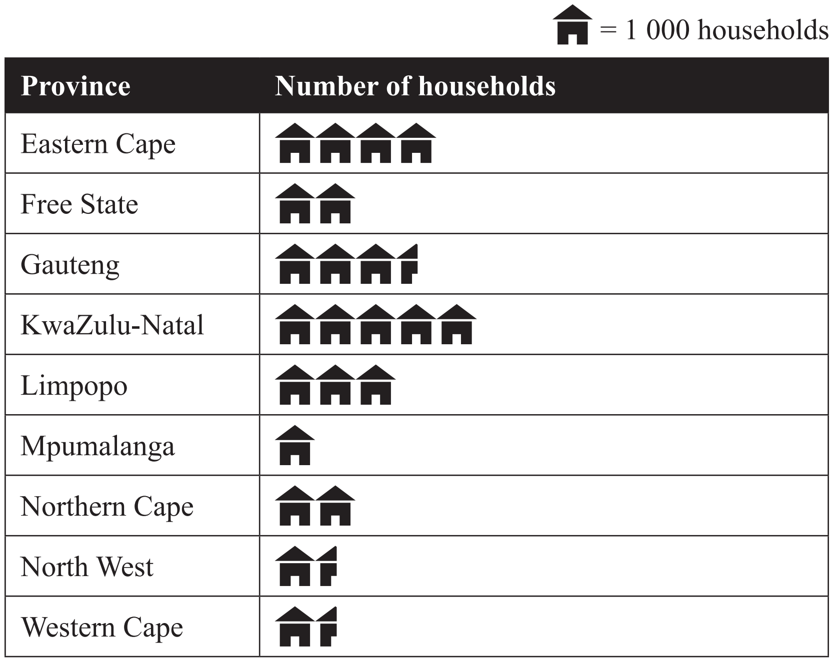
c) 10 children
d) 5 children
e) Orange and lemon, apple, mint, strawberry

2. a)

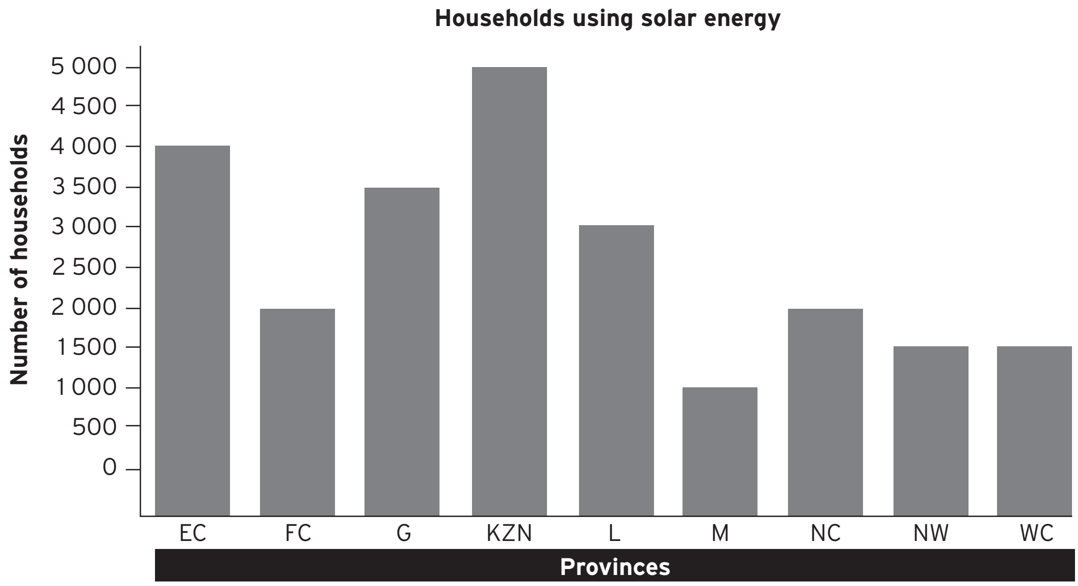
Province	Number of households using solar energy
Eastern Cape	4 000
Free State	2 000
Gauteng	3 500
KwaZulu-Natal	5 000
Limpopo	3 000
Mpumalanga	1 000
Northern Cape	2 000
North West	1 500
Western Cape	1 500

b) Statistics South Africa
c) 2001

d)



e)



3. a) Running water, electricity, telephone, computer

b)

Service	Number of schools in Province A	Number of schools in Province B
Running water	50	80
Electricity	40	65
Telephone	65	75
Computer	20	50

c) Province B

d) Province A

4. a) Maths, Languages, Technology and Life Orientation

b) Yes

c) $\frac{5}{10} = \frac{1}{2}$

d) $\frac{6}{10} = \frac{3}{5}$

e) $\frac{1}{10}$

f) $\frac{1}{10}$

g) A: True; B: False; C: True; D: False

h) 2009

5. a) 8; 8; 9; 9; 9; 10; 10; 11; 11; 12; 12; 12; 13; 13; 13; 13; 14; 14; 14; 14; 14; 14; 15; 15; 15; 15; 16; 18; 19

b) 14; 6

c) 6

d) 5

Below is an assignment you can give your learners to complete. This will give them the opportunity to practise what they have learned in data handling this term.

Assignment

1. Find out the ages of 20 children each in Grades 4, 5 and 6 at your school.
2. For each grade, write the ages in order from youngest to oldest.
3. Write down the mode of each set of data.
4. Write a sentence to explain what this mode tells you about the ages of the children in that grade.
5. Draw a bar graph of the data for each grade.
6. Colour the bar that shows the mode for each grade. (Hint: The mode is the age that most of the children are.)
6. Write one or two sentences to describe your data.
7. The table below shows the mode of children's ages in Grades 4, 5 and 6 across South Africa. Write a sentence to describe how the modes of your data are the same as or different from the modes in the table below.

Modes of children's ages in different grades

Grade	4	5	6
Mode	8	9	10

(Based on data from *Census at School Results 2009*, Statistics South Africa, 2010)

Remedial activities

- Let the learners practise numbering the vertical axes of bar graphs in different number intervals.
- Let the learners practise reading different values from the vertical axis of a bar graph, that is, values in between the ones marked.
- Give the learners practice reading fractions from cardboard cut-outs. Give them a stack of cardboard circles, each divided into different fractions and each shaded in two or three different colours. Let them practise saying how many parts of the circle are shaded in the different colours, for example $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{4}{10}$, $\frac{6}{10}$ and so on.
- If the learners have difficulty finding the mode of a set of values, start with small number values and with only a few numbers in the data set, for example, the numbers 1 to 5, in a data set consisting of only eight or ten numbers. Then slowly increase the quantity of numbers in the data set, as well as the value of each of the numbers.

Extension activities

- Ask the learners to use any of the sets of data in the Learner's Book and to present the data in a different form. For example, if there is a paragraph of data, the learners can draw a pictograph of it; if a bar graph is given, the learners can draw a pictograph of it, or summarise the data in a paragraph; or if a pictograph is given, the learners can draw a table of the data or draw a bar graph of the same data.
- Ask the learners what other questions are important to ask about how people live, go to school, and so on, besides the ones they have worked with in this term. Help them identify a few questions where they can collect data – for example, how many children use a local play park on different days of the week, whether people would prefer to use a bus, taxi or train to travel to school/work, which subjects their classmates find hardest to study. They can then plan a data collection activity, and present their data to the class using graphs or charts and an oral explanation.

Numeric patterns

Remind the learners that they worked with numeric patterns in Term 1. Ask them to name some number patterns they know. Ask them to perform a simple operation to make the numbers in the blue box in the Learner's Book add up to 15. Give them a minute or two to discuss the problem. They might not be able to find a solution. If they don't, ask them to turn the book upside down. The learners will then note that 1 + 6 + 1 + 6 + 1 = 15.

Unit 29 Creating and extending number patterns

MENTAL MATHS

- Tell the learners that they also worked with number sequences and patterns when they worked with whole numbers and fractions. They will use this knowledge to complete number sequences together as a class.
- The sequences they have to complete involve, for example, multiples and non-multiples of 10, and fractions by counting on and back in different intervals.
- They complete number sequences shown on curved number lines. Ask the learners to identify and describe the patterns they observe before they complete them. Check whether they are able to bridge intervals effectively.

Solutions

1. a) Count back in 25s: 300, 275, 250, 225, 200, 150, 125, 100, 75, 50, 25, 0
   b) Count back in 50s: 10 300, 10 250, 10 200, 10 150, 10 100, 10 050, 10 000, 9 950, 9 900, 9 850, 9 800, 9 750
   c) Count back in 75s: 2 300, 2 225, 2 150, 2 075, 2 000, 1 925, 1 850, 1 775, 1 700, 1 625, 1 550, 1 475

2. a) $0, \frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}, \frac{5}{5}, \frac{6}{5}, \frac{7}{5}, \frac{8}{5}, \frac{9}{5}, \frac{10}{5}, \frac{11}{5}$
   b) $\frac{8}{4}, \frac{9}{4}, \frac{10}{4}, \frac{11}{4}, \frac{12}{4}, \frac{13}{4}, \frac{14}{4}, \frac{15}{4}, \frac{16}{4}, \frac{17}{4}, \frac{18}{4}, \frac{19}{4}$
   c) $2\frac{1}{3}, 2\frac{2}{3}, 3, 3\frac{1}{3}, 3\frac{2}{3}, 4, 4\frac{1}{3}, 4\frac{2}{3}, 5, 5\frac{1}{3}, 5\frac{2}{3}, 6$

The learners count on in proper, improper and mixed fractions. Ask them to change the improper fractions to mixed fractions and mixed fractions to improper fractions.

3. a) Count on in 200s: 8 200, 8 400, 8 600, 8 800, 9 000, 9 200, 9 400, 9 600, 9 800, 10 000, 10 200, 10 400
   b) Count on in 4s: 984, 988, 992, 996, 1 000, 1 004, 1 008, 1 012, 1 016, 1 020, 1 024
   c) Count on in 7s: 570, 577, 584, 591, 598, 605, 612, 619, 626, 633, 740

Activity 29.1

1. Ask the learners to explore the rules for creating patterns as shown. Let them draw their own flow diagrams and use 10 consecutive numbers as input values.

   They check whether the use of the inverse operations or the order of operations makes a difference. So, is 5 × 5 + 10 = 35 – 10 ÷ 5, 5 × 5 + 10 = 35 and 35 – 10 ÷ 5 = 5? They should notice that the order of operations does not influence the input or output numbers. They should, however, realise that mathematics has rules or laws. When they solve multi-operation calculations such as 56 – 8 ÷ 8 × 4 + 3 = ..., the order in which they perform the operations is important. When you solve the calculation by working from left to right and disregard the law for the order of operations the solution is 27.

   56 – 7 = 48
   48 ÷ 8 = 6
   6 × 4 = 24
   24 + 3 = 27

   When you apply the correct order of operations, you divide or multiply first and then add or subtract.

   So, 56 ÷ 8 × 4 – 8 + 3 = ...
   56 ÷ 8 = 7
   7 × 4 = 28
   28 – 8 = 20
   20 + 3 = 23

   The learners should observe that the solutions differ, so the order in which you perform the calculation is important.

   - Ask learners to solve the following, first using the operations as they appear from left to right and then using the correct order of operations. They should know by now that they have to solve the expression in brackets first.

     A (22 – 2) ÷ 2 = ...
     22 – 2 = 20
     20 ÷ 2 = 10

     B 22 – (2 ÷ 2) = ...
     2 ÷ 2 = 1
     22 – 1 = 21

   Let them perform the following calculations as in A and B:
   3 × 4 + 8 – 2 ÷ 6 = ...
   15 + 5 – 2 × 3 ÷ 6 = ...

   - The learners study the numbers in the grid. Let them explore and say how the numbers are used to create the grid.
   - Ask the learners to draw a table to find out how many samosas Nazeema sells when she sells different numbers of trays with 6 samoosas each. Let them describe the rule. Encourage them to find rules both amongst the vertical and horizontal numbers. Ask them to complete the table up to the 10th input number.

Solutions

1. Ask the learners to check their solutions by working from the output values.
2. a) Counting or natural numbers are used in 6s. Let them describe any patterns they observe. Column F has multiples of 6. The other columns have numbers created by counting in intervals to get non-multiples of 6. Ask them to choose a number in column A and one in column B. They add the two numbers and find out in which column the solution is, for example, 7 + 8 = 15; 15 is in column C. They explore and use different numbers to find out if this is always true, for example, 19 + 20 = 39.
   b) To get the next numbers in a column you add 6 each time. To get the next numbers in the rows, you add 1 each time.
   c) To get the numbers in the 15th and 20th rows, you multiply 15 and 20 by 6. So, 3 × 15 = 45; 6 × 15 = 90 and 20 × 6 = 120. The answers 90 and 120 will be the last numbers in rows 15 and 20 and the 5 counting numbers before the solutions will appear in the two rows.

	A	B	C	D	E	F
	1	2	3	4	5	6
	7	8	9	10	11	12
	13	14	15	16	17	18
	19	20	21	22	23	24
	25	26	27	28	29	30
	31	32	33	34	35	36
	37	38	39	40	41	42
	43	44	45	46	47	48
Row 15	85	86	87	88	89	90
Row 20	115	116	117	118	119	120

3. a) You get the next number in column 2 by adding 6 (counting in multiples of 6).
   b) When you work with the numbers between the two columns, add multiples of 5.

Unit 30 Investigating and extending patterns

MENTAL MATHS

- Ask the learners to say which number they think is at the bottom if 5 is on top of the dice. Learners who have worked with and explored the numbers on a dice before will know that the numbers on the opposite sides of a dice add up to 7. If 3 is on top then 4 is below.
- The sum of the numbers on a dice is: (1 + 6) + (2 + 5) + (3 + 4) = 7 × 3 = 21. They explore the numbers on more dice and add the numbers they can and cannot see. Ask them to complete the table.

- The numbers 1 to 6 on top of the dice are in ascending order and those below in descending order. They should notice that the sum of the numbers on one dice is 21.
- Ask them what they think the sum of numbers will be on a pair of dice as shown in the pictures. They explore and calculate the numbers they can and cannot see on pairs of dice to realise that the sum of the numbers on a pair of dice is 42. For example:
  $5 + 3 + 1 + 2 + 4 = 15$
  $2 + 4 + 6 + 5 + 3 = 20$
  There is one pair of opposite sides that add up to 7 that is not visible so that $35 + 7 = 42$.

Solutions

1. a) 2
   b) 4
   c) The numbers on opposite sides of a dice add up to 7.
   d) $1 + 2 + 3 + 4 + 5 + 6 = 21$ (or $7 \times 3 = 21$)

2. Can see: $6 + 4 + 2 = 12$

   Cannot see: $1 + 3 + 5 = 9$

   The sum of the numbers you can and cannot see is 21, i.e. the sum of all the numbers on a dice.

3. a), b) i) Can see: $1 + 2 + 4 = 7$ Cannot see: $6 + 5 + 3 = 14$
   ii) Can see: $1 + 4 + 5 = 10$ Cannot see: $6 + 3 + 2 = 11$
   iii) Can see: $1 + 2 + 3 = 6$ Cannot see: $6 + 5 + 4 = 15$

   c)

Number on top	1	2	3	4	5	6
Number below	**6**	**5**	**4**	**3**	**2**	**1**

4. a), b) i) Can see: $1 + 2 + 3 + 4 + 5 = 15$
   Cannot see: $6 + 5 + 4 + 3 + 2 = 20$ and 1 and 6
   ii) $1 + 2 + 3 + 4 + 6 = 16$
   $6 + 5 + 4 + 3 + 1 = 19$ and 2 and 5
   iii) $1 + 2 + 4 + 4 + 5 = 16$
   $6 + 5 + 3 + 3 + 2 = 19$ and 6 and 1 on the first dice
   iv) $1 + 2 + 3 + 5 + 6 = 17$
   $6 + 5 + 4 + 2 + 1 = 18$ and 3 and 4

   The numbers you can and cannot see on opposite sides add up to 35. Then there is one extra pair with a sum of 7 that you cannot see, so that the sum of all the numbers on all the pairs of dice is $35 + 7 = 42$.

Activity 30.1

- The learners investigate numeric patterns created in numbers in beadwork earrings. You can use social talk about different kinds of earrings and the materials they are made of – from very expensive to cheaper ones. Ask who wears earrings and why people wear earrings.
- They have to understand that Xolani can make different earrings with the same coloured beads. Starting with one-bead earrings with only one pink and one black bead – he can make two different colours to get two kinds. Allow them to make drawings if necessary.
- They investigate how many different kinds of earrings can be made with two and four beads. Ask them to complete the table to find out how the number of earrings increases when the number of beads increases.
- The activity integrates with data handling. Encourage the learners to work

systematically. They copy and complete the table to find the number of earrings if different numbers of beads are used.

- Ask the learners to explore the numbers in the different sequences created by using the same first three terms. Ask them to extend each sequence and to create a different sequence with the same three terms. Let them explain to the class how they created the sequence.
- Explain to the learners that you can create a sequence by using the same number and operation consistently (using a constant ratio) or different numbers and operations (that do not involve a constant difference or ratio).

Solutions

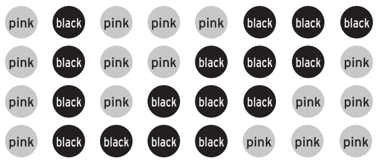
1. a) If he makes one-bead earrings he can make two kinds: one pair with one black bead each and one pair with one pink each.

1 pair + 1 pair = 2 pairs

b) If he makes two-bead earrings he can make four kinds: one pair with two pink and 1one pair with two black beads = 2 pairs. Then one pair with a pink bead on top and a black bead below and one pair with the two colours swopped. He can make four pairs of two-bead earrings.

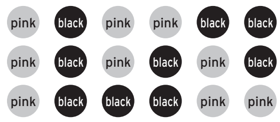
2 pairs + 2 pairs = 4 pairs

c) Four-bead earrings



8 pairs of four-bead earrings

Three-bead earrings



6 pairs of three-bead earrings

d)

Number of beads	1	2	3	4	5	6
Number of different earrings	2	4	6	8	10	12

e) The rule is: the number of beads times 2.

2.

A	2	4	6	8	10	12	14	16	**18**	**20**	**22**
	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	

B	2	4	6	10	16	24	32	42	52	**64**	**76**	**90**
	+ 2	+ 2	+ 4	+ 6	+ 8	+ 8	+ 10	+ 10	+ 12	+ 12	+ 14	

C	2	4	6	12	14	28	30	60	**66**	**68**	**82**
	+ 2	+ 2	+ 6	+ 2	+ 14	+ 2	+ 30	+ 6	+ 2	+ 14	

Keep in mind that learners might extend the sequences using other differences because B and C involve differences that are not constant.

Unit 31 Input and output numbers

MENTAL MATHS

- The learners explore the numbers in the flow diagram to find out how the output numbers are created. Let them give the missing output values. They should find that the difference between the input and output values is 7. The rule is + 7 or + 5 + 2. The output numbers are natural numbers. Write down a number sequence with the first ten consecutive natural numbers and ask them to complete the sequence for the output numbers with the rule.

Input	1	2	3	4	5	6	7	8	9	10
Output	8	9	10	11	12	13	14	17	16	17

- Draw Theo's flow diagram on the board. Let the learners choose ten input numbers (they do not need to be consecutive, but using consecutive numbers will help to create the number sequence they have to create in c).
- They use Theo's rule to determine the output values.
- Ask them to write the number sequence to show the output values, i.e. uneven numbers. Ask the learners if they can think of other rules that will create output numbers that are even and odd if the input numbers are natural numbers. They could investigate what happens when you add or multiply and subtract and divide input numbers with even and odd numbers.

Solutions

1. + 7 or + 5 + 2 or + 4 + 3, and so on (different rules to describe the same problem situation).
2. a) Learners choose 10 input numbers.
   b) Learners use Theo's rule to get output numbers.
   d) Solution for inputs of 1; 2; 3; etc.: 1; 3; 5; 7; 9; 11; …

Activity 31.1

Give the learners copies of the blank flow diagrams from the Photocopiable Resources. They complete the flow diagrams and write a number sequence for the output numbers in each diagram.

Solutions

1.

number	→	number + 11
0	→	11
10	→	21
20	→	31
30	→	41
40	→	51
50	→	61
60	→	71
70	→	81
80	→	91
90	→	101

2. 11; 21; 31; 41; 51; 61; 71; 81; 91; 101; ...

3.

a)

number		number ÷ 5
0	→	0
5	→	1
15	→	3
25	→	5
35	→	7
45	→	9
55	→	11
65	→	13
75	→	15
85	→	17

b)

number		number × 2 + 1
0	→	1
1	→	3
3	→	7
5	→	11
7	→	15
9	→	19
11	→	23
13	→	27
15	→	31
17	→	35

c)

number		10 − number
0	→	10
1	→	9
2	→	8
3	→	7
4	→	6
5	→	5
6	→	4
7	→	3
8	→	2
9	→	1
10	→	0

d)

number		number × 2 + 3
0	→	3
2	→	7
4	→	11
6	→	15
8	→	19
10	→	23
12	→	27
14	→	31
16	→	35
18	→	39
20	→	43

e)

number		number ÷ 2 + 3
0	→	3
2	→	4
4	→	5
8	→	7
16	→	11
32	→	19
64	→	35
128	→	67

f)

number		number × 4 − 8
10	→	32
9	→	28
8	→	24
7	→	20
6	→	16
5	→	12
4	→	8
3	→	4
2	→	0
1	→	–4
0	→	–8

Unit 32 Number sequences in diagrams

MENTAL MATHS

- Ask the learners to explore the numbers in the diagram. Let them explain how the numbers were used to create the diagram.
- There are various patterns to be observed. Let them describe the sequences. Ask them to explore the figure horizontally, vertically and diagonally. Let them add the next 3 or 5 terms in each sequence.

Solutions

1. The boy is describing the pattern of the blue triangles in the bottom row.

2–3. In the top blue and white triangles and the bottom white and blue triangles:

1; 2; 6; 7; 8; 12; 13; 14; 18; 19; 20 Add 1 and 4

3; 4; 5; 9; 10; 11; 15; 16; 17; 21; 22; 23

In the diagonal white triangles:

2; 4; 6; 8; 10; 12; 14; 16; 18; 20; 22 Even numbers – add 2

In the diagonal blue triangles:

1; 3; 5; 7; 9; 11; 13; 15; 17; 19; 21 Odd numbers – add 2

In the rhombi formed by a white and a blue triangle in the 2nd and 3rd rows:

2; 3; 6; 5; 8; 9; 12; 11; 14; 15; 16; 19 Add 1; add 3; subtract 1; …

In the diagonal blue and white triangles in the 3rd and 2nd rows:

3; 6; 9; 12; 15; 18; 21; 24; 27; 30 Add 3 – multiples of 3

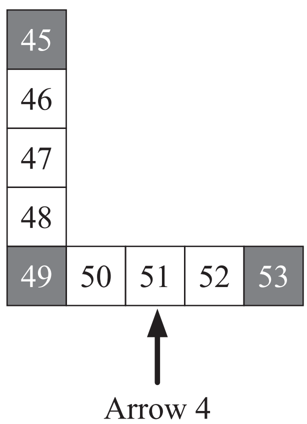
In 3 white triangles in the 2nd and 4th rows (2 on top and 1 below):

2; 4; 6; 8; 10; 12; 14; 16; 18; 20 Even numbers or multiples of 2

And so on.

Activity 32.1

- Ask the learners to describe patterns they observe in the diagram. Tell them that they should imagine that the pattern continues to the right.
- The learners have to find out which numbers (in the centre of a set of 5 squares in the bottom row) arrows 4, 10 and 30 will point to if the pattern is extended. Some learners would probably draw an extension of the pattern to find out which number arrow 4 points to.



Allow them to do this but encourage them to look for relationships because it would be a laborious task to extend the pattern to find the numbers that arrows 10 and 30 point to.

- The learners have to establish which numbers will be on red squares if the pattern is extended. Let them explore and describe the numbers on the red squares in the diagram.
- Question 2 integrates with Space and Shape: location and direction. You could ask learners to use rulers or strips of paper to line up corresponding houses as indicated in the questions.
- Ask the learners to explore the street map to understand that 18 houses are positioned on 3 sides of an open field in the shape of a square. There are 6 houses situated on 3 sides of the square. Help them to understand that house number 17 is due east of house number 8 and house number 8 is due south of house number 17. Tell them that have to find houses according to the directions given and then have to generalise a rule for finding house numbers in opposite directions.

Solutions

1. a) Learners explain any patterns they see.
   b) The arrows 1, 2 and 3 point to the numbers in the centre of sets of 5 squares on the bottom row, i.e. 3; 19; 35. Ask them to explore and describe the relationship between these numbers.
   c) The difference between the numbers in the first set of squares and the second set in the bottom row is 16 (3 + 16 = 19; 19 + 16 = 35). The number that arrow 4 will point to is 35 + 16 = 51.
   To find the number that arrow 10 points to, they count in intervals of 16 until they get the number that goes in the centre of the tenth set of squares, i.e.: 3; 19; 35; 51; 67; 83; 99; 115; 131; 147. Arrow 10 will point to 147.
   It does not appear as if there is a different rule other than counting in 16s to get the number that the 30th arrow points to. They therefore keep on counting in intervals of 16 until they get the number, i.e. 467.
   3; 19; 35; 51; 67; 83; 99; 115; 131; 147; … (10th arrow)
   163; 179; 195; 211; 227; 243; 259; 275; 291; 307; … (20th arrow)
   323; 339; 355; 371; 387; 403; 419; 435; 451; 467 (30th arrow)
   d) They should discover that the numbers are odd numbers with a difference of 4 between them. Let them write the number sequence: 1; 5; 9; 13; 17; 21; 25; 29; 33; …
   Also ask them to explore the pattern in the units of these numbers as a possible rule, i.e. 1; 5; 9; 3; 7; 1; 5; 9; 3 and the next number is 37. Some of the odd numbers in the list ending with one of these digits would be on the red squares, i.e. 41, 61; 103. Let them count in intervals of 4 to check the solutions.
   They should find that 55 and 103 would not be on red squares although the numbers end in 5 and 3.
   e) and f) Learners record different sequences they observe in the patterns, add the next 3 terms and describe the patterns, for example:
   8; 14; 24; 30; 40; 46; 56 (add 6, then 10 … to the even numbers)
   7; 15; 23; 31; 39; 47; 55 (add 8 to the odd numbers)
   6; 16; 22; 32; 38; 48; 54 (add 6, then 10 … to the even numbers)
   Ask the learners to share their solutions with the class.
2. a) House number 15 is due east of house number 10.
   b) Add consecutive uneven numbers each time.
   12 + 1 = 13 9 + 7 = 16
   11 + 3 = 14 8 + 9 = 17
   10 + 5 = 15 7 + 11 = 18
   c) House number 9 is due south of house number 4.

d) Add consecutive uneven numbers.

6 + 1 = 7	3 + 7 = 10
5 + 3 = 8	2 + 9 = 11
4 + 5 = 9	1 + 11 = 12

e) House number 6 is due north-west of house number 18: 18 − 12 = 6
House number 5 is due north-west of house number 17: 17 − 12 = 5
House number 4 is due north-west of house number 16: 16 − 12 = 4

Unit 33 Finding rules

MENTAL MATHS

- The learners establish the rules for getting the output or input numbers. Ask them to write the number sequences for the output numbers in each flow diagram.
- Ask them to describe the pattern they observe in each sequence. They should use consecutive input numbers to create the first ten terms in each sequence.
- They list consecutive input numbers in various intervals and use the rules in the flow diagrams to create the number sequences. This implies that they create their own sequences for input values. They should realise that they have to choose higher numbers where the rule indicates that they have to subtract or divide.

Solutions

1. Here are some possibilities that you could share with the learners to serve as motivation for them to create interesting and more advanced and sophisticated sequences. Ask them to explore the sequences and describe the patterns and relationships they observe.

a) – 5

Input	9	12	15	18	21	24	(multiples of 3)
– 5	4	7	10	13	16	19	(intervals of 3)

b) halve (÷2)

Input	5	10	15	20	25	30	(multiples of 5)
÷ 2	$2\frac{1}{2}$	5	$7\frac{1}{2}$	10	$12\frac{1}{2}$	15	(intervals of $2\frac{1}{2}$)

c) + 3 ÷ 2

Input	2	4	6	8	10	(multiples of 2)
+ 3 ÷ 2	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{2}$	(intervals of 1)

2. Learners write a number sequence for the output of each flow diagram.

Activity 33.1

- The learners have to find the rules for creating each number sequence. Ask them to extend each sequence by filling in the next 5 terms in each sequence.

Solutions

1. + 4: $8\frac{1}{2}$; $12\frac{1}{2}$; $16\frac{1}{2}$; $20\frac{1}{2}$; $24\frac{1}{2}$; $28\frac{1}{2}$; $32\frac{1}{2}$; $36\frac{1}{2}$; $40\frac{1}{2}$
2. + 2: 0; 2; 4; 6; 8; 10; 12; 14; 16; 18
3. + 6, then + 5, alternately: $5\frac{1}{4}$; $11\frac{1}{4}$; $16\frac{1}{4}$; $22\frac{1}{4}$; $27\frac{1}{4}$; $33\frac{1}{4}$; $44\frac{1}{4}$; $49\frac{1}{4}$
4. First term + $4\frac{1}{3}$, thereafter, + 4: 3; $7\frac{1}{3}$; $11\frac{1}{3}$; $15\frac{1}{3}$; $19\frac{1}{3}$; $23\frac{1}{3}$; $27\frac{1}{3}$; $31\frac{1}{3}$; 35
5. + 4: 2; 6; 10; 14; 18; 22; 26; 30; 34
6. – 7: 84; 77; 70; 63; 56; 49; 42; 35; 28
7. + $\frac{5}{10}$: $\frac{5}{10}$; $\frac{10}{10}$; $\frac{15}{10}$; $\frac{20}{10}$; $\frac{25}{10}$; $\frac{30}{10}$; $\frac{35}{10}$; $\frac{40}{10}$; $\frac{45}{10}$
8. + 25: 1; 26; 51; 76; 101; 126; 151; 176; 201
9. + 51 then + 50: 0; 51; 101; 151; 201; 251; 301; 351; 401
10. + 76 then + 75: 0; 76; 151; 226; 301; 376; 451; 526; 601

Problem-solving

Let the learners work in their groups to solve the problems. They should realise that they are working with even and odd numbers so that the house opposite house number 75 is 76, opposite 92 is 93 and 102 is opposite 101. Mrs Tokwe's house number is 4 less than 81, i.e. 77.

Solutions

1. 76
2. 93
3. 102
4. Mrs Tokwe's house is number 77.

Assessment

Tell the learners that they will work individually to perform an assessment task. You should inform learners about assessment tasks at the beginning of a topic and remind them about it during the week – not on the day that they will perform the assessment task. Tell them what the focus of the assessment will be. The learners will need to demonstrate knowledge of numeric patterns that they have dealt with during the past lessons. They will copy and extend number patterns, use rules in flow diagrams to calculate output numbers and write number sequences for output numbers. They copy and complete output numbers in a tables, describe the sequences and state the rules for creating them. Encourage them to do written reflections on their learning experiences. Ask them to write a letter to you. They should indicate what they have learnt, what they found easy or difficult and what they would like to learn more about numeric patterns.

Assessment Task 25

1. Fill in the next thee numbers in each number sequence.
   a) 1; 3; 5; 7
   b) 16; 18; 20; 22
   c) 4; 8; 12;
   d) 0; 4; 9
   e) $1\frac{1}{4}$; $6\frac{1}{4}$; $11\frac{1}{4}$; $16\frac{1}{4}$

2. Complete the flow diagrams.

a)

number		number × 7 – 2
1	→	
2	→	
3	→	
4	→	
5	→	

b)

number		number + 3 × 2
0	→	
5	→	
3	→	
6	→	
2	→	

c) Write down the first 10 numbers in the number sequences for the output numbers above.

3. Fill in the missing numbers in the table.

Input number	14	28	56	70	49	21
Output number	2	4				

a) Describe the input numbers.
b) What is the rule for getting the output numbers?

4. Write down the next five numbers for a number line.
a) 1 8 15 22
b) 100 94 88 82

5. Write a letter to your teacher. Tell him/her what you have learnt about number patterns during this week. Tell him/her what you found easy or difficult. Also tell your teacher what you want to learn more about.

Solutions

1. a) 1; 3; 5; 7; 9; 11; 13
b) 16; 18; 20; 22; 24; 26; 28
c) 4; 8; 12; 16; 20; 24
d) 0; 4; 9; 16; 25; 36
e) $1\frac{1}{4}$; $6\frac{1}{4}$; $11\frac{1}{4}$; $16\frac{1}{4}$; $21\frac{1}{4}$; $26\frac{1}{4}$; $31\frac{1}{4}$

2.

a)

number		number × 7 – 2
1	→	5
2	→	12
3	→	19
4	→	26
5	→	33

b)

number		number + 3 × 2
0	→	6
5	→	16
3	→	12
6	→	18
2	→	10

c) 5; 12; 19; 26; 33; 40; 47; 54; 61; 68
6; 8; 10; 12; 14; 16; 18; 20; 22; 24

3.

Input number	14	28	56	70	49	21
Output number	2	4	**8**	**10**	**7**	**3**

a) Multiples of 7
b) ÷ 7

4. a) 1 8 15 22 29 36 43 50 57
b) 100 94 88 82 76 70 64 58 52

Whole numbers

Unit 34 Multiplication and area

MENTAL MATHS

- Give the learners copies of the blank flow diagrams from the Photocopiable Resources. They work with single and double function machines to complete the flow diagrams. Ask them to do the inverse operations to see whether they get the same input numbers.

Solutions

1.

number	→	number × 7
9	→	63
4	→	28
2	→	14
5	→	35
1	→	7
3	→	21
6	→	42
7	→	49
8	→	56
0	→	0

2.

number	→	number × 2 × 3
8	→	48
4	→	24
3	→	18
5	→	30
6	→	36
0	→	0
9	→	54
1	→	6
7	→	42
10	→	60

3.

number	→	number × 2 × 3
0	→	0
3	→	24
7	→	56
6	→	48
4	→	32
1	→	8
2	→	16
9	→	72
5	→	40
8	→	64

4.

number	→	number × 2 × 5
1	→	10
4	→	40
6	→	60
3	→	30
7	→	70
9	→	90
2	→	20
5	→	50
8	→	80
0	→	0

5.

number	→	number × 10 × 10
0	→	0
2	→	200
7	→	700
4	→	400
3	→	300
1	→	100
5	→	500
8	→	800
9	→	900
6	→	600

Activity 34.1

- The learners worked with the concept of area in Grade 4 measurement by counting the number of square units inside a shape, and they will develop their understanding of area further next term.
- Lead a class discussion about measuring in millimetres, centimetres and kilometres when we measure length.
- Find out if the learners know the difference between area and perimeter. They should understand that perimeter is measured in millimetres, centimetres and kilometres, and area is measured in square units.
- Tell them that they will not necessarily use the standard units, but they will work with smaller units that will be called square units.
- Let them explain what they understand by the measurements in the 4 cm × 5 cm rectangle (which we read as: 4 cm by 5 cm).
- The superscript form of writing a square unit (such as km^2) is not required in Grade 5, but if learners are familiar with this form, you can use it where relevant. This year, learners are only required to express area in square units by calculating the number of squares in each shape.
- In this activity, learners use their own strategies to calculate area.

Solutions

1. a) 42 square units b) 60 square units
   c) 90 square units d) 18 square units
   e) 36 square units f) 60 square units
   g) 35 square units
2. a) 200 square units b) 900 square units
   c) 2 800 square units d) 2 500 square units
3. a) 6 400 square units b) 6 300 square units
   c) 4 900 square units d) 8 100 square units
   e) 4 800 square units

Unit 35 Using number rules in area models

MENTAL MATHS

- Lead a class discussion about the strategy of breaking up the bigger numbers and splitting up an area to make it easier to calculate the area. Learners will use the distributive property to solve the two-digit by one-digit multiplication. They should try to calculate the solutions mentally.

Solutions

$$\begin{aligned} 6 \times 34 &= (6 \times 30) + (6 \times 4) \\ &= 180 + 24 \\ &= 204 \end{aligned}$$

1. a) $6 \times 32 = (6 \times 20) + (6 \times 12) = 120 + 72 = 192$
   b) $7 \times 23 = (7 \times 20) + (7 \times 3) = 140 + 21 = 161$
2. a) $5 \times 75 = (5 \times 70) + (5 \times 5) = 350 + 25 = 375$
   b) $4 \times 84 = (4 \times 80) + (4 \times 4) = 320 + 16 = 336$
   c) $43 \times 6 = (40 \times 6) + (3 \times 6) = 240 + 18 = 258$
   d) $33 \times 8 = (30 \times 8) + (3 \times 8) = 240 + 24 = 264$

e) $56 \times 3 = (50 \times 3) + (6 \times 3)$
$= 150 + 18$
$= 168$

Activity 35.1

- The learners apply the compensation strategy by rounding up the bigger number to a multiple of 10 to calculate the area of a rectangle more easily.
  Area: $6 \times 38 = (6 \times 40) - (6 \times 2)$
  $= 240 - 12$
  $= 228$

Solutions

1. a) $6 \times 37 = (6 \times 40) - (6 \times 3) = 240 - 18 = 222$
   b) $3 \times 88 = (3 \times 90) - (3 \times 2) = 270 - 6 = 264$
   c) $4 \times 49 = (4 \times 50) - (4 \times 1) = 200 - 4 = 196$
   d) $7 \times 46 = (7 \times 50) - (7 \times 4) = 350 - 28 = 322$
2. a) $8 \times 32 = (8 \times 30) + (8 \times 2) = 240 + 16 = 256$
   b) $4 \times 28 = (4 \times 30) - (4 \times 2) = 120 - 8 = 112$
   c) $7 \times 33 = (7 \times 30) + (7 \times 3) = 210 + 21 = 231$
   d) $9 \times 37 = (9 \times 40) - (9 \times 3) = 360 - 27 = 360 - 20 - 7 = 333$
   e) $59 \times 3 = (3 \times 60) - (3 \times 1) = 180 - 3 = 177$
   f) $24 \times 4 = (4 \times 20) + (4 \times 4) = 80 + 16 = 96$
   g) $67 \times 5 = (5 \times 70) - (5 \times 3) = 350 - 15 = 335$
   h) $48 \times 6 = (6 \times 50) - (6 \times 2) = 300 - 12 = 288$

Unit 36 Multiplying three-digit numbers

MENTAL MATHS

- The learners now work with two-digit by two-digit multiplication. Let them explore the calculations in the array and explain to the class how it works. They work as a class to solve the problems using the arrays.

Solutions

1. $46 \times 25 = 800 + 200 + 120 + 30 = 1\ 150$

	20	5
40	800	200
6	120	30

2. 38 × 26 = 600 + 180 + 160 + 48 = 988

	20	6
30	600	180
8	160	48

Activity 36.1

Solutions

1. 37 × 82 = 3 034
2. 29 × 48 = 1 392
3. 46 × 19 = 874
4. 52 × 43 = 2 236
5. 63 × 18 = 1 134
6. 41 × 314 = 156 874
7. 56 × 403 = 22 568
8. 26 × 256 = 6 656
9. 34 × 560 = 19 040
10. 243 × 29 = 7 047

Unit 37 Rough answers

MENTAL MATHS

- Explain the problem to the learners. They have worked with estimation before and should now understand exactly why and how to round off to the nearest 10 to get more accurate estimations that are closer to the accurate solutions. They should be able to see in the drawings when an estimate is too big or too small. They use the strategies to solve the two-digit by two-digit multiplication problems.
- Tell the learners that they should work with square metres (m^2). Let them use calculators to calculate the accurate solutions and compare these to the rough answers.

Solutions

1. a) 38 is less than 40 and 64 is less than 70. The area is less than 2 800 m^2. 38 is more than 30 and 64 is more than 60. The area is more than 1 800 m^2. The area is between 1 800 m^2 and 2 800 m^2.
   b) 48 is less than 50 and 72 is less than 70. The area is less than 3 500 m^2. 48 is more than 40 and 72 is more than 70. The area is more than 2 800 m^2. The area is between 1 800 m^2 and 3 500 m^2.
   c) 27 is less than 30 and 39 is less than 40. The area is less than 1 200 m^2. 27 is more than 20 and 39 is more than 30. The area is more than 600 m^2. The area is between 600 m^2 and 1 200 m^2.
   d) 54 is less than 60 and 44 is less than 50. The area is less than 3 000 m^2. 54 is more than 50 and 44 is more than 40. The area is more than 2 000 m^2. The area is between 2 000 m^2 and 3 000 m^2.
   e) 63 is less than 60 and 28 is less than 30. The area is less than 1 800 m^2. 63 is more than 60 and 28 is more than 20. The area is more than 1 200 m^2. The area is between 1 200 m^2 and 1 800 m^2.

2. a) 38 × 64 = 2 432 m^2
   b) 48 × 72 = 3 456 m^2
   c) 27 × 39 = 1 053 m^2
   d) 54 × 44 = 2 376 m^2
   e) 63 × 28 = 1 764 m^2

Activity 37.1

- The learners now work with three-digit numbers multiplied by two-digit numbers. Let them explore the numbers in the grid and explain to the class how it works. The use the strategy to solve the problems.

Solutions

1. Learners follow the reasoning and see if they agree.
2. 1 200
3. 1 044
4. Answers depend on learners' estimates.
5. a) 33 × 19 = ☐
   30 × 20 = 600
   33 × 19 = 627 m^2
   b) 48 × 57 = ☐
   50 × 60 = 3 000
   48 × 57 = 2 736 m^2
   c) 89 × 91 = ☐
   90 × 90 = 8 100
   89 × 91 = 8 099 m^2
   d) 98 × 99 = ☐
   100 × 100 = 10 000
   98 × 99 = 9 702 m^2
   e) 87 × 19 = ☐
   90 × 20 = 1 800
   87 × 19 = 1 653 m^2
   f) 109 × 42 = ☐
   110 × 40 = 4 400
   109 × 42 = 4 578 m^2
   g) 238 × 18 = ☐
   240 × 20 = 4 800
   238 × 18 = 4 284 m^2
   h) 199 × 27 = ☐
   200 × 30 = 6 000
   199 × 27 = 5 373
   i) 347 × 19 = ☐
   350 × 20 = 7 000
   347 × 19 = 6 593 m^2
   j) 213 × 23 = ☐
   210 × 20 = 4 200
   213 × 23 = 4 899 m^2

   You can now ask the learners to make a generalisation about when estimates are good or the best ones, i.e. when they are less or more than 50, 100 or 1 000 than the accurate solutions.

Unit 38 Problem-solving

MENTAL MATHS

- The learners explore the numbers in the multiplication grids to complete them. Give them copies of the grids. They practise the basic multiplication facts again.

Solutions

1.

×	2	4	6
2	4	**8**	**12**
5	**10**	20	30
4	8	**16**	24

2.

×	4	5	7
1	4	5	7
2	**8**	**10**	14
3	12	**15**	**21**

3.

×	5	3	4
2	**10**	6	8
1	5	**3**	4
7	35	21	**28**

4.

×	6	2	9
2	12	**4**	**18**
3	**18**	6	**27**
5	30	**10**	**45**

5.

×	2	**4**
3	6	12
5	10	20

6.

×	**2**	3	**7**
1	2	**3**	7
2	4	6	14
5	10	**15**	**35**

7.

×	**3**	**7**
3	9	21
7	**21**	49

8.

×	**6**	**5**
1	6	5
2	12	10

Activity 38.1

- You could ask the learners to work in pairs or groups to solve the problems in this unit, which can be done over two lessons so that learners have enough time to investigate each problem as much as they need to, and try out different ways to solve it.
- Some of the problems can also be done for homework if there is not enough time in class for learners to do them all.
- Tell them that they can use some of the strategies they have practised in the previous units. Remind them to leave out the comma in calculations involving money amounts, but to insert it again in the solutions. They solve problems involving money, measurement, rate of pay, and so on.

Solutions

1. a) 40 apples b) R67,50
2. a) 210 minutes b) More than 840 minutes
3. a) 75 ℓ b) R330
4. R9 480
5. a)

	Number of magazines delivered	Amount earned
Monday	50	R37,50
Tuesday	45	R33,75
Wednesday	22	R16,50
Thursday	68	R51,00
Friday	72	R54,00
Total		**R192,75**

b) R192,75
c) R770

6. 4 × 6 × 8 × 16 = 3 072 seats
7. 12 × 8 × 5 = 480 tins
8. a) 8 × 6 × 9 = 432 dots b) 15 × 4 × 8 = 480 dots

Unit 39 Looking for relationships

MENTAL MATHS

- The learners work together to solve the contextual problems.

Solutions

1. a) 6 × 8 = 48 cans b) 8 × 8 = 64 biscuits
   c) 30 × 30 = 900 eggs d) 50 × 20 = 1 000 chairs
   e) 9 × 8 + 7 × 4 = 72 + 28 = 100 plants
2. a) 4 × 4 = 16 b) 40 × 40 = 1 600
   c) 1 × 1 = 1 d) 10 × 10 = 100
   e) 7 × 7 = 49 f) 70 × 70 = 4 900
   g) 9 × 9 = 81 h) 5 × 5 = 25
   i) 50 × 50 = 2 500 j) 3 × 3 = 9

Activity 39.1

- Ask the learners to study the numbers in the calculations. They have to use the relationship between the calculations to solve problems without performing long calculations. The completed calculations involve square numbers.
- They find out which are the best estimates for the given calculations. They have to explain why they think the estimates they choose are the best. They use methods that they prefer to solve three- by two-digit multiplication problems.

Solutions

1. a) 11 × 11 = 121
   12 × 11 = 132
   b) 14 × 14 = 196
   15 × 14 = 210
   c) 18 × 18 = 324
   19 × 18 = 342
   d) 21 ×21 = 441
   21 × 22 = 462
   e) 32 × 32 = 1 024
   31 × 32 = 992
2. a) 14 × 17 = 238, so 10 × 20 = 200 is the best estimate.
   b) 28 × 34 = 952, so 30 × 30 = 900 is the best estimate.
   c) 56 × 59 = 3 034, so 50 × 60 = 3 000 is the best estimate.
   d) 43 × 48 = 2 064, so 40 × 50 = 2 000 is the best estimate.
3. a) 194 × 9 = 1 746 b) 203 × 8 = 1 624
   c) 56 × 76 = 4 332 d) 98 × 69 = 6 762
   e) 76 × 87 = 6 612 f) 126 × 67 = 8 442
   g) 635 × 60 = 38 100 h) 409 ×58 = 23 722
   i) 750 × 69 = 51 750 j) 843 × 76 = 64 068

Assessment

Tell the learners that they would work individually to perform an assessment task to demonstrate knowledge about multiplication they have developed and enhanced during the past units. They apply knowledge of basic multiplication facts and multiples of 10 in tables and flow diagrams, solve two- and three-digit by two-digit multiplication problems using the area model in diagrams. They show understanding of calculating accurate estimates and calculate the accurate area of rectangles. They solve multiplication problems in context.

Assessment Task 26

1. Fill in the missing numbers in the tables.

a)

	0	2	8	1	3	9	4	6	5	7
× 9		18			27	81		54	45	

b)

	1	3	5	7	9	0	2	4	6	8
× 7	7	21	35				14		42	

2. Fill in the missing numbers in the flow diagrams.

a)

number	→	number × 10
	→	110
	→	490
26	→	
34	→	
78	→	

b)

number	→	number × 20
0	→	
1	→	
9	→	
6	→	
7	→	

c)

number	→	number × 200
2	→	
4	→	
6	→	
8	→	
10	→	

d)

number	→	number × 45
1	→	
2	→	
4	→	
8	→	
16	→	

3. Use the grids below to solve the multiplication problems.
Look at the example.
Example:
38 × 34 = 900 + 120 + 240 + 24 = 1 292

×	30	4
30	900	120
8	240	32

a) 53 × 18 =

×		

b) 48 × 23 =

×		

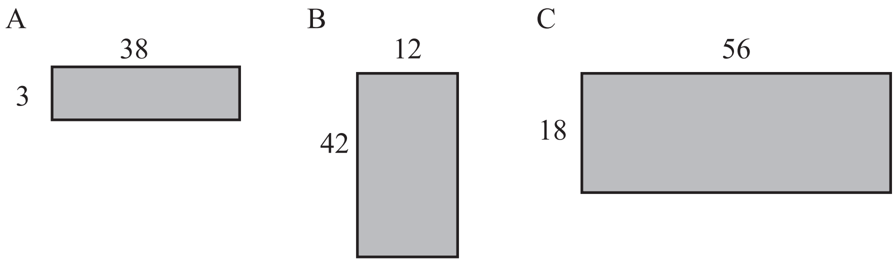
c) 24 × 231

×			

d) 32 × 403

×		

4. a) Calculate the rough area of each rectangle.



b) Now calculate the accurate area.

5. Solve these problems.
   a) There are 12 pens in one pack. How many pens are there in 12 packs?
   b) John earns R37,50 per day. How much does he earn per week if he works 5 days per week?
   c) A farmer planted 50 rows with 320 mealie seeds in each row. How many seeds did he plant altogether?

Solutions

1.

a)

	0	2	8	1	3	9	4	6	5	7
× 9	0	18	72	9	27	81	36	54	45	63

b)

	1	3	5	7	9	0	2	4	6	8
× 7	7	21	35	49	63	0	14	28	42	56

2.

a)

number		number × 10
11	→	110
49	→	490
26	→	260
34	→	340
78	→	780

b)

number		number × 20
0	→	0
1	→	20
9	→	180
6	→	120
7	→	140

b)

number	→	number × 200
2	→	400
4	→	800
6	→	1 200
8	→	1 600
10	→	2 000

c)

number	→	number × 45
1	→	45
2	→	90
4	→	180
8	→	360
16	→	720

3. a) 53 × 18 = 500 + 400 + 30 + 24 = 954

×	10	8
80	500	400
8	30	24

b) 48 × 23 = 800 + 160 + 120 + 24 = 1 104

×	20	3
40	800	120
8	160	24

c) 24 × 231 = 4 000 + 800 + 600 + 120 + 20 + 4 = 5 544

×	200	30	1
20	4 000	600	20
4	800	120	4

d) 32 × 403 = 120 000 + 800 + 90 + 6 = 12 896

×	400	3
30	12 000	90
2	800	6

4. a) A: 40 × 3 = 120
B: 40 × 10 = 400
C: 60 × 20 = 1 200
b) A: 38 × 3 = 114 m^2
B: 42 × 12 = 504 m^2
C: 56 × 18 = 1 008 m^2

5. a) 12 × 12 = 144 pens
b) R39,50 × 5 ➞ R39,50 × 10 = R395
R395 ÷ 2 = R197, 50
or
R39,50 × 2 = R80 − R1
= R79
R79 × 2 = R80 × 2 − R2
= R158
R158 + R40 − 50c = R197,50
c) 320 × 50 = 32 × 5 × 100 (or × 10 × 10)
= 16 000 seeds

Term 4

Whole numbers

In Term 4 the learners will continue working with place value, counting and representing numbers. They will add and subtract up to five-digit numbers, practise basic division facts and divide three-digit by two-digit numbers. They will solve contextual and non-contextual problems and perform addition and subtraction and division assessment tasks at the end of the series of lessons.

Unit 1 Place value and representing numbers

MENTAL MATHS

- Ask the learners to copy the place value board or give them copies of the template from the Photocopiable Resources.
- The learners work in pairs and use a number of counters. Nine counters have been used in the example. One learner places the counters on the board in different positions – for example, 3 under thousands and 6 under tens. The partner writes the number the two counters represent. The next learner moves the counters to represent a different number and the first learner writes down the number. Each learner writes down 10 numbers. Ask the learners to read their numbers aloud. You can also ask them to write the numbers in words on the board.

Solutions

Learners work in pairs to complete the activity.

Activity 1.1

- The learners write numbers represented in expanded notation in number symbols and words. They write numbers in ascending order and answer questions about numbers on the information board. They round off numbers to the nearest 1 000 and solve an addition and subtraction problem represented in words.
- Ask them to do the calculations with number symbols and to write the solutions in words.
- Let learners use calculators. If you do not have calculators available they could do the activity without them. They enter the number on the first display on a calculator. They add one number at a time (powers of 10) to get the numbers on the rest of the displays. Let them write down the numbers they add.

Solutions

1. a) 20 000 + 500 + 4 + 100 000 = 120 504
   b) 6 000 + 50 + 40 000 + 700 000 = 746 050
   c) 900 000 + 9 + 90 + 900 = 900 999
   d) 600 + 3 000 + 800 000 + 10 = 803 610
   e) 7 + 600 + 50 000 + 500 000 = 550 607
2. a) One hundred and twenty thousand five hundred and four
   b) Seven hundred and forty-six thousand and fifty
   c) Nine hundred thousand nine hundred and ninety-nine
   d) Eight hundred and three thousand six hundred and ten
   e) Five hundred and fifty thousand six hundred and seven

3. a)

June	8 473
May	9 268
March	11 823
February	119 825
April	135 672
January	137 796

b) The learners might reason that January and April are the months in which there are school holidays. The weather could also be a factor because animals are more active in summer and the days are longer.

c) During February.

d) i) May = 9 000
ii) April = 136 000
iii) January = 138 000

4. a)

$$\begin{array}{r} 45\,459 \\ +\ \underline{29\,825} \\ 75\,284 \end{array}$$

Seventy-five thousand two hundred and eighty-four

b)

$$\begin{array}{r} 167\,392 \\ -\ \underline{\ \ 85\,577} \\ 81\,815 \end{array}$$

Eighty-one thousand eight hundred and fifteen

5. 304 156 + 20 000 = 324 156 + 700 = 324 856 + 200 000 = 524 856 + 3 000 = 527 856

Unit 2 Quick addition and subtraction

MENTAL MATHS

- The learners will practise addition and subtraction strategies that they should perform mentally.
- They break down and build up numbers to make multiples of 10, use the associative property and apply the inverse operation to count on.
- The strategies assist with practising carrying and decomposition.

Solutions

1. a) 26 + 33 = 26 + 30 + 3
= 59

b) 45 + 49 = 40 + 40 + 9 + 1 + 4
= 94

c) 18 + 36 = 36 + 4 + 10 + 4
= 54

d) 67 + 15 = 60 + 10 + 7 + 3 + 2
= 82

e) 49 + 33 = 40 + 30 + 9 + 1 + 2
= 82

f) 26 + 57 = 20 + 50 + 7 + 3 + 3
= 83

g) 32 + 58 = 30 + 50 + 8 + 2
= 90

h) 29 + 49 = 20 + 40 + 9 + 1 + 8
= 78

i) 19 + 31 = 19 + 1 + 30
= 50

j) 57 + 58 = 50 + 50 + 7 + 3 + 5
= 115

2. a) 41 − 25 = 41 − 20 − 5
= 21 − 1 − 4
= 16
41 = 25 + **5** + **11**
41 − 16 = 25

b) 86 − 35 = 86 − 30 − 5
= 51
86 = 35 + **5** + **46**
86 − 51 = 35

c) 24 − 17 = 24 − 10 − 7
= 7
24 = 17 + **3** + **4**
24 − 7 = 17

d) 53 − 38 = 53 − 30 − 8
53 = 38 + **2** + **13**
53 − 15 = 38

		= 23 − 3 − 5		
		= 15		
e)	83 – 14	= 83 – 10 – 4	83 = 14 + **6** + **60** + 3	83 – 69 = 14
		= 73 – 3 – 1		
		= 69		
f)	64 − 47	= 64 − 40 – 7	64 = 47 + **3** + **14**	64 − 17 = 47
		= 24 − 4 − 3		
		= 17		
g)	66 − 29	= 66 − 20 − 9	66 = 29 + **1** + **36**	66 − 37 = 29
		= 46 − 6 − 3		
		= 37		
h)	95 − 38	= 95 − 30 – 8	95 = 38 + **2** + **45**	95 − 57 = 38
		= 65 − 5 − 3		
		= 57		
i)	86 − 43	= 86 − 40 − 3	86 = 43 + **7** + **36**	86 − 43 = 43
		= 43		
j)	73 − 59	= 73 − 50 − 9	73 = 59 + **1** + **13**	73 − 14 = 59
		= 23 − 3 − 6		
		= 14		

Activity 2.1

- Ask the learners to work together as a class and find ways to calculate the number of cubes in each cube construction. Allow them to do calculations on the board if they struggle to count and calculate mentally.
- They will apply repeated addition and multiplication to count and calculate. Use their strategies to allow them to explore other skills such as doubling and using properties of numbers (such as the order of operations).
- Allow them to use cubes to build the constructions to check their solutions. The activity enhances skills relating to reading perspective in diagrams and pictures.
- Give the learners copies of the one-minute addition and subtraction grid from the Photocopiable Resources. They have to complete as many calculations as they can in one minute while you keep time. Ask them to use the strategies they have practised in Mental Maths. You should do these exercises frequently so that learners can monitor their progress in performing mental calculations effectively.

Solutions

1. a) 8 + 8 + 8 + 8 = 32 or 4 × 8 = 32 cubes
   16 + 16 = 32; double 16 = 32 or 2 × 16 = 32
   b) 2 + 3 + (2 × 8) = 16 + 5 = 21 cubes
   c) (4 × 5) + 5 + 1 = 26 cubes
   d) (2 × 3 × 4) + 5 + 4 + 2 + 3 = 24 + 14 = 38 cubes
   e) 8 + (4 × 3 × 4) + 8 + 8 = 8 + 48 + 16 = 72 cubes

2.

One-minute maths	
Addition	**Subtraction**
1. 8 + 6 = 14	2. 18 + 16 = 24
3. 28 + 26 = 45	4. 80 + 60 = 140
5. 26 + 24 = 50	6. 38 + 22 = 50
7. 49 + 51 = 100	8. 70 + 90 = 160
9. 27 + 50 = 77	10. 38 + 60 = 98
11. 81 − 5 = 76	12. 94 − 10 = 84
13. 63 − 4 = 59	14. 89 − 50 = 39
15. 101 − 4 = 97	16. 24 − 17 = 7
17. 82 − 6 = 76	18. 83 − 13 = 70
19. 67 − 20 = 47	20. 63 − 4 = 59

Unit 3 Add and subtract four- and five-digit numbers

MENTAL MATHS

- Ask the learners to use strategies that will help them to solve the word problems faster and more easily. They work with problems in measurement and money contexts.

Solutions

1. R10 – R4,50 = R10 – R5 + 50c
   = R5,50
2. 8:18 − 8:30 ➞ 18 + 2 + 10 ➞ 12 min
   8:30 − 8:46 = 16 min
   12 + 16 = 28 min
3. 24 + 37 = 24 + 30 + 6 + 1
   = 61 kg of apples
4. R86 − R27 = 86 − 20 − 6 − 1
   = R59 spent
5. 16:43 − 17:00 ➞ 43 + 7 + 10 ➞ 17 min
   17:00 − 17:16 = 16 min
   17 + 16 = 33 min
6. R20 − R11,20 = 20 − 12 + 80c
   = R8,80
7. 86 − 57 = 86 − 50 − 6 − 1
   = 29 km
8. R75 + R35 = 75 + 30 + 5
   = R110
9. R85 − R46 = 85 − 40 − 5 − 1
   = R39

Activity 3.1

- The learners use strategies they have developed and practised before to solve the addition and subtraction problems involving carrying and decomposition.
- Revise some of the strategies they have used in Term 3. They should explain their strategies and solutions.
- You could ask them to apply inverse operations to check solutions for homework.

Solutions

If the learners do not use some of the strategies below, share it with them during class feedback.

1. 4 050 − 3 847 = ☐

$$\begin{array}{rcrrrr} 4\,050 & \rightarrow & 4\,000\ + & 0\ + & 50\ + & 0 \\ -\ \underline{3\,847} & \rightarrow & \underline{3\,000\ +} & \underline{800\ +} & \underline{40\ +} & \underline{7} \\ & & 3\,000\ + & 1\,000\ + & 40\ + & 10 \\ & - & \underline{3\,000\ +} & \underline{800\ +} & \underline{40\ +} & \underline{7} \\ & & & 200\ + & 0\ + & 3 \\ & = 203 & & & & \end{array}$$

2. 670 − 469 = ☐
   469 + 1 = 470
   470 + 30 = 500
   500 + 170 = 670
   170 + 30 + 1 = 201
   670 − 469 = 201

3. 30 467 − 28 346 = ☐
   (30 000 − 20 000) + (10 000 − 8 000) + (400 − 300) + (60 − 40) + (7 − 6)
   = (20 000 − 20 000) + 2 000 + 100 + 20 + 1
   = 2 121

4. 50 007 − 25 329 = ☐
   25 329 + 1 = 25 330
   25 330 + 70 = 25 400
   25 400 + 607 = 26 007
   26 007 + 24 000 = 50 007
   24 000 + 607 + 70 + 1 = 24 678
   50 007 − 25 329 = 24 678

5. 7 006 − 3 685 = ☐
   3 685 + 15 = 3 700
   3 700 + 3 306 = 7 006
   3 306 + 15 = 3 321
   7 006 − 3 685 = 3 321

6. 4 305 + 2 807 = ☐

$$\begin{array}{rcrrrr} 4\,305 & \rightarrow & 4\,000\ + & 300\ + & 0\ + & 5 \\ +\ \underline{2\,807} & \rightarrow & \underline{2\,000\ +} & \underline{800\ +} & \underline{0\ +} & \underline{7} \\ & & \underline{6\,000\ +} & \underline{1\,100\ +} & \underline{0\ +} & \underline{12} \\ & = & 7\,000\ + & 100\ + & 10\ + & 2 \\ & = & 7\,112 & & & \end{array}$$

7. 36 076 + 24 885= ☐
   (30 000) + (20 000) + (6 000 + 4 000) + (0 + 800) + (70 + 80) + (6 + 5)
   = 50 000 + 10 000 + 800 + 150 + 11
   = 60 000 + 900 + 60 + 1
   = 60 961

8. 45 318 + 45 792 = ☐

```
  45 318
+ 45 792
      10
     10
   1 0
  10
  8
  91 110
```

9. 37 529 + 33 581 = ☐

```
  37 529
+ 33 581
      10
     10
   1 0
  10
  6
  71 110
```

10. 71 690 + 9 218 = ☐

```
 ¹71 ¹690
+  9 218
  80 908
```

Unit 4 Word problems

MENTAL MATHS

- Learners often struggle with problems of the 'How many more?' type because they are under the impression that they have to add instead of subtract. In this lesson, they get opportunities to practise solving problems of this type. They use the suggested strategies that involve counting on to calculate.
- Ask them if they have other ways of solving the problems. Let them discuss the strategies and solutions.

Solutions

1. Learners discuss strategies for solving the problem.
2. 85 − 46 = 46 + 4 + 30 + 5
   John needs: R85 − R46 = R39
   = 50 + 50 + 30 + 1
   = R131
3. a) 44 + ☐ = 62
   44 + 6 = 50
   50 + 12 = 62
   12 + 6 = 18
   44 + 18 = 62

   b) 33 + ☐ = 82
   33 + 7 = 40
   40 + 42 = 82
   42 + 7 = 49
   33 + 49 = 82

   c) 28 + ☐ = 61
   28 + 2 = 30
   30 + 31 = 61
   31 + 2 = 33
   28 + 33 = 61

   d) 14 + ☐ = 58
   14 + 6 = 20
   20 + 38 = 58
   38 + 6 = 44
   14 + 44 = 58

e) 18 + □ = 72
18 + 2 = 20
20 + 52 = 72
52 + 2 = 54
18 + 54 = 72

f) □ + 25 = 73
25 + 5 = 30
30 + 43 = 73
43 + 5 = 48
48 + 25 = 73

g) □ + 44 = 80
44 + 6 = 50
50 + 30 = 80
30 + 6 = 36
36 + 44 = 80

h) □ + 17 = 62
17 + 3 = 20
20 + 42 = 60
42 + 3 = 45
45 + 17 = 62

i) □ + 38 = 67
38 + 2 = 40
40 + 27 = 67
27 + 2 = 29
29 + 38 = 67

j) □ + 19 = 70
19 + 1 = 20
20 + 50 = 70
50 + 1 = 51
51 + 19 = 70

Activity 4.1

- Learners use their own strategies to solve the problems, including strategies explored during the Mental Maths activity.

Solutions

1. 68 years
2. 2 712 chickens
3. R3 699
4. R2 865
5. 19 years

Unit 5 Problem-solving

MENTAL MATHS

- Learners might use counting on or inverse operations to solve the problems mentally.

Solutions

1. 50 + □ = 150
150 − 50 = 100
50 + 100 = 150

2. □ + 75 = 225
75 + 25 = 100
100 + 125 = 225
125 + 25 = 150
150 + 75 = 225

3. □ + 250 = 1 000
1 000 − 250 = 750
750 + 250 = 1 000

4. 185 + □ = 200
200 − 185 = 15
185 + 15 = 200

5. □ + 500 = 2 000
2 000 − 500 = 1 500
1 500 + 500 = 2 000

6. 825 + □ = 950
825 + 75 = 900
900 + 50 = 950
75 + 50 = 125
825 + 125 = 950

7. □ + 55 = 100
55 + 5 + 40 = 100
45 + 55 = 100

8. □ + 140 = 200
200 − 140 = 60
60 + 140 = 200

9. 69 + □ = 100
69 + 1 = 70
70 + 30 = 100
69 + 31 = 100

10. □ + 78 = 100
78 + 2 = 80
80 + 20 = 100
22 + 78 = 100

Activity 5.1

- Ask the learners to use strategies that they are comfortable with to solve the contextual and non-contextual problems. Allow them to share their strategies and solutions during class feedback.

Solutions

1. a) R5 000 − R1 675 = □
or
R1 675 + □ = R5 000
1 675 + 25 = 1 700
1 700 + 300 = 2 000
2 000 + 3 000 = 5 000
3 000 + 300 + 25 = 3 325
R5 000 − R1 675 = R3 325 is the price of the laptop

b) 1 025 − 856 = □
or
856 + □ = 1 025
856 + 4 = 860
860 + 140 = 1 000
1 000 + 25 = 1 025
140 + 29 = 169
1 025 km − 856 km = 169 km further from Cape Town

c) R10 855 − R8 999 = □
or
R8 999 + □ = R10 855
8 999 + 1 = 9 000
9 000 + 1 855 = 10 855
R10 855 − R8 999 = R1 856 more than the first one

d) 12 000 − 5 745 = □
or
5 745 + □ = 12 000
5 745 + 5 = 5 750
5 750 + 250 = 6 000
6 000 + 6 000 = 12 000
6 000 + 255 = 6 255
12 000 − 5 745 = 6 255 km from the island

e) R95 395 − R39 999 = □
or
39 999 + □ = 95 395
39 999 + 1 = 40 000
40 000 + 50 000 = 90 000
90 000 + 5 395 = 95 395
50 000 + 5 396 = R55 396
R95 395 – R39 999 = R55 396 more than the second-hand car

2. a) 56 453 + 23 857 = 80 310
   b) 18 341 + 12 579 = 30 920
   c) 94 067 + 6 869 = 100 936
   d) 23 756 + 23 568 = 47 324
   e) 10 943 + 17 987 = 28 930
   f) 76 899 + 14 211 = 91 110
   g) 70 000 – 23 567 = 46 433
   h) 51 234 – 50 736 = 498
   i) 26 067 – 21 976 = 4 091
   j) 65 500 – 24 897 = 40 603
   k) 15 440 – 12 880 = 2 560
   l) 24 006 – 20 778 = 3 228

Assessment

Tell the learners that they will work on their own to perform the assessment task, which involves addition and subtraction. They will apply knowledge and skills that they have developed and practised during the past five units. Discuss the information about the creation of books after the assessment task. Ask the learners to look for relationships between the numbers.

Assessment Task 27

1. a) 400 000 + 10 000 + 6 000 + 500 + 50 + 5 = ☐
   b) 700 + 6 + 20 000 + 200 000 + 1 000 = ☐
   c) 25 000 + 15 000 + 300 000 = ☐
   d) 10 500 + 3 000 + 100 + 15 = ☐
   e) 470 000 + 20 000 + 7 = ☐
2. Work out the answers.
   a) 46 + 54 = ☐
   b) 37 + 53 = ☐
   c) 56 – 28 = ☐
   d) 74 – 39 = ☐
   e) 58 + 34 = ☐
3. Work out the answers.
   a) 45 987 + 23 541 = ☐
   b) 21 765 + 22 345 = ☐
   c) 20 453 – 18 467 = ☐
   d) 12 907 – 10 878 = ☐
4. Show how you solve these problems.
   a) Eric reads a book with 144 pages. He has already read 67 pages. How many more pages must he read?

b) The book that Nathalie is reading has 256 pages. She must still read 89 pages. Which page is she at?
c) Nandipha's book has 192 pages. She has read 75 pages. How many more pages must she read?

Did you know?

Many books have 128 pages, 144 pages, 160 pages, 192 pages or 256 pages – all multiples of 16. Books are made by folding and cutting large sheets of paper. Folding each sheet of paper three times will give 16 pages. Why do you think books often have multiples of 16 pages?

Solutions

1. a) 416 555 b) 221 706
   c) 34 000 d) 13 615
   e) 490 007
2. a) 100 b) 90
   c) 28 d) 35
   e) 92
3. a) 69 528 b) 44 110
   c) 1 986 d) 2 029
4. a) 77 pages b) page 167
   c) 117 pages

Properties of 3-D objects

This section revises and consolidates the work done on 3-D objects in Term 2.

Unit 6 Describing and sorting 3-D objects

Remind the learners about the properties we can use to describe and distinguish between shapes, i.e. type of surface, number of faces and shapes of faces.

MENTAL MATHS

- The 3-D objects in the Learner's Book appear in the Photocopiable Resources section of this Teacher's Guide. If the learners struggle to group the objects, they might find it useful to cut out the pictures of the 3-D objects and physically sort them into groups each time.
- The learners work together as a class. Make tables on the board to fit the different classifications. For example:

	Curved	Flat	Flat and curved

The learners explore the objects and classify them accordingly.

Solutions

1. Curved surfaces: B and Q
   Flat surfaces: D, E, M, F, K, L, G, T, H, S, I, R, J, P
   Curved and flat surfaces: A, C, N, O
2. Prisms: D, K, E, M, F, L, G, T, H, S
   Pyramids: I, R, J, P

3. Rectangular prisms: D, K
   Cubes: E, M
   Other prisms: F, L, G, T, H, S

Activity 6.1

- Assess how well learners are able to sort 3-D objects into various groups, how easily they can describe and name 3-D objects and how well they compare various features of objects.

Solutions

1.

3-D object	Type of surface/s	Number of surfaces	Shapes of faces	Are there any right angles?
Sphere	Curved only	1	Only one curved surface	No
Cone	Curved and flat	2	One circular face and one curved surface	No
Cylinder	Curved and flat	3	Two circular faces and one curved surface	No
Rectangular prism	Flat only	6	Rectangles, or rectangles and squares	Yes, at all corners
Cube	Flat only	6	Squares only	Yes, at all corners
Square-based pyramid	Flat only	5	One square and four triangles	Only on the base (corners of the square)

2. a) A: cube
      B: square-based pyramid
   b) One of the following.
      - They both have only flat faces.
      - They both have a square base.
   c) Any two of the following.
      - The cube has six faces. The square-based pyramid has five faces.
      - The cube has only square faces. The square-based pyramid has one square face and four triangular faces.
      - The cube has right angles at all six corners. The square-based pyramid has right angles only at its base.

3. This is an extension task that helps the learners increase their understanding of how to show the six faces of a cube on paper. This will help them as they start to move from concrete representations to abstract representations of 3-D objects.

Unit 7 Faces and nets of prisms

In Term 2, the learners worked with boxes and learned how they can use a net to fold a flat shape into a 3-D model. In this unit, the learners now work with more formal nets of 3-D objects, matching nets to objects and making models.

MENTAL MATHS

- Draw a table like the one below on the board. Ask the learners to visualise the objects and their attributes as given in the table. They count the number of faces, vertices and edges of the objects. Do not rectify them if they give incorrect solutions. Give them 3-D objects to check their solutions.
- They should notice that the number of faces, vertices and edges of the pyramids are consecutive natural or counting numbers and even numbers. The numbers for the prisms reflect consecutive counting numbers, even numbers and multiples of 3.
- Ask them to predict the numbers for a pentagonal-based (five-sided base) pyramid and pentagonal-based prism. Show them pictures of these objects if you do not have the actual ones. They should notice that the patterns continue consistently.

Solutions

Name	Faces	Vertices	Edges
Triangular-based pyramid	4	4	6
Square-based pyramid	5	5	8
Triangular prism	5	6	9
Rectangular prism	6	8	12

Activity 7.1

- Assess how well learners can explain what a net is, how well they can match nets to 3-D objects and how well they work with nets and to create 3-D models.

Solutions

1. a) C b) A
   c) D d) B
2. Ensure that the learners have enough time to work through this task. Many learners will need to work with paper or cardboard cut-outs of the shapes and fold them in order to test whether they will work. Use the page of nets from the Photocopiable Resources. F cannot be folded into a cube.
3. The nets are provided in the Photocopiable Resources. Copy the nets so that learners can cut them out and fold them into 3-D objects.

Assessment

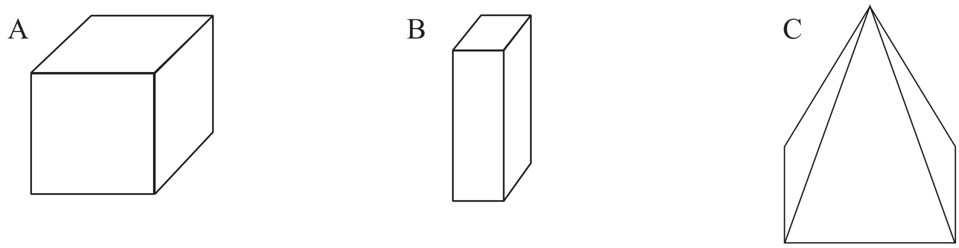
Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

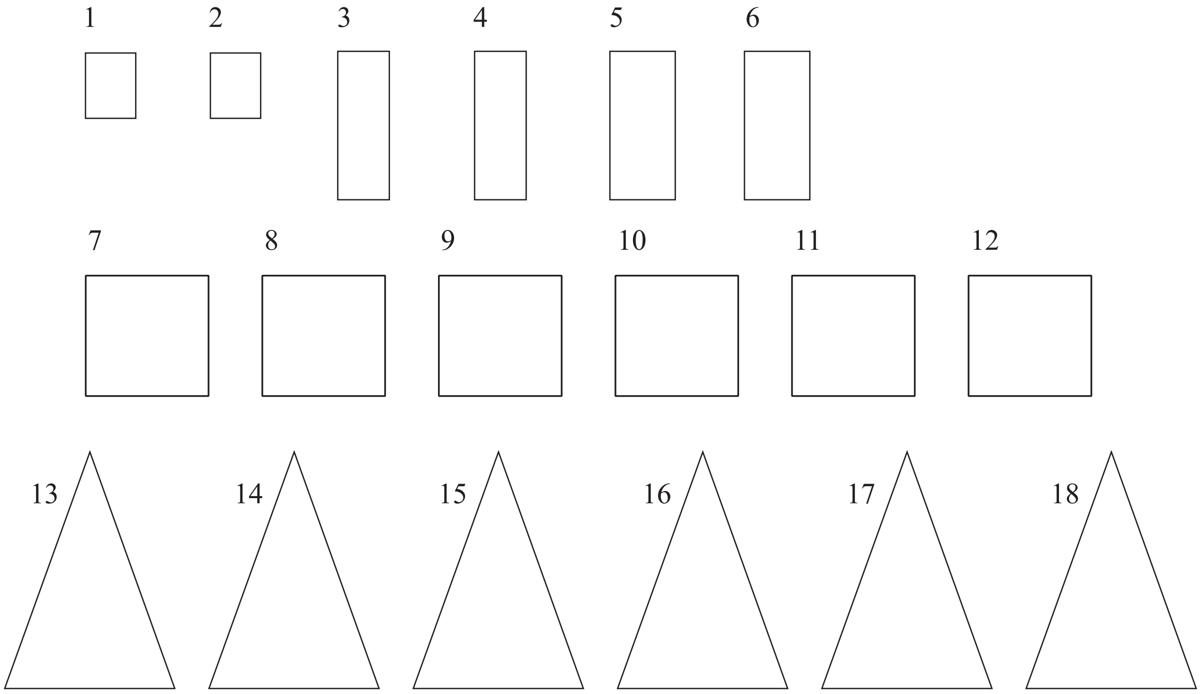
Assessment Task 28

1. Which statements are true and which are false? Correct each false statement.
   a) A sphere has two curved surfaces.
   b) A cone has one flat surface and one curved surface.
   c) A rectangular prism has five faces.
   d) A cube has six rectangular faces.
   e) A square-based pyramid has five rectangular faces.
   f) A cube has right angles at its corners.

g) A rectangular prism has right angles at its corners.
h) The difference between a cube and a rectangular prism is that they have different numbers of faces.

2. Which of the shapes below will you need as face(s) for each object?





Learners can complete copies of the rubric.

Self-assessment

How well are you able to do the following?

I can	Yes, easily	Most times	Sometimes	I need a lot of help
Say what the following 3-D objects are: prisms, spheres, cylinder, cones and pyramids.				
Describe the surfaces of various 3-D objects.				
Explain what a face is.				
Tell the difference between a cube and a rectangular prism.				
Describe the number and shapes of faces of prisms.				

Match shapes to the faces of 3-D objects.				
Match nets to 3-D objects.				
Make a model of a rectangular prism using a net.				

Solutions

1. a) False. A sphere has one curved surface.
   b) True.
   c) False. A rectangular prism has six faces.
   d) False. A cube has six square faces.
   e) False. A square-based pyramid has no rectangular faces.
   f) True
   g) True
   h) False. The difference between a cube and a rectangular prism is that the faces of a cube are made up of squares whereas the faces of a rectangular prism are made up of rectangles, or both rectangles and squares.
2. A: 9, 10, 11, 12, 13, 14
   B: 1, 2, 5, 6, 7, 8
   C: 9, 15, 16, 17, 18

Remedial activities

- Let the learners work through more examples of activities such as question 2 in the Assessment Task. Instead of providing pictures of the faces, provide cardboard cut-outs of the faces from which the learners must choose faces.
- Once the learners have identified which faces will work to create a prism, let them stick the faces together to make a net of the prism. As they work through such trial-and-error tasks, they will develop their skills at visualising how the faces of the net is folded to form the 3-D model.

Extension activities

- Let the learners use nets of 3-D objects other than cubes and rectangular prisms and build models and decorate them. Encourage the learners to work as neatly and accurately as possible.
- Challenge the learners to draw their own nets and then to build 3-D models. The learners will find that accuracy in measurement and folding is key to creating perfect models. If the measurement of just one face is incorrect, it will throw out the balance of the 3-D model.

Common fractions

Tell the learners that they will build on the knowledge they have practised and developed about fractions in Term 3.

In the first Mental Maths activity, they will revise concepts they worked with earlier this year. You can use the entire lesson for the first Mental Maths activity, and let the learners complete some of the tasks for homework.

The learners will count in fractions using sequences and number lines, do equal sharing with remainders that need to be shared, find fractions of whole numbers, calculate with fractions, use equivalent fractions and identify and represent fractions.

Unit 8 Equivalent fraction rule

MENTAL MATHS

- Tell the learners that they will revise previous work done on fractions. Let them work together as a class and get involved in as much discussion as time allows.

Solutions

1. a) i) $1\frac{3}{4}$; $3\frac{3}{4}$; $5\frac{3}{4}$; $7\frac{3}{4}$; $9\frac{3}{4}$; $11\frac{3}{4}$; $13\frac{3}{4}$; $15\frac{3}{4}$; $17\frac{3}{4}$

ii) $\frac{8}{7}$; $\frac{10}{7}$; $\frac{12}{7}$; $\frac{14}{7}$; $\frac{16}{7}$; $\frac{18}{7}$; $\frac{20}{7}$; $\frac{22}{7}$; $\frac{24}{7}$

b) i) You add 2 each time in the sequence of mixed fractions.

ii) You add $\frac{2}{7}$ each time in the sequence of improper fractions.

c) $\frac{7}{4}$; $\frac{15}{4}$; $\frac{23}{4}$; $\frac{31}{4}$; $\frac{39}{4}$; $\frac{44}{4}$; $\frac{55}{4}$; $\frac{63}{4}$; $\frac{71}{4}$

d) $1\frac{1}{7}$; $1\frac{3}{7}$; $1\frac{5}{7}$; 2; $2\frac{2}{7}$; $2\frac{4}{7}$; $2\frac{6}{7}$; $3\frac{1}{7}$; $3\frac{3}{7}$

2. a) $7 \div 2 = 3$ rem 1 Each one gets $3\frac{1}{2}$.

b) $7 \div 3 = 2$ rem 1 Each one gets $2\frac{1}{3}$.

c) $7 \div 4 = 1$ rem 3 Each one gets $1\frac{3}{4}$.

d) $7 \div 5 = 1$ rem 2 Each one gets $1\frac{2}{5}$.

e) $7 \div 6 = 1$ rem 1 Each one gets $1\frac{1}{6}$.

3. a) $\frac{1}{2}$ of $16 = 16 \div 2 \times 1 = 8$

b) $\frac{1}{4}$ of $16 = 16 \div 4 \times 1 = 4$

c) $\frac{3}{4}$ of $16 = 16 \div 4 \times 3 = 12$

d) $\frac{1}{8}$ of $16 = 16 \div 8 \times 1 = 8$

e) $\frac{7}{8}$ of $16 = 16 \div 8 \times 7 = 14$

4. a) $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{9}{2} = 4\frac{1}{2}$

b) $1\frac{1}{4} + 1\frac{1}{4} + 1\frac{1}{4} + 1\frac{1}{4} = 4 + \frac{4}{4}$
$= 5$

c) $2\frac{3}{4} + 1\frac{3}{4} + 3\frac{3}{4} = 6\frac{9}{4} = 6 + (9 \div 4)$
$= 6 + 2\frac{1}{4}$
$= 8\frac{1}{4}$

d) $5\frac{4}{5} + 4\frac{4}{5} = 9\frac{8}{5}$
$= 9 + (8 \div 5)$
$= 10\frac{3}{5}$

e) $2\frac{4}{7} + 2\frac{4}{7} = 4\frac{8}{7}$
$= 4 + (8 \div 7)$
$= 5\frac{1}{7}$

Activity 8.1

Solutions

1. Answers may differ. Examples are given below.
   a) $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$
   b) $\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{4}{16} = \frac{5}{20}$
   c) $\frac{1}{3} = \frac{3}{9} = \frac{4}{12} = \frac{5}{15} = \frac{6}{18}$
   d) $\frac{1}{6} = \frac{3}{18} = \frac{4}{24} = \frac{5}{30} = \frac{6}{36}$
   e) $\frac{1}{10} = \frac{2}{20} = \frac{3}{30} = \frac{4}{40} = \frac{5}{50}$
2. a) $\frac{1}{12} \times 8 = \frac{8}{12} = \frac{2}{3}$ m
   b) $\frac{1}{3}$ m
3. $1\frac{3}{4} \times 3 = 1\frac{3}{4} + 1\frac{3}{4} + 1\frac{3}{4} = 3\frac{9}{4} = 3\frac{1}{4} + 2 = 5\frac{1}{4}$ cups
4. $1\frac{3}{4} + 1\frac{3}{4} + 1\frac{3}{4} + 1\frac{3}{4} = 7$ cups
   12 + 12 + 12 + 12 = 48 doughnuts
5. Learners draw shapes to represent fractions.

Unit 9 Equivalent fraction rule

MENTAL MATHS

- Learners review and discuss Jabulani's rule for creating equivalent fractions.
- They ten check Peter and Paul's work to find the error in Peter's working.

Solutions

Learners' answers will vary.

Activity 9.1

- Remind the learners of the rule for creating equivalent fractions they learnt in Term 2. Let them explain how the rule works. Allow them to use the fraction wall if they struggle with the rule.
- They have to find out what the relationship is between $\frac{1}{2}$ and the numbers in the equivalent fractions. They should notice, for example, when looking at $\frac{1}{2} = \frac{2}{4}$ that 1 × 2 and 2 × 2 give $\frac{2}{4}$. Let them do the same with $\frac{1}{2}$, $\frac{3}{6}$, $\frac{4}{8}$, $\frac{5}{10}$ and $\frac{6}{12}$. They should realise that the bottom numbers (denominators) are multiples of 2 or even numbers.
- Ask learners why thirds, fifths, sevenths and elevenths are not included in the list of equivalent fractions. They should find out that there are no whole numbers that you multiply by 2 to get 3, 5, 7 and 11 or that these numbers are not multiples of 2 or even numbers.
- The learners investigate the strategy that learners in the illustrations used to create equivalent fractions, and decide what is wrong with one of the rules. They use the rule to create equivalent fractions.

Solutions

Examples are given for answers. There are many equivalent fractions for each fraction.

1. $\frac{1}{7} = \frac{2}{14}$
2. $\frac{1}{11} = \frac{2}{22}$
3. $\frac{1}{12} = \frac{2}{24}$
4. $\frac{3}{7} = \frac{7}{21}$
5. $\frac{6}{11} = \frac{26}{66}$
6. $\frac{5}{12} = \frac{60}{144}$
7. $\frac{3}{8} = \frac{9}{24}$
8. $\frac{5}{7} = \frac{25}{35}$
9. $\frac{3}{10} = \frac{6}{20}$
10. $\frac{4}{5} = \frac{15}{20}$
11. $\frac{6}{7} = \frac{42}{29}$
12. $\frac{3}{4} = \frac{15}{20}$
13. $\frac{7}{10} = \frac{14}{20}$
14. $\frac{10}{11} = \frac{20}{22}$
15. $\frac{11}{12} = \frac{22}{24}$

Unit 10 Fractions of whole numbers

MENTAL MATHS

- Learners use the pictures to find fractions of whole numbers and work with the class to find out how they can prove that $\frac{3}{4}$ is smaller or bigger than $\frac{7}{8}$.

Solutions

1. $\frac{1}{2}$ of 6 = 3
   $\frac{1}{3}$ of 6 = 2
2. $\frac{1}{4}$ of 8 = 2
   $\frac{3}{4}$ of 8= 6
3. $\frac{1}{2}$ of 10 = 5
   $\frac{1}{5}$ of 10 = 2
4. $\frac{1}{2}$ of 14 = 7
   $\frac{1}{7}$ of 14 = 2
5. $\frac{1}{3}$ of 9 = 3
   $\frac{2}{3}$ of 9 = 6

Activity 10.1

- The learners will now use a suggested strategy to find fractions of whole numbers. You could tell them that they will not always have pictures or objects to help them find fractions of whole numbers. They have to develop a strategy that involves only numbers to solve this type of problem.
- Let them explore and discuss the relationship between the numbers such as $\frac{3}{4}$ of 8 = 6. They should realise that (8 ÷ 4) × 3 = 6. They apply this rule to calculate fractions of whole numbers without using learning aids.

Solutions

1. a) Answers will differ.
   b) Learners explain their calculations.
2. a) $\frac{1}{4}$ of 16 = (16 ÷ 4) × 1 = 4 × 1 = 4
   b) $\frac{3}{4}$ of 16 = (16 ÷ 4) × 3 = 4 × 3 = 12
   c) $\frac{1}{5}$ of 20 = (20 ÷ 5) × 1 = 4 × 1 = 4
   d) $\frac{3}{5}$ of 20 = (20 ÷ 5) × 3 = 4 × 3 = 12
   e) $\frac{1}{10}$ of 30 = (30 ÷ 10) × 1 = 3 × 1 = 3

f) $\frac{7}{10}$ of 30 = (30 ÷ 10) × 7 = 3 × 7 = 21

g) $\frac{1}{7}$ of 21 = (21 ÷ 7) × 1 = 3 × 1 = 3

h) $\frac{5}{7}$ of 21 = (21 ÷ 7) × 5 = 3 × 5 = 15

i) $\frac{1}{9}$ of 18 = (18 ÷ 9) × 1 = 2 × 1 = 2

j) $\frac{5}{9}$ of 18 = (18 ÷ 9) × 5 = 2 × 5 = 10

k) $\frac{1}{6}$ of 24 = (24 ÷ 6) × 1 = 4 × 1 = 4

l) $\frac{5}{6}$ of 24 = (24 ÷ 6) × 5 = 4 × 5 = 20

m) $\frac{1}{3}$ of 12 = (12 ÷ 3) × 1 = 4 × 1 = 4

n) $\frac{2}{3}$ of 12 = (12 ÷ 3) × 2 = 4 × 2 = 8

o) $\frac{1}{11}$ of 22 = (22 ÷ 11) × 1 = 2 × 1 = 2

p) $\frac{7}{11}$ of 22 = (22 ÷ 11) × 7 = 2 × 7 = 14

q) $\frac{1}{8}$ of 80 = (80 ÷ 8) × 1 = 10 × 1 = 10

r) $\frac{5}{8}$ of 80 = (80 ÷ 8) × 5 = 10 × 5 = 50

Unit 11 Fractions in real life

MENTAL MATHS

- The learners work with fraction problems in measurement contexts. If they do not know, you should tell them that the prefix 'kilo-' in kilogram means thousand. Ask them how many grams there are in one kilogram, and what is measured in grams and kilograms (refer to what they learnt about measuring mass in Term 3).
- Learners use the objects in the pictures to work with $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ of a kilogram. They find fractions of kilograms and apply repeated addition to calculate the total mass of objects. They also compare the masses of objects to find out which are heavier or lighter.
- Encourage learners to convert between mass (whole numbers) and fractions to enhance understanding.

Solutions

1. 1 kg = 1 000 g
2. 500 g + 500 g = 1 kg
   500 = $\frac{1}{2}$ kg
3. 250 g + 250 g + 250 g + 250 g = 1 000 g
   250 g = $\frac{1}{4}$ kg
4. 250 g + 250 g + 250 g = 750 g
   750 g = $\frac{3}{4}$ kg
5. $\frac{1}{2}$ kg + $\frac{1}{4}$ kg = $\frac{3}{4}$ kg
   $\frac{3}{4}$ kg < 1 kg
   or

$500\text{ g} + 250\text{ g} = 750\text{ g}$

$750\text{ g} < 1\text{ kg}$

6. $\frac{1}{2}\text{ kg} = 500\text{ g}$

   $350\text{ g} < \frac{1}{2}\text{ kg}$

   $200\text{ g} < \frac{1}{2}\text{ kg}$

   $450\text{ g} < \frac{1}{2}\text{ kg}$

   $250\text{ g} < \frac{1}{2}\text{ kg}$

7. $\frac{1}{2}\text{ kg} + \frac{1}{2}\text{ kg} + \frac{1}{2}\text{ kg} = 1\frac{1}{2}\text{ kg}$

   or

   $500\text{ g} + 500\text{ g} + 500\text{ g} = 1\ 500\text{ g}$

8. a) $1\ 500\text{ g} + 2\ 500\text{ g} = 4\ 000\text{ g}$

   b) $1\frac{1}{2}\text{ kg} + 2\frac{1}{2}\text{ kg} = 4\text{ kg}$

9. a) $100\text{ g} + 250\text{ g} + 500\text{ g} = 850\text{ g}$ $\quad 850\text{ g} < 1\text{ kg}$

   b) $500\text{g} + 250\text{ g} + 500\text{ g} = 1\ 250\text{ g}$ $\quad 1\ 250\text{ g} > 1\text{ kg}$

   c) $250\text{ g} + 500\text{ g} + 150\text{ g} = 900\text{ g}$ $\quad 900\text{ g} < 1\text{ kg}$

10. a) $1\frac{1}{2}\text{ kg} = 1\ 500\text{ g}$

    $2\ 800\text{ g} > 1\ 500\text{ g}$

    b) $2\frac{3}{4}\text{ kg} = 2\ 000 + 250 + 250 + 250 = 2\ 750\text{ g}$

    $2\frac{4}{5}\text{ kg} = 2\ 000 + 200 + 200 + 200 + 200 = 2\ 800\text{ g}$

    ($\frac{1}{5} = 200\text{ g}$; $\frac{4}{5} = 1\ 000\text{ kg}$)

    $2\frac{4}{5}\text{ kg} > 2\frac{3}{4}\text{ kg}$

Activity 11.1

- Learners can work in groups to solve the word problems and addition and subtraction calculations. Allow them to record their strategies and solutions on A3 sheets of paper. They present their work to the class and display their posters in the classroom. Share the strategies below with the learners if they do not already use them.

Solutions

1. 1 m: 1 car and $\frac{1}{4}$ m left

   2 m: 2 cars and $\frac{2}{4}$ m left

   3 m: 3 cars and $\frac{3}{4}$ left – this gives 4 cars

   6 m: 8 cars

   7 m: 9 cars and $\frac{1}{4}$ m wire left

2. 30 sausage rolls: 16 learners get 1 roll each and 14 sausage rolls left

   14 sausage rolls cut in half = 28 half sausage rolls: each one gets $\frac{1}{2}$ sausage roll and there are 12 halves $\frac{12}{2}$ left

   12 half sausage rolls = 24 quarter sausage rolls: each one gets $\frac{1}{4}$ sausage roll and eight quarters $\frac{8}{4}$ left

8 quarter sausage rolls = 16 eighth sausage rolls: each one gets $\frac{1}{8}$

Each learner gets: $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} = 1 + \frac{4}{8} + \frac{2}{8} + \frac{1}{8} = 1\frac{7}{8}$ sausage rolls.

3. 1 tart needs $\frac{2}{3}$ lemon ➡ 1 lemon and $\frac{1}{3}$ left

   2 tarts need $\frac{4}{3}$ lemon ➡ 2 lemons $\frac{2}{3}$ left

   3 tarts need $\frac{4}{3} + \frac{3}{3} = \frac{7}{3} = 2\frac{1}{3}$ lemon used

   4 tarts need $2\frac{1}{3} + \frac{2}{3} = 3$ lemons

   8 tarts need 6 lemons

   16 tarts need 12 lemons

   24 tarts need 18 lemons

   2 lemons are needed for $\frac{2}{3} + \frac{2}{3} + \frac{2}{3}$ 3 tarts

   24 tarts + 3 tarts = 27 tarts can be baked with 20 lemons

4. a) $\frac{3}{5}$ of 30 = (30 ÷ 5) × 3
   = 6 × 3
   = 18 girls

   b) $\frac{10}{30} = \frac{1}{3}$ took sandwiches along

   c) 10 whole sandwiches = 20 halves

   20 learners each got $\frac{1}{2}$ sandwich

5. Perimeter $= 3\frac{2}{3} + 3\frac{2}{3} + 3\frac{2}{3} + 3\frac{2}{3}$

   $= 12\frac{8}{3}$

   $= 14\frac{2}{3}$ cm

6. a) $\underbrace{\frac{1}{2} + \frac{1}{2}}_{1} + \underbrace{\frac{1}{2} + \frac{1}{2}}_{1} + \underbrace{\frac{1}{2} + \frac{1}{2}}_{1} + \frac{1}{2} = \square$

   $1 + 1 + 1 + \frac{1}{2} = 3\frac{1}{2}$

   b) $\underbrace{\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}}_{1} + \underbrace{\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}}_{1} + \frac{1}{4} = \square$

   $1 + 1 + \frac{1}{4} = 2\frac{1}{4}$

   c) $\frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{15}{4}$

   = 15 ÷ 4

   $= 3\frac{3}{4}$

   d) $1\frac{3}{4} - \frac{1}{4} = 1\frac{2}{4}$

   $= 1\frac{1}{2}$

   e) $\frac{7}{5} - \frac{1}{5} = \frac{6}{5}$

   = 6 ÷ 5

   $= 1\frac{1}{5}$

   f) $1\frac{9}{10} - 1\frac{7}{10} = 1\frac{2}{10}$

   g) $2\frac{7}{8} - 1\frac{3}{8} = 1\frac{4}{8}$

   $= 1\frac{1}{2}$

Unit 12 Ratio and fractions

MENTAL MATHS

- Ask the learners if they remember what ratio means. Let them look at the picture and see that for every girl there are three horses. The ratio of girls to horses is 1 : 3 and the ratio of horses to girls is 3 : 1.
- Help learners understand the relationship between ratio and fractions. The ratios 1 : 3 and 3 : 1 are almost like the fractions $\frac{1}{3}$ and $\frac{3}{1}$. The ratio 1 : 3 is a comparison or a relationship between two groups of objects or amounts. It says how much bigger the one group or amount is than the other. The fraction $\frac{1}{3}$ is a comparison or relationship between a whole and its parts. It names 1 part of a whole that is divided into 3 equal parts.
- Make sure learners do not write a ratio as a fraction with the same numbers, as the actual fraction form of a ratio is different: in the ratio 1 : 3, for example there are four parts altogether (1 part to 3 parts), so the fractions in the ratio are $\frac{1}{4}$ and $\frac{3}{4}$, not $\frac{1}{3}$.
- Ask the learners to study the information on the shirt label and answer the questions. They have to find out which mixtures have the same strength as the mixture that Lucy used for making orange juice.

Solutions

1. a) wool : cotton = 2 : 8
   b) Double the parts of wool and double the parts of cotton.
   2 × 2 = 4 parts wool and 2 × 8 = 16 parts of cotton.
   The ratio is now 4 : 16
   c) Multiply the parts of cotton by 3 and the parts of wool by 3.
   3 × 8 = 24 parts of cotton and 3 × 2 = 6 parts of wool.
   The ratio is now 6 : 24.

2. a) 2 : 10 = 1 : 5 (1 × 2 = 2 and 5 × 2 = 10)
   e) 20 : 100 = 1 : 5 (1 × 20 = 20 and 5 × 20 = 100)
   f) 8 : 40 = 1 : 5 (1 × 8 = 8 and 5 × 8 = 40)

Activity 12.1

- The learners continue to work with ratio problems involving mixtures of paint. They solve a problem involving ratio and fractions to understand what the relationship between these concepts is.

Solutions

1. a) i) 2 : 2 = 1 : 1. They get emerald green.
   ii) 10 : 5 = 2 : 1. They get sea green.
   iii) 10 : 5 or 2 : 1. They get sea green.
   iv) 6 : 12 = 1 : 2. They get new leaf green.
   b) 4 : 10 = 2 : 5. He makes light avocado green.

2. a) $\frac{3}{5}$ of R60 000 = (60 000 ÷ 5) × 3
   = 12 000 × 3
   = R36 000 is Lucy's share
   $\frac{2}{5}$ of R60 000 = (60 000 ÷ 5) × 2 or R60 000 − R36 000 = R24 000
   = 12 000 × 2
   = R24 000 is Mark's share

b) $8 + 7 = 15$ so that Lucy gets $\frac{8}{15}$ and Mark $\frac{7}{15}$

$\frac{8}{15} \times 60\,000 = (60\,000 \div 15) \times 8$
$= 4\,000 \times 8$
$=$ R32 000 for Lucy

$\frac{7}{15} \times 60\,000 = (60\,000 \div 15) \times 7$
$= 4\,000 \times 7$
$=$ R28 000 for Mark

c) $13 + 12 = 25$ so that Lucy gets $\frac{13}{25}$ and Mark $\frac{12}{25}$.

$\frac{13}{25} \times 60\,000 = (60\,000 \div 25) \times 13$
$= 2\,400 \times 13$
$=$ R31 200 for Lucy

$\frac{12}{25} \times 60\,000 = (60\,000 \div 25) \times 12$
$= 2\,400 \times 12$
$=$ R28 800 for Mark

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 29

Use the tasks in the first Mental Maths activity in this section. Learners work on their own to complete the tasks.

Whole numbers

Tell the learners they will build on the knowledge of division they have obtained to solve division problems in and out of context. They will perform an assessment task after the series of lessons.

Unit 13 Halving

MENTAL MATHS

- Tell the learners that they will show what they know about basic division facts in completing the tables. Give them copies of the blank tables template from the Photocopiable Resources.

Solutions

1.

	60	48	30	24	36	54	42	0	6	18	12
÷ 6	10	8	5	4	6	9	4	0	1	3	3

2.

	42	14	0	28	7	70	49	21	56	63	35
÷ 7	**6**	**2**	**0**	**4**	**1**	**10**	**7**	**3**	**8**	**9**	**5**

3.

	80	24	48	32	72	16	0	8	40	64	56
÷ 8	**10**	**3**	**6**	**4**	**9**	**2**	**0**	**1**	**5**	**8**	**9**

4.

	9	90	72	54	36	45	0	18	27	63	81
÷ 9	1	10	8	6	4	5	0	2	3	7	9

Activity 13.1

- The learners work with halving problems to enhance their understanding of division by 2 as halving.

- Ask the learners to work with amounts of money in the same way that they work with whole numbers – they only insert the decimal commas at the end.
- In question 3, learners find half of each group of coins separately before calculating the total amount.

Solutions

1.	a)	48 ÷ 8 = 6	48 ÷ 4 = 12	48 ÷ 2 = 24
	b)	72 ÷ 8 = 9	72 ÷ 4 = 18	72 ÷ 2 = 36
	c)	56 ÷ 8 = 7	56 ÷ 4 = 14	56 ÷ 2 = 28
	d)	64 ÷ 8 = 8	64 ÷ 4 = 16	64 ÷ 2 = 32
	e)	24 ÷ 12 = 2	24 ÷ 6 = 4	24 ÷ 3 = 8
	f)	36 ÷ 12 = 3	36 ÷ 6 = 6	36 ÷ 3 = 12
	g)	48 ÷ 12 = 4	48 ÷ 6 = 8	48 ÷ 3 = 16

2.	a)	R18,50 ÷ 2 = R9,25 R90,48 ÷ 2 = R45,24 R34,96 ÷ 2 = R17,48	R9,25 + R45,24 + R17,48 = R71,97
	b)	R20,50 ÷ 2 = R10,25 R64,80 ÷ 2 = R32,40 R38,60 ÷ 2 = R19,30	R10,25 + R32,40 + R19,30 = R61,95
	c)	R22,86 ÷ 2 = R11,43 R84,50 ÷ 2 = R42,25 R32,90 ÷ 2 = R16,45	R11,43 + R42,25 + R16,45 = R70,13

3. a) (5 × 20c) + (4 × 50c) + (6 × R1) + (7 × R2) + (4 × R5)
= 100c + 200c + R6 + R14 + R20
= R1 + R2 + R40
= R43 is each twin's share
b) R43 × 2 = R86 is the total value

Unit 14 Multiples and powers of 10

MENTAL MATHS

- The learners solve division problems with multiples of 10 involving two- by two-digit, three- by one and two- digit and four- by two and three-digit division.
- Some learners might solve the problems without having to look for relationships. Encourage those who struggle to look for relationships that will help them solve the problems.

Solutions

1.	a)	6 ÷ 6 = 1 60 ÷ 60 = 1 600 ÷ 600 = 1 60 ÷ 6 = 10 600 ÷ 6 = 100 600 ÷ 60 = 10 6 000 ÷ 600 = 10	b)	9 ÷ 9 = 1 90 ÷ 90 = 1 900 ÷ 900 = 1 90 ÷ 9 = 10 900 ÷ 9 = 100 900 ÷ 90 = 10 9 000 ÷ 900 = 10	c)	7 ÷ 7 = 1 70 ÷ 70 = 1 700 ÷ 700 = 1 70 ÷ 7 = 10 700 ÷ 7 = 100 700 ÷ 70 = 10 7 000 ÷ 700 = 10

2.	a)	80 ÷ 80 = 1	b)	60 ÷ 60 = 1
	c)	50 ÷ 50 = 1	d)	400 ÷ 4 = 100
	e)	500 ÷ 5 = 100	f)	300 ÷ 30 = 10
	g)	800 ÷ 80 = 10	h)	2 000 ÷ 20 = 100
	i)	2 000 ÷ 200 = 10	j)	4 000 ÷ 400 = 10

Activity 14.1

- The learners solve problems involving division by 25, 50 and 75. They find out how many 10s, 100s and 1 000s are in non-multiples up to five-digit numbers.

Solutions

1. a) 25 ÷ 25 = 1
   50 ÷ 25 = 2
   75 ÷ 25 = 3
   100 ÷ 25 = 4
   200 ÷ 25 = 8

   b) 250 ÷ 25 = 10
   500 ÷ 25 = 20
   750 ÷ 25 = 30
   1 000 ÷ 25 = 40
   2 000 ÷ 25 = 80

   c) 50 ÷ 50 = 1
   100 ÷ 50 = 2
   150 ÷ 50 = 3
   300 ÷ 50 = 6
   3 000 ÷ 50 = 60

   d) 75 ÷ 75 = 1
   150 ÷ 75 = 2
   300 ÷ 75 = 4
   600 ÷ 75 = 8
   6 000 ÷ 75 = 80

2. a) 4: 0 b) 46: 4 c) 546: 54
   d) 3 452: 345 e) 14 214: 1 421

3. a) 78: 0 b) 314: 3 c) 678: 6
   d) 5 213: 52 e) 20 915: 209

4. a) 567: 0 b) 3 546: 3 c) 9 102: 9
   d) 79 347: 79

Unit 15 Division with and without remainders

MENTAL MATHS

- Ask the learners to make up their own story or word problems for the calculations. They do the calculations without writing anything down. Lead a class discussion about these problems.

Solutions

Word problems will differ.

1. 47 ÷ 7 = 6 remainder 5
2. 59 ÷ 8 = 7 remainder 3
3. 78 ÷ 9 = 8 remainder 7
4. 52 ÷ 6 = 8 remainder 4
5. 39 ÷ 4 = 9 remainder 3
6. 29 ÷ 3 = 9 remainder 2
7. 53 ÷ 5 = 10 remainder 3
8. 58 ÷ 10 = 5 remainder 8

Activity 15.1

- The learners use their own strategies to solve three-digit by one-digit division problems.

Solutions

1. a) 147 ÷ 7 = 21 b) 328 ÷ 8 = 41
   c) 459 ÷ 9 = 51 d) 505 ÷ 5 = 101
   e) 248 ÷ 4 = 62 f) 360 ÷ 6 = 60
   g) 639 ÷ 3 = 213 h) 806 ÷ 2 = 403
   i) 404 ÷ 4 = 101 j) 540 ÷ 9 = 60

2. a) 206 ÷ 4 = 51 remainder 2
b) 709 ÷ 7 = 101 remainder 2
c) 803 ÷ 5 = 160 remainder 3
d) 904 ÷ 9 = 100 remainder 4
e) 308 ÷ 6 = 51 remainder 2
f) 801 ÷ 8 = 100 remainder 1
g) 300 ÷ 7 = 42 remainder 6
h) 700 ÷ 9 = 77 remainder 7
i) 400 ÷ 3 = 133 remainder 1
j) 800 ÷ 7 = 114 remainder 2

Unit 16 Sharing is caring

MENTAL MATHS

- Ask the learners to solve the equal sharing problems involving money amounts. They must not leave out the decimal commas because both the rand and cent amounts are multiples of the divisors.

Solutions

1. R60 ÷ 2 = R30 and 50c ÷ 2 = 25c
   Each one gets R30,25.
2. R300 ÷ 3 = R100 and 90c ÷ 3 = 30c
   Each one gets R100,30.
3. R500 ÷ 5 = R100 and 25c ÷ 5 = 5c
   Each one gets R100,05.
4. R460 ÷ 4 = R115 and 80c ÷ 4 = 20c
   Each one gets R115,20.
5. R280 ÷ 7 = R40 and 70c ÷ 7 = 10c
   Each one gets R40,10.
6. R310 ÷ 2 = R155 and 50c ÷2 = 25c
   Each one gets R155,25.
7. R880 ÷ 8 = R110 and 40c ÷ 8 = 5c
   Each one gets R110,05.
8. R990 ÷ 9 = R110 and 45c ÷ 9 = 5c
   Each one gets R110,05.
9. R850 ÷ 10 = R85 and 50c ÷ 10 = 5c
   Each one gets R85,05.
10. R505 ÷ 5 = R101 and 35c ÷ 5 = 7c
    Each one gets R101,07.

Activity 16.1

- The learners solve word problems involving four- and five-digit numbers divided by one-digit divisors. Ask them to use their own strategies.
- Give them copies of the crossword puzzle. They solve three-digit by one-digit division problems to complete the puzzle.

Solutions

1. a) R2 964 ÷ 4 = ☐

$$4\overline{)2\,9^{1}64}$$
$$741$$

Each one gets R741.

b) 324 ÷ 9 = ☐

$$9\overline{)32^{5}4}$$
$$36$$

Each child gets 36 sweets.

c) R72 000 ÷ 8 = ☐
8|72 000
9 000
Each person got R9 000.

d) 528 ÷ 8 = ☐
8|52[4]8
66
There are 66 piles.

e) 9 500 kg ÷ 250 = ☐
250 + 250 + 250 + 250 = 1 000 (4 crates)
1 000 × 9 = 9 000 (4 × 9 crates)
250 + 250 = 500 (2 crates)
(4 × 9) + 2 = 38
The crane can lift 38 crates.

2.

[1] 2	4		[2] 3	9
7		[3] 8	7	
[4] 5	[5] 2		[6] 8	[7] 1
	[8] 9	1		3
[9] 7	5		[10] 8	6

Unit 17 Subtract to divide

MENTAL MATHS

- The learners apply repeated subtraction as a strategy to divide. They do this in preparation for the strategy they will use for dividing three-digit numbers.
- Ask them to complete a copy of the table. They use repeated subtraction to solve the problems in question 2 using tables and number lines.

Solutions

1. a) 4 boxes

b)

32 − 8 = 24	1 box filled	24 cakes left
24 − 8 = 16	2 boxes filled	16 cakes left
16 − 8 = 8	3 boxes filled	8 cakes left
8 − 8 = 0	4 boxes filled	0 cakes left

2. The learners use tables and number lines to solve the division problems using repeated subtraction. They should make the following conclusions.
a) 42 − 6 − 6 − 6 − 6 − 6 − 6 − 6 = 0 — 42 ÷ 6 = 7 boxes
b) 48 − 8 − 8 − 8 − 8 − 8 − 8 = 0 — 48 ÷ 8 = 6 packs
c) 35 − 5 − 5 − 5 − 5 − 5 − 5 − 5 = 0 — 35 ÷ 5 = 7 packs
d) 27 − 3 − 3 − 3 − 3 − 3 − 3 − 3 − 3 − 3 = 0 — 27 ÷ 3 = 9 bags
e) 28 − 7 − 7 − 7 − 7 = 0 — 28 ÷ 7 = 4 bags

Activity 17.1

- The learners study and discuss the division strategy involving repeated subtraction. They use the strategy to solve three-digit by one-digit division problems.

Solutions

1. The solution to the first problem (using the suggested strategy) is shown below.
   390 ÷ 26 = ☐

390	260	130
− 26	− 26	− 26
364	234	104
− 26	− 26	− 26
338	208	78
− 26	− 26	− 26
312	182	52
− 26	− 26	− 26
286	156	26
− 26	− 26	− 26
260	130	0

   390 ÷ 26 = 15

2. 306 ÷ 17 = 18
3. 357 ÷ 21 = 17
4. 684 ÷ 12 = 57
5. 336 ÷ 14 = 24
6. 405 ÷ 15 = 27
7. 464 ÷ 16 = 29
8. 576 ÷ 18 = 32

Unit 18 More division by two-digit numbers

MENTAL MATHS

- Ask the learners to select the expression they would use to solve the word problem. They use their own strategy to solve the problem. They make up their own word problem for 288 ÷ 12 = ☐ and solve it. Ask them to do the inverse operation to check the solution.

Solutions

1. C: 475 ÷ 19
   The learners use their own strategy to solve the problem.
   475 ÷ 19 = 25
2. They make up a word problem for 288 ÷ 12 = ☐ and solve the problem using their own strategy.
   288 ÷ 12 = 24
   Ask them to use multiplication to check their solution.
   24 × 12 = 288

Activity 18.1

- The learners explore and discuss another strategy to solve division problems. They use the strategy to solve the word problems. Ask them to do inverse operations to check their solutions.

Solutions

Make sure that all the learners understand the procedures in the long division strategy. They should generate the 19× table using doubling and adding previous products. Ask them to use the strategy to solve the problems in context. Assist them in creating the 17× table. They should not have problems with creating tables for the other divisors.

1.

$17\overline{)374}$	17	37	34
22	× 2	− 34	− 34
	34	3	0

Each one pays R22.

2. 25 boxes
3. 28 packets
4. 76 trucks
5. 23 potatoes

Unit 19 Practise what you have learnt about division

MENTAL MATHS

- Let the learners work together as a class to solve the crossword puzzle. They divide three-digit by one-digit divisors. Give each learner a copy of the puzzle.

Solutions

(1) 1	(2) 2	9		(3) 8	(4) 1
(5) 7	8		(6) 1	4	7
	(7) 4	(8) 4	8		9
(9) 2		(10) 1	7	(11) 3	
(12) 2	(13) 9	6		(14) 5	(15) 4
(16) 5	1		(17) 3	8	7

Activity 19.1

The learners solve three-digit by two-digit problems with remainders. They use their own strategies.

Solutions

1. 838 ÷ 18 = 46 remainder 10
2. 739 ÷ 17 = 43 remainder 8
3. 600 ÷ 29 = 20 remainder 10
4. 735 ÷ 13 = 56 remainder 7
5. 967 ÷ 25 = 38 remainder 17
6. 879 ÷ 36 = 24 remainder 15

7. 497 ÷ 24 = 20 remainder 17
8. 979 ÷ 12 = 81 remainder 7
9. 453 ÷ 10 = 45 remainder 3
10. 547 ÷ 18 = 30 remainder 7

Assessment

The learners work on their own to perform to assessment task. They solve division problems out of context.

Assessment Task 30

1. Complete the tables.

a)

	80	48	32	4	0	16	28	40	20	8
÷ 4										

b)

	60	48	30	6	0	12	18	24	36	54
÷ 6										

2. Solve the following.

a) 20 ÷ 2 =
b) 20 ÷ 5 =
c) 20 ÷ 4 =
d) 20 ÷ 10 =
e) 100 ÷ 1 =
f) 100 ÷ 2 =
g) 100 ÷ 4 =
h) 100 ÷ 5 =
i) 100 ÷ 10 =
j) 100 ÷ 25 =
k) 100 ÷ 50 =

3. Calculate:

a) 47 ÷ 6 = ☐
b) 30 ÷ 7 = ☐
c) 33 ÷ 8 = ☐
d) 29 ÷ 4 = ☐
e) 16 ÷ 7 = ☐
f) 55 ÷ 9 = ☐

4. Solve these problems.

a) 147 ÷ 6 = ☐
b) 132 ÷ 7 = ☐
c) 245 ÷ 8 = ☐
d) 356 ÷ 9 = ☐
e) 478 ÷ 10 = ☐

5) Calculate:

a) 536 ÷ 10 = ☐
b) 798 ÷ 10 = ☐
c) 1 234 ÷ 100 = ☐
d) 13 567 ÷ 100 = ☐
e) 24 874 ÷ 1 000 = ☐

6) Calculate:

a) 425 ÷ 17= ☐
b) 392 ÷ 14= ☐

Solutions

1. a)

	80	48	32	4	0	16	28	40	20	8
÷ 4	20	12	8	1	0	4	7	10	5	2

b)

	60	48	30	6	0	12	18	24	36	54
÷ 6	10	8	5	1	0	2	3	4	6	9

2. a) 20 ÷ 2 = 10
b) 20 ÷ 5 = 4
c) 20 ÷ 4 = 5
d) 20 ÷ 10 = 2
e) 100 ÷ 1 = 100
f) 100 ÷ 2 = 50
g) 100 ÷ 4 = 25
h) 100 ÷ 5 = 20

i) 100 ÷ 10 = 10 j) 100 ÷ 25 = 4
k) 100 ÷ 50 = 2

3. a) 47 ÷ 6 = 7 remainder 5 b) 30 ÷ 7 = 4 remainder 2
c) 33 ÷ 8 = 4 remainder 1 d) 29 ÷ 4 = 7 remainder 1
e) 16 ÷ 7 = 2 remainder 2 f) 55 ÷ 9 = 6 remainder 1

4. a) 147 ÷ 6 = 24 remainder 3 b) 132 ÷ 7 = 24 remainder 3
c) 245 ÷ 8 = 18 remainder 6 d) 356 ÷ 9 = 30 remainder 5
e) 478 ÷ 10 = 39 remainder 5

5) a) 536 ÷ 10 = 53 remainder 6 b) 798 ÷ 10 = 79 remainder 8
c) 1 234 ÷ 100 = 12 remainder 34
d) 13 567 ÷ 100 = 135 remainder 67
e) 24 874 ÷ 1 000 = 24 remainder 874

6) a) 425 ÷ 17= 25 b) 392 ÷ 14= 28

Area, perimeter and volume

Ask learners to explain what they remember about perimeter, area and volume. They can use the diagrams in the Learner's Book in their explanations.

Learners should know that perimeter is the distance around a shape or object, area is the flat surface surrounded by the perimeter and volume is the amount of space that an object contains. We refer to both volume and capacity when working with the measurement of liquids and solids. The learners learnt about the difference between capacity and volume in Term 1.

Unit 20 The distance around shapes

MENTAL MATHS

- In working with perimeter the learners perform calculations involving addition, multiplication and doubling. Tell them they will practise calculation strategies that will help them to calculate perimeter. They will apply number rules, i.e. the distributive and associative properties. Let them explain their strategies and the relationships they observe to the class.

Solutions

1. (20 + 20) + (50 + 50) = 40 + 100
   = 140

2. 25 + 24 + 24 + 25 = 25 + 25 + 24 + 24
   = 50 + 48
   = 98

3. (15 + 15) + (20 + 20) = 30 + 40
   = 70

4. (2 × 15) + (2 × 20) = 30 + 40
   = 70

5. 2 × (15 + 20) = 2 × 35
   = 70

6. (25 + 25) + (30 + 30) = 50 + 60
   = 110

7. 2 × (25 + 30) = 2 × 55
   = 110

8. Double 21 plus double 20 = 42 + 40
= 82

9. Double 12 plus double 11 = 24 + 22
= 46

10. 28 + 28 + 12 + 12 = 28 + 12 + 28 + 12
= 40 + 40
= 80

Activity 20.1

- Ask the learners to find the lengths of lace ribbon needed to sew around the edges of the two tray cloths. Check how they determine this. Do not give them a formula; let them suggest strategies to calculate the total distance around the rectangles. They will probably use addition, (30 + 30 + 50 + 50). They should know from working with whole numbers and number sentences that 30 + 30 + 50 + 50 = (2 × 30) + (2 × 50) = 2 (30 + 50) = 60 + 100 = 160 cm.
- Ask learners to determine the length of fencing needed to surround or enclose the garden, swimming pool and fowl run. Some of them might reason that there should be space left for gates. Ask them how they could work this out after they have calculated the perimeter. They might suggest that you subtract the width of a gate from the perimeter.

Solutions

1. 30 + 30 + 50 + 50 = 160 cm
25 + 25 + 40 + 40 = 130 cm

2. 3 + 3 + 2 + 2 = 10 m
5 + 5 + 10 + 10 = 30 m
Total: 10 + 30 = 40 m

Activity 20.2

- Make sure that learners have measuring instruments to use when working with measurement. Remind them that they worked with measuring length before.
- When learners have to measure something that is large ask them how they plan to measure it. If you do not have metre sticks, trundle wheels or measuring tapes, learners could use rulers to measure strips of card to make a metre strip. They could also use strips of a double newspaper sheets – the long side should be one metre.
- Learners should know that the measurements of small objects are done in millimetres and centimetres and larger objects are measured in metres and they would need tape measures.

Solutions

1. a) 80 + 80 + 43 + 43 = 246 mm
b) 16 + 16 + 62 + 62 = 156 mm
c) 59 + 59 + 27 + 27 = 172 mm
d) 64 + 64 + 9 + 9 = 146 mm

2. Answers will depend on the size of your classroom.

3. a) millimetres
b) millimetres
c) centimetres and millimetres
d) centimetres
e) metres
f) kilometres

4. 150 m + 8 m + 142 m + 100 m + 8 m + 92 m = 500 m

5. a) 20 cm b) 40 cm
   c) 71,4 cm d) 61,2 cm
   e) 54 cm f) 44 km

6. Check the accuracy of learner's diagrams.
   a) 24 cm b) 23 cm
   c) 10,8 cm d) 32 cm
   e) 22 cm

Unit 21 Perimeter

In this unit, the learners will work with the measurement of perimeter of shapes constructed of 1 cm × 1 cm squares of full and half squares to determine the perimeter.

MENTAL MATHS

- Learners calculate the perimeter of shapes with regular lengths and breadths.

Solutions

A: 24 cm B: 24 cm
C: 18 cm D: 20 cm
E: 16 cm

Activity 21.1

- In this activity perimeters are irregular and they calculate the total number of 1 cm lengths. Learners should realise that shapes A to D are constructed from eight squares that are arranged in different ways. The perimeter of each shape is different. Ask the learners to investigate how they could arrange eight squares to create the longest and the shortest perimeters.

Solutions

Shapes A, B and D have the longest perimeter: 16 cm.

Activity 21.2

- Tell the learners they will calculate the perimeter of shapes that do not only involve distances around flat (2-D) shapes but also involve the perimeter of 2-D representations of 3-D objects and perimeters inside shapes.
- In question 1, the learners have to calculate the length of ribbon fastened around a box. They should understand that they calculate the perimeter, which is not always about the distance around the edges of a flat surface.
- In question 3, they calculate the perimeter of sport fields. Ask them why we use metres and not centimetres or millimetres to measure the perimeter of these objects.
- In question 4 the learners measure perimeter of shapes that include diagonal lines. They should realize that the horizontal and vertical lines of the square are 1 cm in length but the diagonals are longer so that it is not a matter of counting the number of sides. Ask them to measure the length of a diagonal.

Solutions

1. 66 cm
2. a) 6 units b) 10 units c) 10 units
3. Rugby field: 480 m
   Tennis court: 68 m
   Soccer pitch: 288 m
4. Learners measure the perimeters and compare their answers.

Unit 22 Covering surfaces

MENTAL MATHS

- Ask learners to explain what area is. Remind them that they worked with multiplication arrays earlier this year. The measurement of area is closely related to this concept.
- Ask the learners to calculate the number of square prints that there will be on the completed tray cloth and the floor tiling. They should realise that they have to multiply the number of squares on the length by the number of squares on the breadth.
- The learners continue to develop and enhance understanding of perimeter and area. By now they should realise the relationship between the measurement of perimeter and area.
- Ask learners to use effective strategies to determine area.
- In some questions, learners have to calculate the perimeter and area of complex shapes. Let them explore and explain how they will do it.

Solutions

1. $2 \times 5 = 10$
   $10 - 3 = 7$ prints needed
2. $4 \times 7 = 28$
   $28 - (7 + 3 + 2) = 28 - 12$
   $= 16$ prints needed
3. $4 \times 5 = 20$ square tiles
4. Area

Activity 22.1

- Make sure learners understand the difference between the units used to measure area and perimeter. Remind learners that they have worked with square units and numbers before.

Solutions

1. a) km^2 – town b) m^2 – classroom
   c) cm^2 – book d) mm^2 – eraser
2. a) 4 cm^2 b) 16 cm^2
   c) 9 cm^2 d) 14 cm^2
   e) 20 cm^2 f) 36 cm^2

Activity 21.2

Solutions

1. a) 24 square units b) 48 square units
   c) 50 square units d) 15 square units
   e) 27 square units
2. a) 6 squares b) 2 squares
   c) 10 squares d) 12 squares
3. a) 3 cm^2 b) 4 cm^2
   c) 8 cm^2 d) $2\frac{1}{2}$ cm^2
   e) $7\frac{1}{2}$ cm^2 f) $2\frac{1}{4}$ cm^2
4. Learners compare measurements.

Rectangle	Length (L)	Breadth (B)	Perimeter in cm	Area in cm^2 units
A	4	1	10	4
B	4	3	14	12
C	2	2	8	4
D	$3\frac{1}{2}$	3	13	$10\frac{1}{2}$
E	$2\frac{1}{2}$	2	9	5
F	9	2	22	18
G	3	$1\frac{1}{2}$	9	$4\frac{1}{2}$
H	$5\frac{1}{2}$	3	17	$16\frac{1}{2}$

Unit 23 More about area and perimeter

Tell the learners that they will calculate the area of irregular shapes using square units to assist with calculations. They should understand that one right-angled triangle is half of the square indicated in the scale.

For some shapes, two triangles will make up one whole square. They use the same strategy to calculate the area of other irregular shapes.

MENTAL MATHS

- Although mental maths is regarded as doing calculations mentally without pencil and paper calculations, the learners should be allowed to scribble intermediate steps in the mental calculation procedures. Advise the learners to do this with these types of calculations.

Solutions

1. $(2 + 2) + (9 + 9) = 4 + 18$
   $= 18 + 2 + 2$
   $= 22$ cm
2. $(2 \times 7) + (2 \times 12) = 14 + 24$
   $= 38$ cm
3. $2 \times (90 + 110) = 2 \times 200$
   $= 400$ mm
4. $(12 + 18) \times 2 = 30 \times 2$
   $= 60$ m
5. $50 + 50 + 60 + 60 = 100 + 120$
   $= 220$ km
6. $(2 \times 5\frac{1}{2}) + (2 \times 10\frac{1}{2}) = 11 + 21$
   $= 32$ cm
7. $(2 \times 25) + (2 \times 12) = 50 + 24$
   $= 74$ cm
8. $(2 \times 4) + (2 \times 19) = 8 + 38$
   $= 46$ km
9. $(2 \times 6\frac{1}{4}) + (2 \times 12\frac{1}{4}) = 12\frac{1}{2} + 24\frac{1}{2}$
   $= 37$ m
10. $(2 \times 900) + (2 \times 60) = 1\,800 + 120$
    $= 1\,920$ cm

Activity 23.1

1. Check learners' diagrams.
   a) 18 square centimetres
   b) 84 square centimetres
   c) 9 900 square millimetres
   d) $3\frac{3}{4}$ square metres
   e) 3 000 square kilometres
   f) $57\frac{3}{4}$ cm^2
   g) 300 cm^2
   h) 76 km^2
   i) $75\frac{1}{16}$ m^2
   j) 54 000 cm^2
2. Perimeter: 100 m
   Area: 395 square metres

Activity 22.2

- For question 4, learners have to determine which of the plans are equivalent to the size of the swimming pool. The problem involves ratio – the length is four times the breadth. Ask the learners to estimate first and then measure the shapes to decide which plans are equivalent. Plan A measures 1 × 4 units and plan B is 2 × 4 units. The length of plan A is 4 times the breadth so it is equivalent to the measurement of the swimming pool.

Solutions

1. a) 4 square centimetres
   b) 6 square centimetres
   c) 1 square centimetre
   d) 3 square centimetres
2. Shape B
3. a) 2 cm^2
   b) 5 cm^2
   c) 9 cm^2
   d) 5 cm^2
   e) 7 cm^2
4. Shape a)

Unit 24 Volume and capacity

MENTAL MATHS

- The learners multiply length × breadth × height when calculating volume. They practise multiplying three numbers in preparation for calculating volume. They work with the multiplicative property of 1 and change factors to multiples to multiply easier. They also apply the commutative and associative properties. Emphasise the importance of knowing the multiplication tables by heart.

Solutions

1. $3 \times 3 \times 3 = 3 \times 9$ or 9×3
   $= 27$
2. $4 \times 2 \times 1 = 8 \times 1$
   $= 8$
3. $5 \times 4 \times 3 = 20 \times 3$
   $= 60$
4. $2 \times 2 \times 2 = 2 \times 4$ or 4×2
   $= 8$
5. $1 \times 3 \times 8 = 3 \times 8$
   $= 24$
6. $4 \times 7 \times 2 = 7 \times 8$
   $= 56$
7. $4 \times 3 \times 3 = 4 \times 9$ or 9×4
   $= 36$
8. $9 \times 2 \times 2 = 9 \times 4$
   $= 36$
9. $3 \times 1 \times 5 = 15 \times 1$
   $= 15$
10. $6 \times 5 \times 2 = 6 \times 10$
    $= 60$

Activity 24.1

- Use two sheets of A4 paper. Ask a learner to help. Roll the paper in the length into a cylinder and ask the learner to roll the paper in the breadth. (Your cylinder will be longer than the learner's cylinder.) Ask the learners which cylinder they think will hold the most. Ask the learners what substance they think could be used to test their answers. Water would not be effective. Use sand or a pack of potato chips (150 g) to do an investigation.
- Ask learners whether we refer to the contents of the cylinders as the volume or the capacity. Tell them that they will work with the concept of volume later. Remind them about the relationship between volume and capacity: capacity is the total amount of space inside a container, and volume is the amount of space taken up by whatever is inside the container.
- So a container can have a capacity of 12 cubes, but the number of cubes inside the container can be fewer than this, for example, four cubes. Then the volume of cubes inside the container is four cubes – fewer than the capacity of this container.
- Remind the learners that when they measure length they work with cm (L and B), in area measurement we use squares and for volume we use cubes or rectangular prisms with length, breadth and height).

Solutions

1. a) 8 cm^3 (The capacity is 18 cm^3.)
   b) 12 cm^3 (The capacity is 36 cm^3.)
2. The first container will work better because it is a rectangular prism with right angles.
3. Six 1 cm^3 cubes

Activity 24.2

- The learners continue to calculate the volume of boxes and explore the number of cubes that will fill the boxes. They calculate the number of cubes in the stacks or constructions and find out how many cubes are needed to fit the dimensions provided.

Solutions

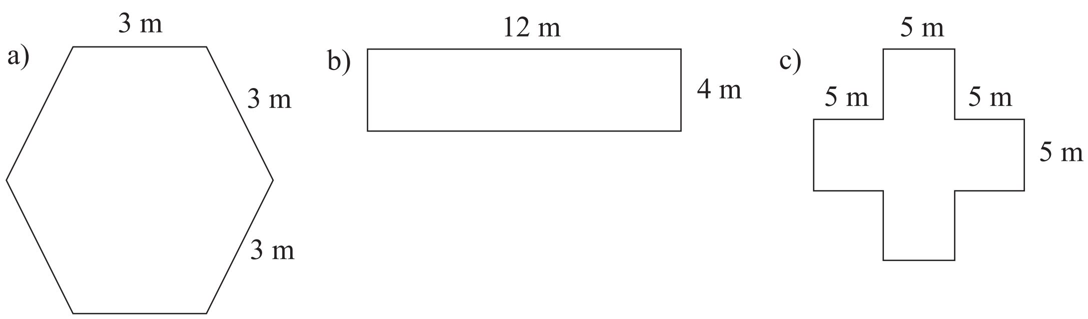
1. a) 2 cubes b) 6 cubes c) 8 cubes
   d) 12 cubes e) 4 cubes f) 9 cubes
2. a) 25 square metres b) 42 square metres
   c) 6 000 square metres d) 35 square meters
3. a) 1 cube b) 8 cubes c) 27 cubes
4. a) 3 cubes b) 4 cubes
   c) 5 cubes d) 10 cubes

Assessment

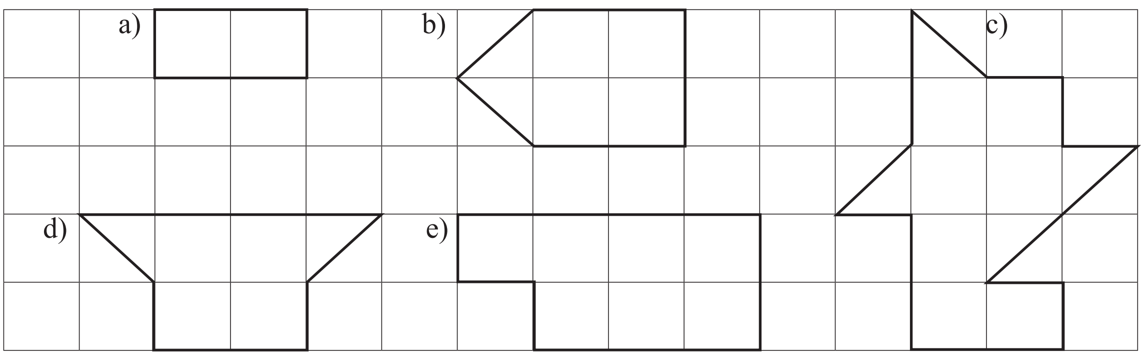
Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 31

1. Calculate the perimeter of each garden.



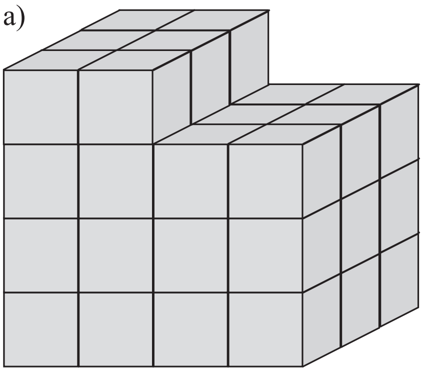
2. Calculate the area of each shape.



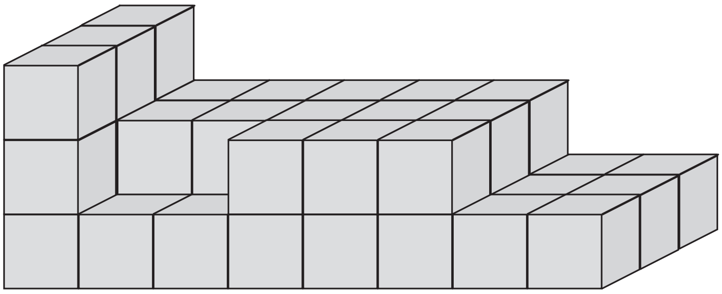
3. Use the square dotty paper and draw a shape with each area.
   a) 12 square centimetres
   b) 10 square centimetres
   c) 15 square centimetres

4. What is the volume of each stack of cubes? Each cube is one unit.

a)



b)



Solutions

1. a) 18 m b) 12 m
   c) 60 m
2. a) 2 units b) 5 units
   c) 9 units d) 5 units
   e) 7 units
3. Answers will differ.
4. a) 42 square units b) 43 square units

Position and movement

Unit 25 Grid letters and numbers on a map

In this section the learners will practise locating positions of objects using alphanumeric grid references. They will also use directions on a map and find and describe routes on maps. This work links with mapwork skills that the learners will develop in Geography lessons in Grade 5. Have a number of suitable maps available as extra resources that the learners can try to read.

MENTAL MATHS

- The learners worked with grid references on maps in Grade 4, so the concept is not new to them. Remind them how to use the alphanumeric grid references before they work through Activity 25.1.
- Assess how well the learners able to locate places on the map using alphanumeric grid references and how well they can describe the correct roads to take to get from one place to another.

Solutions

1. C1
2. A4
3. Village
4. Sea; town
5. A1 and A2
6. a) Pine Road
   b) C1; C2; B2; B3 and B4
7. a) Beach Road
   b) The road called N5 and then Green Road.

Activity 24.1

- This is a challenging activity that can also be done later in this section if learners are not yet ready for it at this stage. They need to identify a part of the map that is in the same position as the matching square on the grid, and copy the object shown on that part of the map into the matching grid square. Help them to do this by moving one finger horizontally across the map towards the object, and another finger vertically down towards the same object, from the nearest letter and number on the sides of the map. They then find the block on the grid where the number and letter intersect, and draw that object in the block. Learners may need to use trial and improvement methods to position all the objects correctly relative to each other, so have copies of the grid available that they can use to make a few practice drawings.

Solutions

Check that learners draw the map correctly.

Unit 26 Directions on a map

This unit focuses on following directions and describing routes on a map.

MENTAL MATHS

Solutions

1. a) B3 b) D3 and D4
   c) C1 and B1 d) A4
2. a) Farm guesthouse b) Rock paintings
3. a) Hiking trails b) River resort

4. There are different routes. Example: From the guesthouse, go up White Road, turn right into Yellow Road, and then turn left into Purple Road. You will reach the orchard at the end of the road.

Activity 26.1

- Assess how well learners are able to locate places on the map using alphanumeric grid references, how well they can follow directions on a map and how well they describe routes to get from one place to another.

Solutions

1. A4
2. a) The park
   b) C3
3. a) C4
   b) A1
   c) There are different routes. Example: Take a right into Station Street. Walk up the street until you get to Lavender Street. Turn left into Lavender Street. Go past the post office, go past Main Road and go past Blueberry Street. Deon's house is at the end of the street on the right.
4. Let learners trace any two different routes from the corner of Lavender Street and Blueberry Street to the school, with their fingers, and then describe the routes to a partner before writing down the directions.

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 32

1. Look at the map in Activity 26.1.
   a) In which block is the railway station?
   b) In which block is the civic centre?
   c) Megan took the following route when she went to town. Follow her route on the map, and write down the names of the places she visited: Megan went into town by train. From the train station, she turned right into Station Road. Then she took the first road to the left, to get to the first place she needed to be, _____. There, she posted her letter. Next, she crossed the road and walked down Main Road to get to the second place she needed to be, _____. Here she did some shopping. Next, Megan walked further down Main Road to get to the third place, _____, and watched a movie. Afterwards, she crossed the road to get to the fourth place, _____, where she sat on a bench and enjoyed a sandwich.
2. Look at the map for the Mental Maths in Unit 26.
   a) Where will you be if you follow these directions?
   From the river resort, cross the bridge and then take the first left turn into Yellow Road. Next, take the first right turn into White Road, and follow the road to the end.
   b) Where will you be if you follow these directions?
   From the farm guesthouse, take White Road and follow it until you reach the museum. Then take a left turn into Green Road, and the second right turn into Red Road. Go to the end of the road.

c) What is the shortest route from the farm guesthouse to the river resort?
d) What is the longest route from the farm guesthouse to the river resort?

3. Choose any map in this chapter. Take turns with a partner to ask questions about the map.

Learners can complete a copy of the rubric.

Self-assessment

How well are you able to do the following?

I can	Yes, easily	Most times	Sometimes	I need a lot of help
Find and describe the positions of objects in a grid.				
Find and describe the positions of places on a map using a grid.				
Follow directions to trace a path on a map.				

Solutions

1. a) B4
   b) B2
   c) Post office, shopping centre, cinema, park
2. a) Museum
   b) Hiking trails
   c) Go along White Road and turn right into Yellow Road. Then turn right into Purple Road, cross the bridge and you will be at the river resort.
   d) There are various longer routes. The longest one would probably be: Go up White Road until you get to the museum. Turn left into Green Road and take the second right into Red Road. Turn right into Blue Road. Go all the way down until you get to Orange Road. Turn right into Orange Road and then right into Purple Road. Go all the way down Purple Road, cross the bridge and then you will be at the river resort.
3. Make sure that the learners ask one another questions related to:
   - grid references
   - places found at different grid references
   - routes to take to get from place to place.

Remedial activities

- If the learners struggle, they may need help with reading an alphanumeric grid. Do a number of exercises in which they practise finding single objects placed in different blocks in a grid.
- Some learners may also need simpler maps. Give them lots of practice with locating places on simple maps. Start with maps that show only two places. Then increase the complexity of the maps to include two places with two roads, then three places with three roads, and so on.

Extension activities

- Ask the learners to use the directions north, south, east and west on the maps. Where the north arrow is not shown, they can assume that it points to the top of the page. They can work out the other directions from there.
- Let the learners draw their own maps, insert a grid over the map and then ask questions about the map. Let pairs or small groups of learners test one another using their own maps and questions.

Transformations

Unit 27 Translations, reflections, rotations

In Term 3, the learners were introduced to translations, reflections and rotations of smaller shapes to create bigger shapes and patterns. In this section, they continue to use these transformations and they also learn about tessellations. The learners also begin to describe patterns.

MENTAL MATHS

- Remind the learners what the terms translation, reflection and rotation mean.
- Work through the examples in the Learner's Book and also demonstrate on the board how to do each transformation.

Solutions

A: The triangle was rotated.
B: The triangle was reflected.
C: The rectangle was translated (or reflected).
D: The rectangle was translated.
E: The quadrilateral was reflected.
F: The quadrilateral was rotated.

Activity 27.1

Solutions

1. Let the learners use dotted paper to work on. It will help to guide them how to move the smaller shapes as they recreate the composite shapes.

2–3. Assess how well learners are able to translate, reflect and rotate shapes to create composite shapes.

Unit 28 Tessellations

Explain what a tessellation is. Emphasise that there are no gaps between parts of a pattern in a tessellation. This means that not all shapes can be used for tessellations – for example, you cannot use circles as there are always gaps between parts of circles that are placed next to each other in a pattern. The learners should now be familiar with the concepts of translation, reflection and rotation, and so they can use these concepts to copy and create various tessellations.

MENTAL MATHS

- Ask the learners to describe the transformations displayed in the patterns. They should explain how each smaller shape has been transformed to create the bigger shape.
- Ask the learners to stare hard at picture A and then to look at picture C. They count the number of cubes in picture C. Ask them to stare hard at picture B and then to look at picture C again and count the number of cubes.

Solutions

1. The small triangle has been rotated (turned) to create the hexagon. The rectangle has been translated (slid) to the right, down left and right and then down again. The concave hexagon has been reflected (flipped) and the rhombi translated.
2. Learners should realise that the cube construction is flipped upwards when they look at picture C each time. To count the number of cubes they should realise that there are hidden cubes in the stack. The arrangement and shading of the cubes cause an optical illusion – we see the cubes in different ways although the drawing is static or does not change. They will count different numbers of cubes.

Activity 28.1

- Assess how well the learners can describe what a tessellation is and how well they are able to transform shapes to make tessellations.

Solutions

1. a–c) Let the learners work on dotted paper if they find it easier. Allow sufficient time for them to experiment and explore with the shapes.
   d) Learners draw lines of symmetry.
2. a) Let the learners copy and cut out the shapes. Then let them move the shapes and trace around them to copy the tessellations.
   b) Learners explain how they moved the shapes.

Unit 29 Describing patterns

The learners will describe patterns by referring to lines, shapes, symmetry, reflections and translations.

MENTAL MATHS

Solutions

1. a) A: squares pattern: squares; straight lines
   B: tesselation with rectangles
   C: honeycomb: straight lines; hexagon
   D: pine cone: spirals; parallelogram
   E: straight lines and curved shapes
   b) Learners describe the transformations.
   c) A, B, C and D

Activity 29.1

- Assess how well the learners are able to describe patterns, how well they can copy a complex pattern and how well they can tessellate a pattern.

Solutions

1. a) Yes, there are curved lines.
   b) Triangles; squares; rectangles; triangles; hexagon; heptagon; circle
   c) Yes. There are a lot of symmetrical shapes.
   d, e) The whole Ndebele pattern, with the solid border line around it, forms one 'shape' that can tessellate. If learners only draw a part of the pattern inside the border line, they should choose a shape that does tessellate.
2. Learners talk about and copy their partners' patterns. Let this be an opportunity for learners to extend the patterns and colour them to produce decorative poster sheets that can be pinned up around the room.

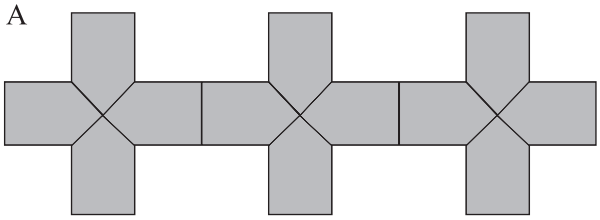
Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

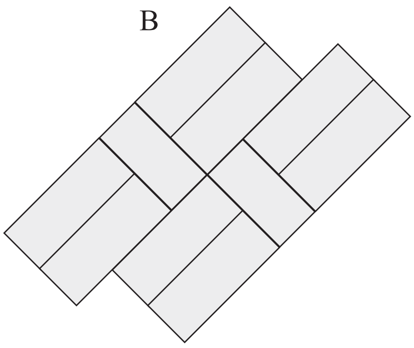
Assessment Task 33

1. Which of the patterns below are tessellations?

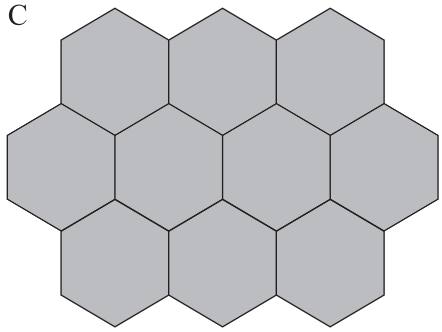
A



B



C



2. Describe how you can move different shapes to make the patterns.
3. Copy the patterns on dotted paper.

The learners can complete a copy of the rubric.

Self-assessment

How well are you able to do the following?

I can	Yes, easily	Most times	Sometimes	I need a lot of help
Explain what translation, reflection and rotation mean.				
Describe what a tessellation is.				
Make tessellations.				
Describe different patterns by saying what shapes were used to make the pattern and how the shape was moved to create the pattern.				

Solutions

1. B and C
2. C: The hexagon is translated.
   B: The rectangle is rotated and translated.
   A: The pentagon is rotated and translated (or rotated and reflected).
3. The learners try to copy the patterns.

Remedial activities

- Give the learners a lot of practice in tracing around shapes to create tessellations. Start with one simple shape and ask the learners to make as many different tessellations as they can with this shape. Remind them to slide, flip or turn the shape to fill gaps and that no shapes should overlap in a tessellation.
- If necessary, instead of letting the learners trace around a single shape to create tessellations, let them use large cardboard copies of the same shape and place them next to one another. The learners may find it easier to do this first. Then let them make the same pattern by tracing around a copy of a single shape.

Extension activities

- Challenge the learners to make interesting, colourful tessellations using two shapes. They could cover an A3 sheet with their tessellations and then use the pages to cover books or gifts.
- Let the learners work in pairs. They each take a turn to draw a tessellation pattern without the partner seeing the pattern. Then they describe their pattern to the partner, who must try to produce the same pattern.

Geometric patterns

Remind the learners that they worked with geometric patterns in Term 2. Ask them what they remember about the topic. Tell them that they will learn more about it in the next two units. They will also complete an assessment task to show what they know about geometric patterns.

Unit 30 Writing rules for tile patterns

MENTAL MATHS

- Ask the learners to study the red and black tile patterns. They should make up a rule to help work out how many black tiles there will be in a pattern if they know how many red tiles are in the pattern.
- The learners use the rule to calculate the number of red tiles for the given numbers of black tiles. They substitute the words with numbers.

Solutions

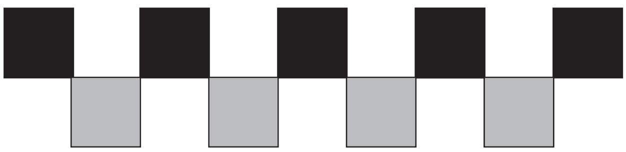
1. Learners should be able to see that the number of black tiles is double the number of red tiles plus one.
2. a) 8 black tiles = (8 × 2) + 1 = 17
   b) 10 black tiles = (10 × 2) + 1 = 21
   c) 12 black tiles = (12 × 2) + 1 = 25
   d) 20 black tiles = (20 × 2) + 1 = 41
   e) 50 black tiles = (50 × 2) + 1 = 101

Activity 30.1

- Ask the learners to study and describe the patterns in the square arrangements.
- Ask them to draw the pattern with four green squares to find out how many purple squares there are. Let them copy and complete the table.
- They then find out how many purple squares will be needed for patterns with 12 and 25 green squares. They perform the inverse operation to find out how many green squares will be needed if there are 30 purple squares.
- They develop a rule and write it in words and in shorthand. The learners use rules to determine output numbers in flow diagrams.
- They use a given rule to create output numbers with their own numbers and they create their own rules. They ask a partner to use their rules to create output numbers.

Solutions

1. a)



   b) 5 purple squares
   c)

Number of green squares	1	2	3	4	5	6	7	8
Number of purple squares	2	3	4	5	6	7	8	9

   d) i) 13 purple squares ii) 26 purple squares
   e) 29 green squares
   f) You need one more purple square than the number of green squares.
2. a) 10 → 31 b) 7 → 22
   c) 0 → 0 d) 3 → 10
   e) 11 → 34 f) 100 → 301
   g) 121 → 364 h) 200 → 601
   i) 250 → 751 j) 300 → 901

3. a) Answers will differ.

4. a) Answers will differ.
   b) Learners test partner's rules.

Unit 31 More rules

MENTAL MATHS

- Ask the learners to use the rules and complete the flow diagrams. They investigate rules and select rules that match the input and output numbers.

Solutions

1. a)

Number	→	number − 4
7		3
12		8
20		16
4		0
13		9
24		20

b)

Number	→	number × 3 − 1
10		29
1		2
9		26
0		0
6		23
4		11

2. Learners discuss each rule. They decide and explain which ones are correct. Let them check the rules by applying them to the input and output number. They should discover that all the rules give the same input and output number – various rules could be used to describe the same problem situation.

A:	4 × 2 = 8	Number ➞ number × 2
B:	4 + 4 = 8	Number ➞ number + 4
C:	Double 4 = 8	Number ➞ double the number
D:	4 × 3 − 4 = 8	Number ➞ (number × 3) − 4
E:	4 × 4 − 8 = 8	Number ➞ (number × 4) − 8

Activity 31.1

- The learners investigate the relationships between the number of squares in flowerbeds and in the paving surrounding the flowerbeds.
- Ask them to write number sentences to calculate the size of the garden, the flowerbed and the number of paving tiles. They should realise that they get the number of paving tiles by subtracting the size of the flowerbed from the size of the garden. They give this rule in words.
- They write the short form for a given rule and use the rule to determine the output numbers in a table. Ask them to copy the flow diagrams and find the rules for getting the output numbers.

Solutions

1. a) 25 square units b) 10 square units
   c) 18 tiles

2. a) A: i) 12 square units
   ii) 2 square units
   iii) 10 tiles

   B: i) 9 square units
   ii) 1 square unit
   iii) 8 tiles

   C: i) 16 square units
   ii) 4 square units
   iii) 12 tiles

   b) Answers will differ.
   c) Number of tiles = area of garden – area of flowerbed

3. a) Number × 4 – 2

Number	1	2	3	4	5	6	7	8	10	20	100
4 x number – 2	2	6	10	14	18	22	26	30	38	78	398

4. a) Number × 3 + 2
   b) Number × 6 – 1
   c) Number × 2 + 3

Assessment

Tell the learners that they will write an assessment task. They will work individually to solve the problems. They will apply knowledge and skills that they have learnt in this topic to solve the problems.

Assessment Task 34

In this task, learners explore patterns in beadwork necklaces, complete a table to find the number of white beads if they know the number of black beads, and create a rule for the relationship between the white and black beads. They use a rule to create output numbers and match rules to flow diagrams with output and input numbers.

1. Mary uses square beads to create necklaces.
   a) Draw a necklace with six black beads.
   b) Complete the table.

Black beads	2	4	6	8	10	12	14	20
White beads	3	5						

   c) Write a rule for calculating the number of white beads if you know the number of black beads.

2. Mary created this rule:
   Number → (number + 1) ÷ 2
   Use Mary's rule to find the output numbers in each function machine.
   a) 5 + 1 ÷ 2 → ☐
   b) 11 + 1 ÷ 2 → ☐
   c) 1 + 1 ÷ 2 → ☐
   d) 19 + 1 ÷ 2 → ☐
   e) 21 + 1 ÷ 2 → ☐

3. Match the rules and the flow diagrams.

Black beads	2	4	6	8	10	12	14	20
White beads	3	5						

Rules	Number → (number × 2) + 1 Number → number + 3 Number → (number × 3) – 1

A	2	→	5	**B**	2	→	5	**C**	2	→	5
	10	→	13		10	→	29		10	→	21
	3	→	6		3	→	8		3	→	7
	4	→	7		4	→	11		4	→	9

Solutions

1. a) Learners draw a necklace.
   b)

Black beads	2	4	6	8	10	12	14	20
White beads	3	5	7	9	11	13	15	21

   c) White beads = black beads + 1

2. a) 5 + 1 ÷ 2 → 3
   b) 11 + 1 ÷ 2 → 6
   c) 1 + 1 ÷ 2 → 1
   d) 19 + 1 ÷ 2 → 10
   e) 21 + 1 ÷ 2 → 1

3. A: Number → number + 3
   B: Number → (number × 3) – 1
   C: Number → (number × 2) + 1

Number sentences

Remind the learners that they have worked with number sentences in Term 1 and they use number sentences often in work on whole numbers and even fractions. They will build on the knowledge they have developed in previous units.

Unit 32 Number express

MENTAL MATHS

- The learners use the context of wheels on a train to enhance understanding of number sentences. Ask them to count the number of wheels on the train engine and the trucks that it pulls. They should realise that the number of wheels on the engine could stay constant while the number of trucks and their wheels could vary.
- Ask the learners to look at the different number sentences that can be created.
- Let learners write number sentences on the board to calculate the number of wheels if the engine pulls a different numbers of trucks.
- Explain the number or function machines to the learners. Tell them that the number of trucks and the number of wheels are the input and output numbers respectively. Ask them to create function machines for the number sentences they have created. They should notice that the number of trucks is always multiplied by 4 and you add 12 (number of wheels on the engine) to get the total number of wheels.
- If learners know what the total number of wheels on the train is and they have to find the number of trucks pulled by the engine, they subtract 12 and divide by 4 – the inverse operations for calculating the number of wheels.

Solutions

1. Learners say which number sentence they prefer and explain why.

2. a) $12 + (5 \times 4) = 12 + 20$
   $= 32$ wheels

   b) $12 + (8 \times 4) = 12 + 32$
   $= 44$ wheels

   c) $12 + (7 \times 4) = 12 + 28$
   $= 40$ wheels

   d) $12 + (6 \times 4) = 12 + 24$
   $= 36$ wheels

   e) $12 + (10 \times 4) = 12 + 40$
   $= 52$ wheels

   f) $12 + (1 \times 4) = 12 + 4$
   $= 16$ wheels

   g) $12 + (3 \times 4) = 12 + 12$
   $= 24$ wheels

3. 108 – 12 → 96 ÷ 4 → 24 trucks

4. a) 5 → × 4 → +12 → 32

   b) 8 → × 4 → +12 → 44

   c) 7 → × 4 → +12 → 40

   d) 6 → × 4 → +12 → 36

   e) 10 → × 4 → +12 → 52

   f) 1 → × 4 → +12 → 16

   g) 3 → × 4 → +12 → 24

Activity 32.1

- Ask the learners to copy and complete the function machines or give them copies of the blank machines from the Photocopiable Resources. Let them write a number sentence for each machine.
- Then ask the learners to write number sentences to show the inverse operations for each machine. They should notice that the order of operations does not influence the input and output numbers. Let them solve the number sentences in c) using inverse operations.

Solutions

1. a)

7 → × 3 → + 2 → **23**

8 → ÷ 4 → × 20 → **40**

3 → + 6 → × 7 → 63

9 → ÷ **4** → + 20 → 56

7 → × 5 → – 6 → 29

5 → × 5 → **× 4** → 100

	b)	7 × 3 + 2 = ☐	21 + 2 = 23	
		8 ÷ 4 × 20 = ☐	2 × 20 = 40	
		☐ + 6 × 7 = 63	63 ÷ 7 – 6 = 3	
		9 ☐ + 20 = 56	56 – 20 = 36	36 ÷ 4 = 9
		☐ × 5 – 6 = 29	29 + 6 ÷ 5 = ☐	35 ÷ 5 = 7
		5 × 5 ☐ = 100	5 × 5 = 25	25 × 4 = 100
2.	a)	☐ + 500 = 2 000	2 000 – 500 = 1 500	
	b)	☐ + 50 = 900	900 – 50 = 850	
	c)	☐ + 300 = 7 000	7 000 – 300 = 6 700	
	d)	☐ + 250 = 1 500	1 500 – 250 = 1 250	
	e)	☐ + 420 = 800	800 – 420 = 380	
	f)	☐ + 9 975 = 10 000	10 000 – 9 975 = 25	
	g)	☐ + 8 025 = 8 500	8 500 – 8 025 = 475	
	h)	☐ + 750 = 3 000	3 000 – 750 = 2 250	
	i)	☐ + 125 = 700	700 – 125 = 575	
	j)	☐ + 91 = 200	200 – 91 = 109	
3.	a)	☐ – 50 = 600	600 + 50 = 650	
	b)	☐ – 25 = 750	750 + 25 = 775	
	c)	☐ – 123 = 1 123	1 123 + 123 = 1 246	
	d)	☐ – 0 = 25	25 + 0 = 25	
	e)	☐ – 675 = 500	500 + 675 = 1 175	
	f)	☐ – 1 500 = 500	500 + 1 500 = 2 000	
	g)	☐ – 100 = 0	0 + 100 = 100	
	h)	☐ – 250 = 1 250	1 250 + 250 = 1 500	
	i)	☐ – 75 = 2 025	2 025 + 75 = 2 100	
	j)	☐ – 1 = 9 999	9 999 + 1 = 10 000	

Unit 33 Writing and solving number sentences

MENTAL MATHS

- Read the number puzzles to the learners. Ask them to write open number sentences on the board to show how they solve the puzzles. They should apply inverse operations for Jenny, Tendai, Trudy and Isaac. Remind them to use a shortcut to multiply by 25. Also remind the learners that the order of operations does not apply in solving some of the problems.
- For Goolam they write down a number series starting with 2 and apply the rule. The learners should realise that they could use different input numbers starting with 2. For example, consecutive counting numbers: 2; 3; 4; 5; 6 or consecutive even numbers: 2; 4; 6; 8; 10. They could use input numbers with various constant differences: 2; 5; 8; 11; 14 (plus 3) or 2; 7; 12; 17; 22 and so on. They should describe the patterns for the different sequences of input and output numbers.
- Aneesha's puzzle could be solved by inspection, using equivalent fractions or ratio.
- Learners apply inverse operations to solve the problems.

Solutions

1.	a)	Jenny	
		☐ × 23 = 552	552 ÷ 23 = 24
	b)	Goolam	
		(2 × 3) − 2 = 4	
		(3 × 3) − 2 = 7	

$(4 \times 3) - 2 = 10$
$(5 \times 3) - 2 = 13$
$(6 \times 3) - 2 = 16$
Sequence of input numbers: 2; 3; 4; 5; 6 (Consecutive counting/natural numbers)
Sequence of output numbers: 4; 7; 10; 13; 16 (Count in intervals of 3)

c) Tendai
$\square \div 7 = 25$ $25 \times 7 = 100 \times 7 \div 4$
$= 700 \div 4$
$= 175$

d) Aneesha
3 balls of wool = 4 pairs of socks
$\square$ balls of wool = 12 pairs of socks
$4 \times 3 = 12$
$3 \times 3 = \square$ $3 \times 3 = 9$
9 balls of wool = 12 pairs of socks
or

$\frac{3}{4} = \frac{\square}{12}$ $\frac{3}{4} = \frac{9}{12}$
or
$3 : 4 = \square : 12$ $3 : 4 = 9 : 12$

e) Trudy
$\square \times 6 - 13 = 35$ $35 + 13 \div 6 = 48 \div 6$
$= 8$

f) Isaac
$\square - 469 = 275$ $469 - 275 = 194$

2. a) $\square \times 1 = 54$ $54 \div 1 = 54$
b) $\square \times 7 = 0$ $0 \div 7 = 0$
c) $\square \times 8 = 0$ $0 \div 8 = 0$
d) $\square \times 9 = 63$ $63 \div 9 = 7$
e) $\square \times 5 = 55$ $55 \div 5 = 11$
f) $\square \div 7 = 6$ $6 \times 7 = 42$
g) $\square \div 10 = 0$ $0 \times 10 = 0$
h) $\square \div 4 = 10$ $10 \times 4 = 40$
i) $\square \div 5 = 20$ $20 \times 5 = 100$
j) $\square \div 4 = 250$ $250 \times 4 = 1\ 000$

Activity 33.1

- Ask the learners to look at the chocolate fillings in the boxes. There are different numbers of chocolates in the different boxes. Explain that each box contains chocolates with cream and nut fillings. Ask learners to write number sentences to show how to calculate the total number of chocolates in the boxes. Show them how they can swap and regroup the numbers to calculate more easily (using the associative and the commutative properties).
- Learners write a number sentence to calculate the number of chocolates on the strings.
- In question 3, the learners study the products and prices on the till slip. Ask them to estimate the total amount that Cathy spent on shopping. They write number sentences to show how they calculate the accurate cost of the products. Remind them to only insert the decimal comma when they write the solutions.
- Check whether learners group the prices of the same items or calculate the prices separately. They break up the numbers to calculate more easily.

Solutions

1. (14 + 10) + (16 + 14) + (12 + 16) + (9 + 15)
   = (16 + 14) + (16 + 14) + (10 + 15) + (12 + 9)
   = 30 + 30 + 25 + 21
   = 60 + 41
   = 101
2. (6 × 6) + (6 × 4) + (1 × 3)
   36 + 24 + 3
   = 63
3.

Baked beans: 3 × R6, 35	(3 × 640) – (3 × 5) = (1 800 + 120) – 15 = 1 920 – 15	R19,05
Cat food: 4 × R4,39	(4 × 440) – (4 × 1) = (1 600 + 160) – 4 = 1 760 – 4	R17,56
Bread: 1 × R8,95		R8,95
Potatoes: 1 × R7,25		R7,25
Apples: 1 × R7,50		R7,50
Carrots: 1 × R6,50		+ R6,50
Total		**R66,81**

Unit 34 Equations that balance

MENTAL MATHS

- Tell the learners that they will solve equations. Remind them that equations work like a balancing scale. The values on both sides of an equation should be equal. Ask them how they would go about finding the mass of one can on the scale. Work through the steps with the class. The learners solve the problems by inspection. You should let them substitute the value of ☐ into the equations to check their solutions.
- Learners need to understand that the place holder ☐ stands for the same number. They find out how many athletes travel in one mini-bus by using the steps provided.

Solutions

1. Learners work through the given example.
2. ☐ + ☐ + ☐ = 22 + ☐
   11 + 11 + 11 = 22 + 11
   33 = 33 — There are 33 boys and 33 girls.

   or

   ☐ + ☐ + ☐ = 22 + ☐
   ☐ + ☐ = 22 — (Take away ☐ on both sides)
   Half of 22 = 11

   or

   22 ÷ 2 = 11
   ☐ = 11
   ☐ + ☐ + ☐ = 22 + ☐
   11 + 11 + 11 = 22 + 11
   33 = 33

Activity 34.1

- The learners solve equations. Assist them with the interpretation of the problems. They should realise that □ stands for the unknown values they have to determine.

Solutions

1. □ + □ + □ + 4 = □ + 50
   □ + □ + 4 = 50
   □ + □ = 46 (Take 4 away from both sides)
   46 ÷ 2 = 23 or 23 + 23 = 46
   □ = 23
2. a) Learners discuss the given information.
   b) Ali's number of stamps + Nashreen's number of stamps
   = □ + 12 + 30 + □ × 17 + 9
3. a) 4 × 3 m
   b) 4 × 3 m + 7 × 8 m
   c) The learners have to find different combinations of long and short pipes with a length of 40 m if short and long pipes are used. Encourage them to make bonds of 40 by investigating which multiples of 8 and 3 will give a sum of 40. They can list the possibilities as:
   8 + 32 = 40, which are 1 long pipe + 4 long pipes,
   i.e. (1 × 8) + (4 × 8) = 40 m
   16 + 24 = 40, which are 2 long pipes + 8 short pipes,
   i.e. (2 × 8) + (8 × 3) = 40 m
   24 + 16 = 40, which are 8 short pipes and 2 long pipes,
   i.e. (8 × 3) + (2 × 8) = 40 m
   32 + 8 = 40, which are 4 long pipes + 1 long pipe,
   i.e. (4 × 8) + (1 × 8) = 40 m
   40 + 0 = 40, which are 5 long pipes, i.e. 5 × 8 = 40 m

Assessment

Tell the learners they will work on their own to solve the problems involving number sentences. They will apply knowledge they have developed during the past three units. They have to determine which number sentences or equations describe problems, they solve number sentences, fill in missing values and operations in function machines, apply knowledge of the commutative property, doubling and halving and display understanding of equivalent expressions. Some problems must be solved by choosing from multiple possible answers.

Assessment task 34

1. Five children are playing in the park. Three of the children are riding on tricycles and two of them ride on bicycles.
   a) How many wheels are there on the tricycles and bicycles altogether? Which of the following number sentences can you use to solve the problem?
      A (3 × 1) + (2 × 3) =
      B (3 × 3) + (2 × 3) =
      C 3 + 3 + 2 + 2 =
      D 3 + 3 + 3 + 2 + 2 =
   b) Calculate the number of wheels.
2. Fill in the missing numbers.
   a) □ × 3 + 2 = 26 b) □ – 4 ÷ 2 = 5
   c) 20 + 12 ÷ 8 = □ d) 56 ÷ 7 × 2 = □

e) $30 - \square \div 5 = 4$ f) $50 + 25 \div \square = 25$

3. Which equations are true and which are false?
   a) $\square + 7 = 7 + \square$ b) $\square \times 8 = 8 \times \square$
   c) $\square - 3 = 3 - \square$ d) $\square \div 4 = 4 \div \square$
   e) $\square + 10 = \square \times 10$ f) $\square - 0 = 0 - \square$
4. Solve each problem.
   a) Double R1,99 = $\square$ b) Double R4,95 = $\square$
   c) Half of R60,90 = $\square$ d) Half of R126,60 = $\square$
5. Solve each equation.
   a) $5 \times (4 + 7) = (5 \times \square) + (5 \times \square)$
   $= \square + \square$
   $= \square$
   b) $6 \times (9 + 2) = (6 \times \square) + (5 \times \square)$
   $= \square + \square$
   $= \square$
   c) $\square + \square + \square + 43$
   $= \square + \square + 56$
   d) $\square + \square + \square + \square + 26$
   $= \square + \square + 76$

Solutions

1. a) D (3 + 3 + 3 + 2 + 2)
   b) 13 wheels
2. a) $\square = 8$ b) $\square = 6$
   c) $\square = 4$ d) $\square = 16$
   e) $\square = 10$ f) $\square = 3$
3. a) True b) True
   c) False d) False
   e) False f) False
4. a) R3,98 b) R9,90
   c) R30,45 d) R63,30
5. a) $5 \times (4 + 7) = (5 \times 4) + (5 \times 7) = 20 + 35 = 55$
   b) $6 \times (9 + 2) = (6 \times 9) + (6 \times 2) = 54 + 12 = 66$
   c, d) Learners discuss possible solutions.

Probability

The work on probability continues from Grade 4. The learners do not have to work with the concept of probability in detail yet. They do activities that will prepare them for working with probability in more detail later. Learners have to identify possible outcomes of events, perform repeated events, record actual outcomes of the events, and compare the frequencies of actual outcomes. In Grade 5, the learners are meant to be able to do up to 20 repeated events and record their outcomes.

Unit 35 Events and outcomes

MENTAL MATHS

- Ensure that the learners understand what an event is and what an outcome is. Provide home language support where necessary.

Solutions

1. a) Event: choosing one of four cards
   b) Outcome: number 2
2. a) Event: rolling a dice
   b) Outcome: number 6
3. a) Event: choosing one of two beads
   b) Outcome: white bead
4. a) Event: choosing one of three shapes
   b) Outcome: a square

Activity 35.1

Assess how well learners can list the possible outcomes of an event and how well they can tell the difference between possible outcomes and actual outcomes.

Solutions

Event	Possible outcomes of the event	Actual outcome of the event
Choosing one of four cards	• 1 • 2 • 3 • 4	2
Rolling a dice	• 1 • 2 • 3 • 4 • 5 • 6	6
Choosing one of two beads	• White • Black	White
Choosing one of three shapes	• Rectangle • Square • Circle	Square

Unit 36 Recording actual outcomes

MENTAL MATHS

- The learners have to find the missing digit in a four-digit multiple of 9. Allow them to use trial and improvement to find the missing digit. They should discover that there is more than one possible outcome. You could inform them, if they do not know that the four digits in the number should have a sum, that is a multiple of 9.
- Once they have determined that the missing digits are 0 or 9, ask them to explore other four- and five-digit numbers that are multiples of 9, for example 7 245; 2 547; 13 635; 99 279, and so on. Then create four- or five-digit multiples of 9 with two missing digits. Ask them to find the missing digits.

Solutions

9 036 (9 + 3 + 6 = 18)

9 936 (9 + 9 + 3 + 6 = 27)

Activity 36.1

- From previous work in data handling, both in Grade 4 and earlier this year, the learners should be quite comfortable working with tally tables. The activities in this unit give learners practice in carrying out repeated events and recording their outcomes.
- Ensure that the learners know how to draw up suitable tally tables and that they can record the outcomes of the repeated events accurately. Let learners compare their outcomes with other groups or pairs, and discuss whether the frequency of each outcome increases as the number of trials increases. For example, if two groups each do 20 trials tossing a coin, the total number of actual outcomes doubles to 40. But does the total number of heads or tails outcomes also double, or even increase? Learners may begin to notice that increasing the number of times you perform an event does not automatically increase any particular outcome of the event in the same proportion.

Assessment

Assess how well the learners can list possible outcomes of events, draw up a suitable tally table to record the outcomes of an event, record the results or actual outcomes of their trials accurately and how well they can compare the frequency of actual outcomes for the series of trials they perform.

Assessment Task 35

1. Liesl tossed a coin a number of times and recorded her results.

Possible outcomes	Tallies	Number of each actual outcome
Heads	~~IIII~~ ~~IIII~~ III	13
Tails	~~IIII~~ II	7

   a) How many times did Liesl toss the coin?
   b) Which side of the coin faced up most of the time?

2. Roll a dice 20 times and record your actual outcomes.
   a) Prepare a tally table that lists all the possible outcomes.
   b) Roll a dice 20 times and record each outcome.
   c) Which number was your most common outcome?
   d) Which number was your least common outcome?
   e) Write two sentences that describe your results.
   f) Compare your results with a partner's results. Are the results the same or different?

3. Toss a coin 20 times and record your actual outcomes.
   a) Prepare a tally table that lists all the possible outcomes.
   b) Toss a coin 20 times and record each outcome.
   c) Write two sentences that describe your results.
   d) Compare your results with a partner's results. Are the results the same or different?

Learners can complete the following rubric.

Self-assessment

How well are you able to do the following?

I can	Yes, easily	Most times	Sometimes	I need a lot of help
Explain what an event is.				
Explain what 'possible outcomes' means.				
Describe what the possible outcomes are of tossing a coin.				
Describe what the possible outcomes are of rolling a dice.				
Toss a coin up to 20 times and write down all the actual outcomes.				
Roll a dice up to 20 times and write down all the actual outcomes.				
Spin a spinner up to 20 times and write down all the actual outcomes.				

Solutions

1. a) 20 times
   b) Heads – 13 times
2. The learners' tally table should include the following information.

Possible outcomes	Tallies of actual outcomes	Number of each actual outcome
One		
Two		
Three		
Four		
Five		
Six		

3. The learners' tally table should include the following information.

Possible outcomes	Tallies of actual outcomes	Number of each actual outcome
Heads		
Tails		

Remedial activities

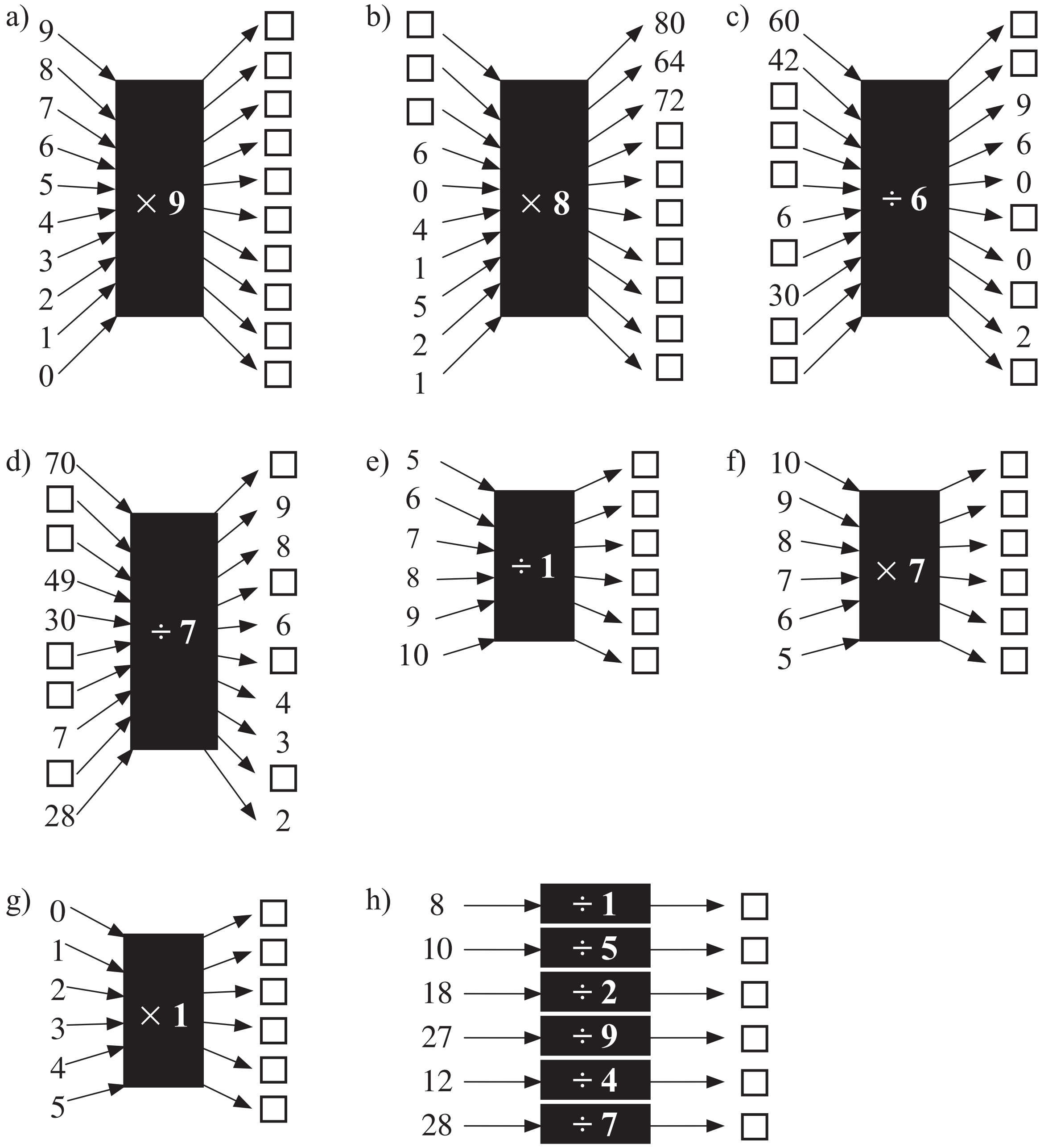
- If the learners do not use tally marks with ease, give them more practice in using them. Let them work in pairs or small groups, where each learner asks another to use tally marks to write a number. Let them check one another's work.
- Let the learners work with a number of events where the possible outcomes are only two, for example: tossing a coin, choosing one of two objects from a bag, choosing one of two cards, and spinning a spinner where the possible outcomes are only one of two colours. Let them first repeat the event three or four times, then move on to repeat the event up to 20 times. Only then let them progress to working with events where there are three, then four, and later more, outcomes.
- Let the learners describe the events they performed and how they handled the events and recorded the outcomes. Explaining this will help learners think clearly and logically, and gain a better understanding of the concepts.

Extension activities

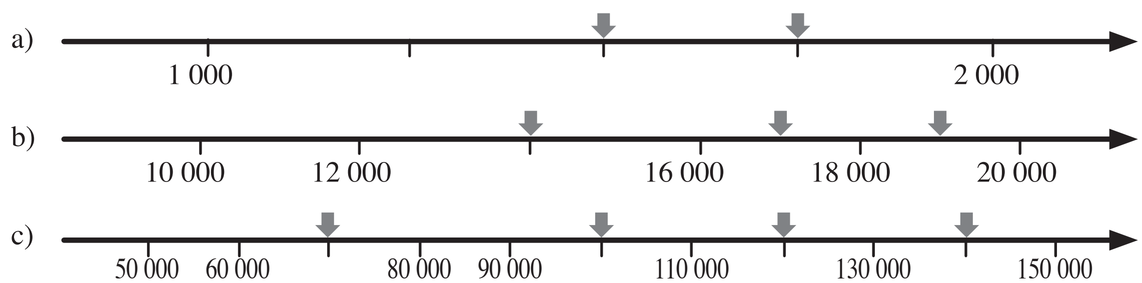
- Let the learners experiment by rolling a dice up to 30 or 40 times and recording the outcomes. Let them state the frequency of the actual outcomes and identify the number with the highest frequency. Ask the learners to try and predict what their results would be if they were to repeat the experiment.

4. Resources

Term 1 Unit 18 Activity 18.1

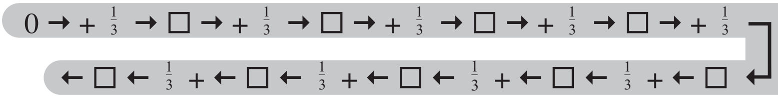


Term 2 Activity 2.1 Question 5

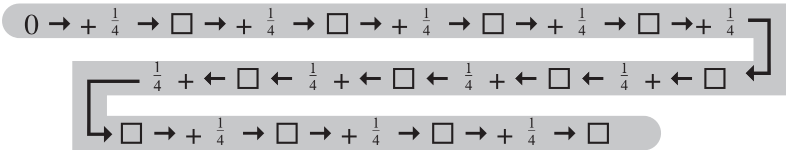


Term 2 Activity 6.1 Question 3

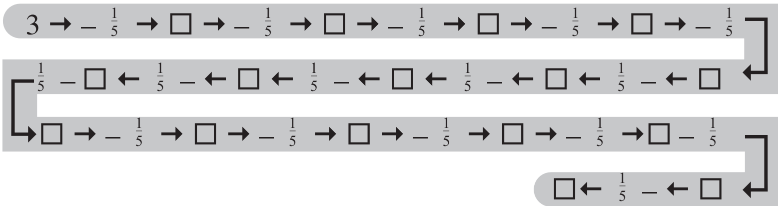
a)



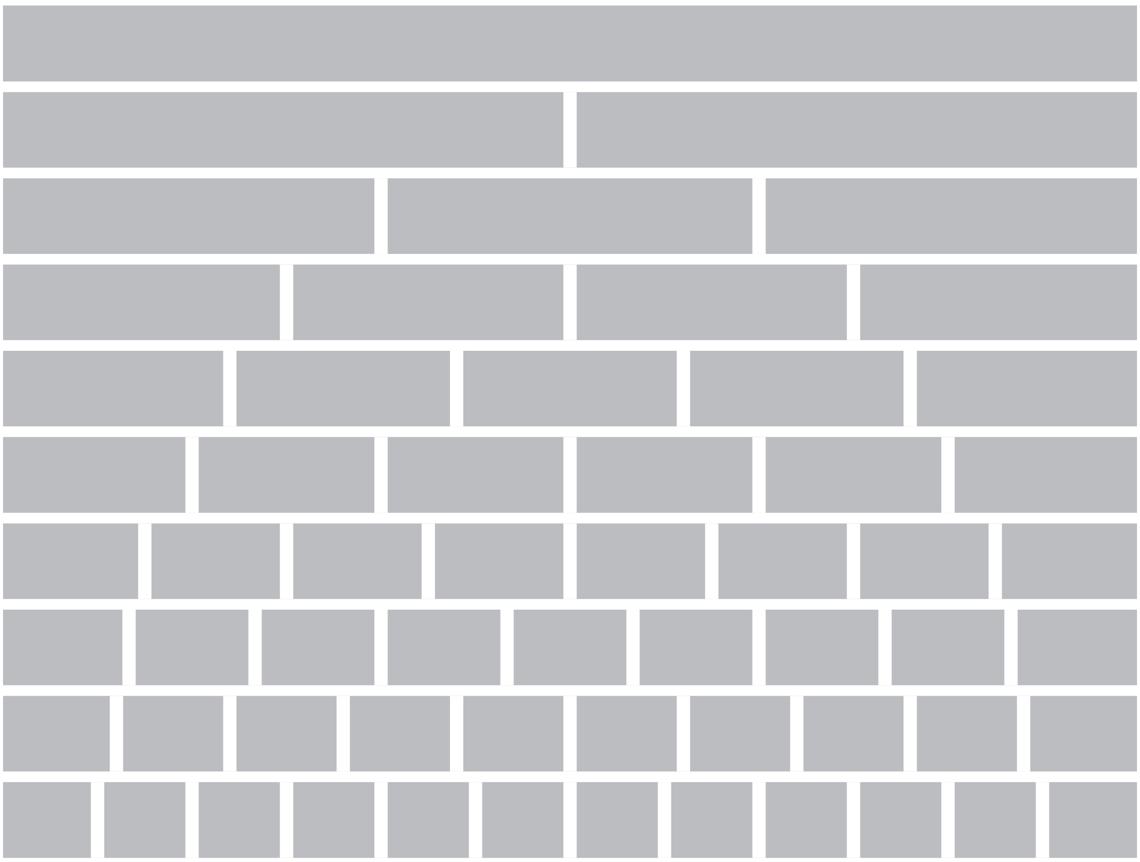
b)



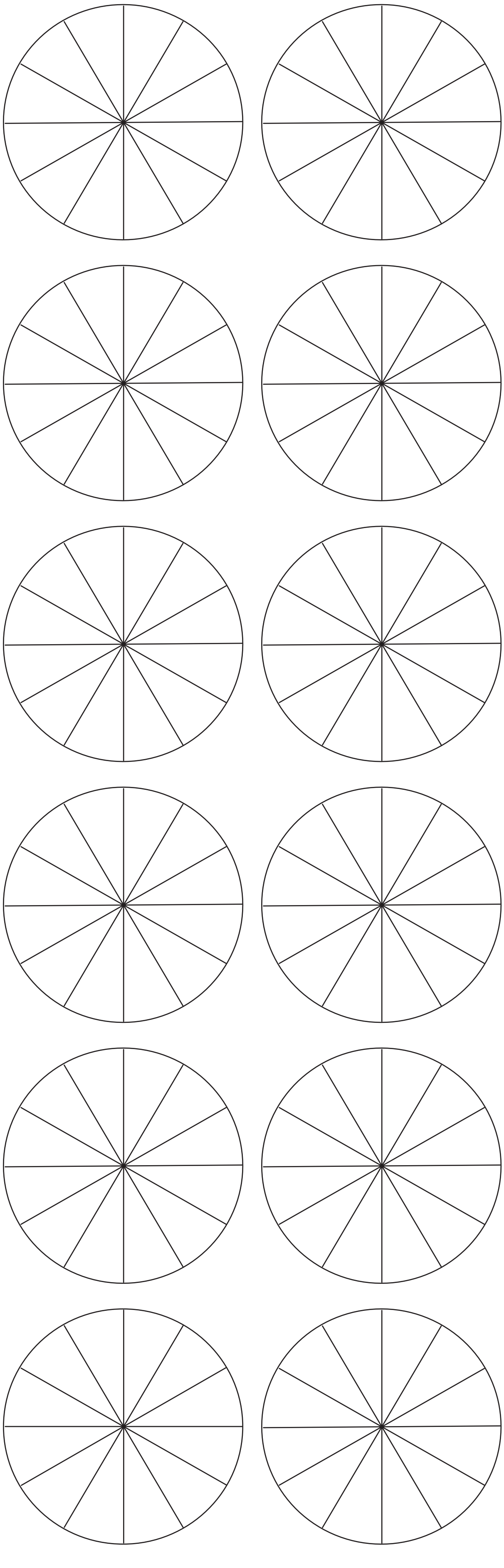
c)



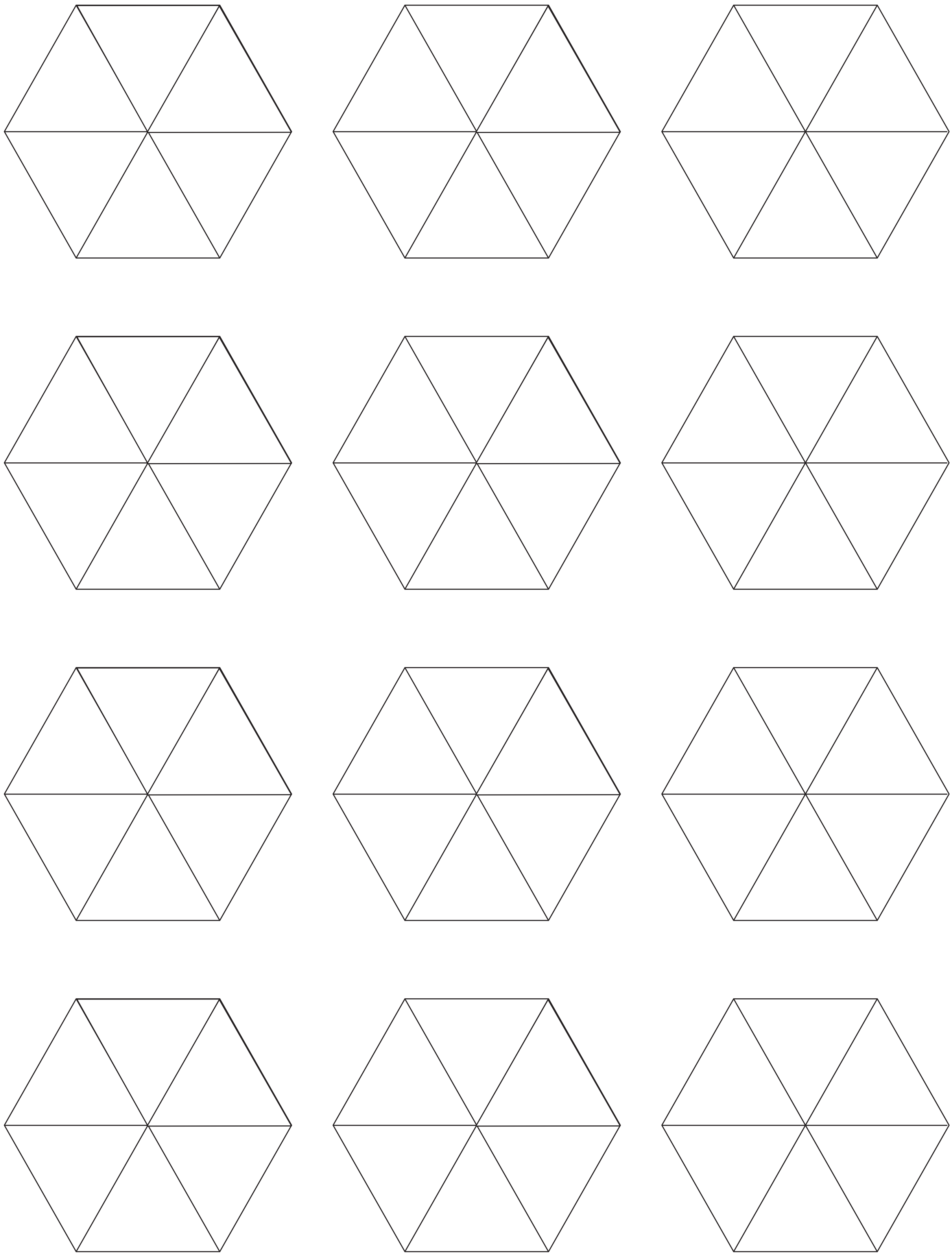
Term 2 Activity 9.1 Question 1



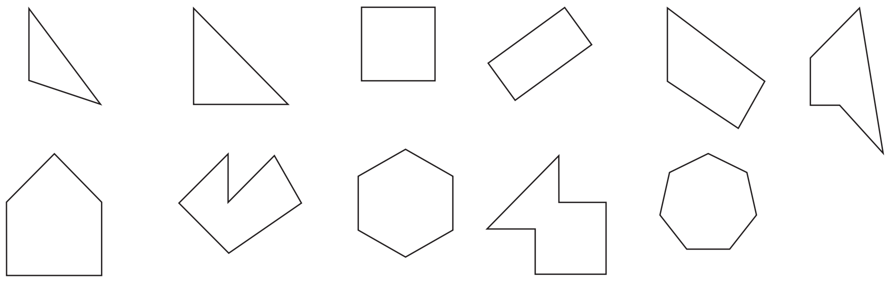
Term 2 Unit 6 Mental Maths



Term 2 Unit 2 Mental Maths



Term 2 Unit 31 Activity 31.2

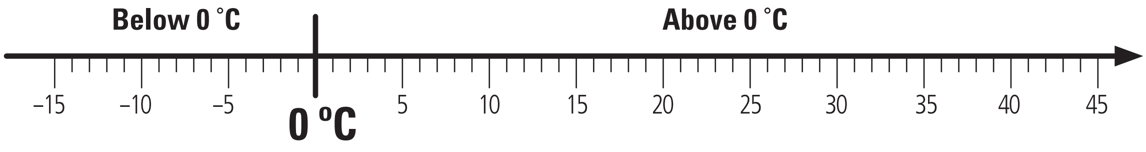


Term 2 Unit 38 Mental Maths

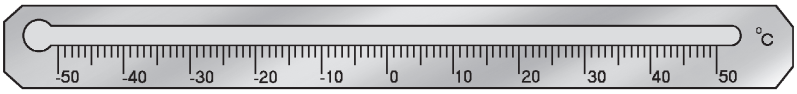
16 ÷ 4	25 ÷ 5
14 ÷ 7	28 ÷ 4
32 ÷ 4	70 ÷ 7
36 ÷ 3	32 ÷ 8
45 ÷ 5	18 ÷ 9
27 ÷ 9	64 ÷ 8
44 ÷ 4	24 ÷ 2

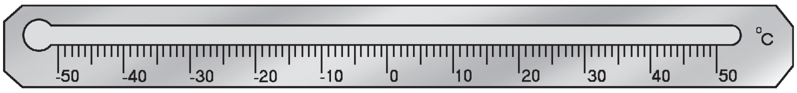
15 ÷ 3	36 ÷ 6
63 ÷ 9	4 ÷ 4
40 ÷ 4	0 ÷ 8
24 ÷ 4	63 ÷ 7
9 ÷ 9	21 ÷ 7
0 ÷ 3	66 ÷ 6

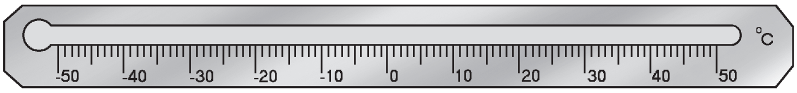
Term 3 Unit 25 Activity 25.2

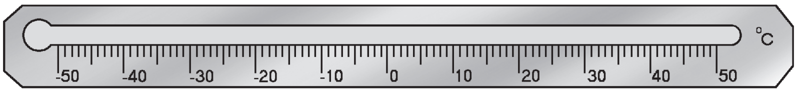


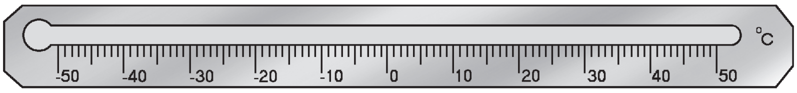
Term 3 Unit 25 Activity 25.2

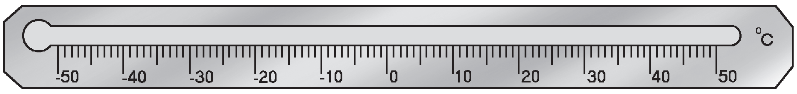












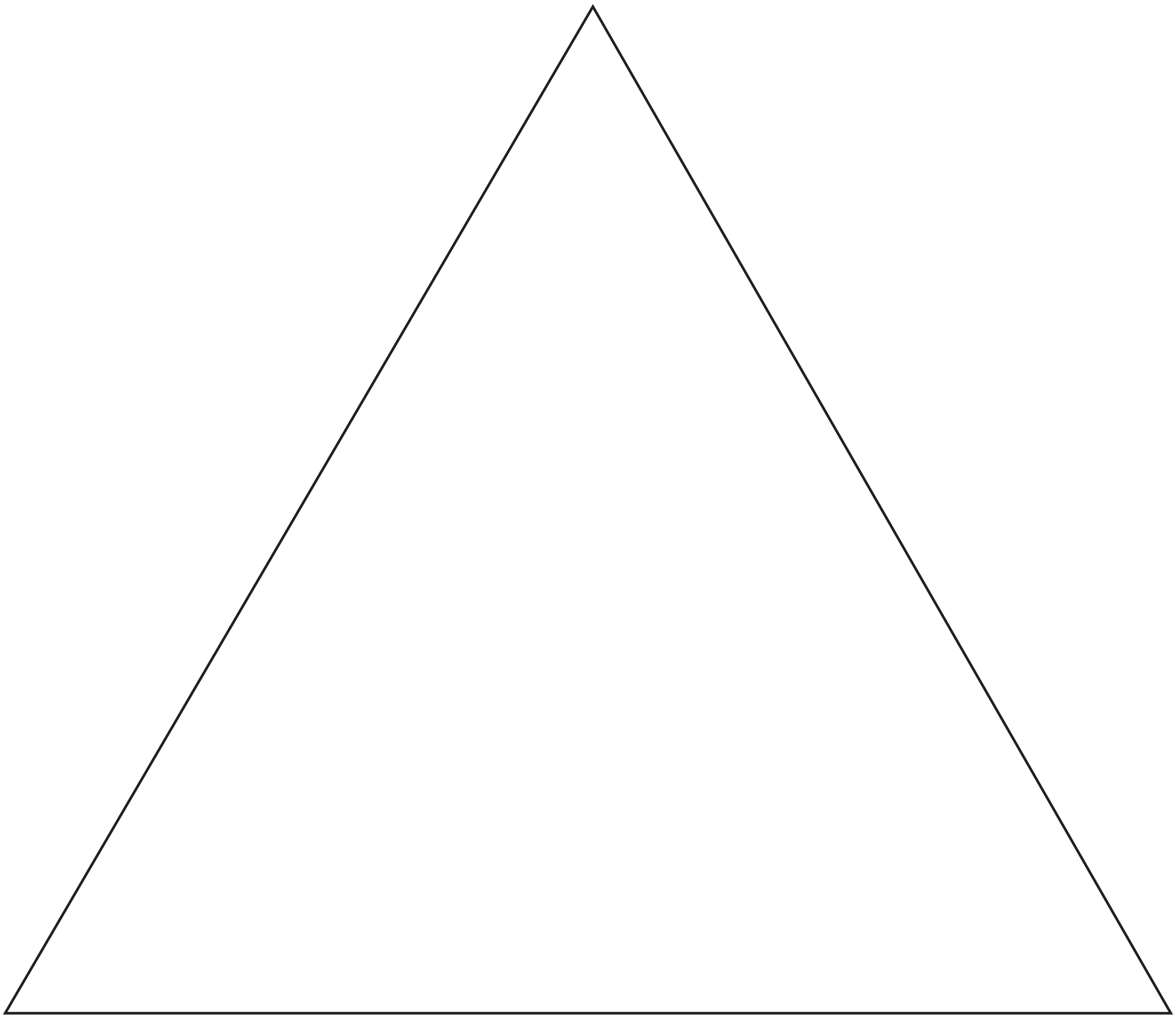
Term 1 Unit 2 Mental Maths – Flard Cards

10000	1000
20000	2000
30000	3000
40000	4000
50000	5000
60000	6000
70000	7000
80000	8000
90000	9000

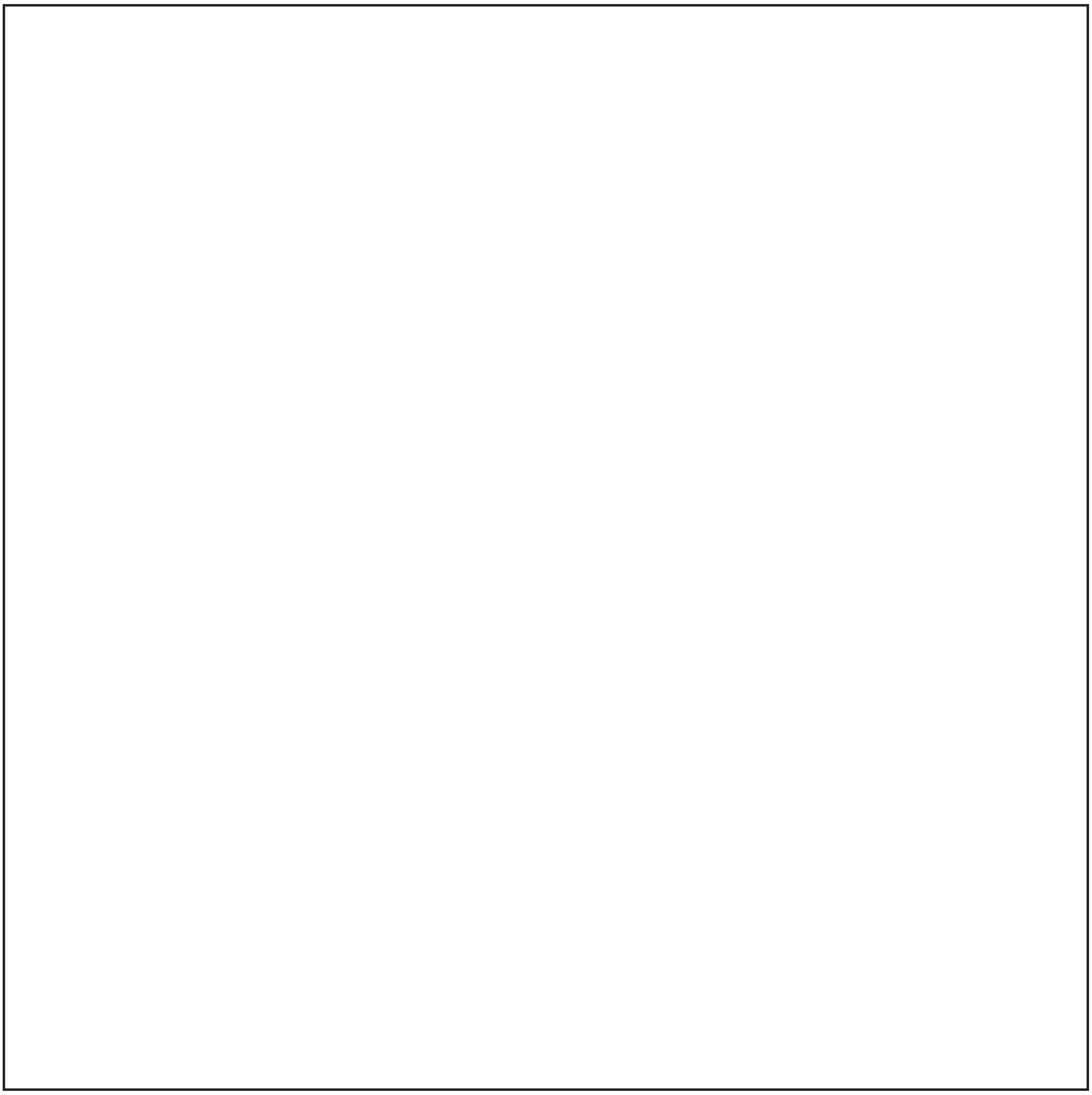
Flard Cards

100	10	1
200	20	2
300	30	3
400	40	4
500	50	5
600	60	6
700	70	7
800	80	8
900	90	9

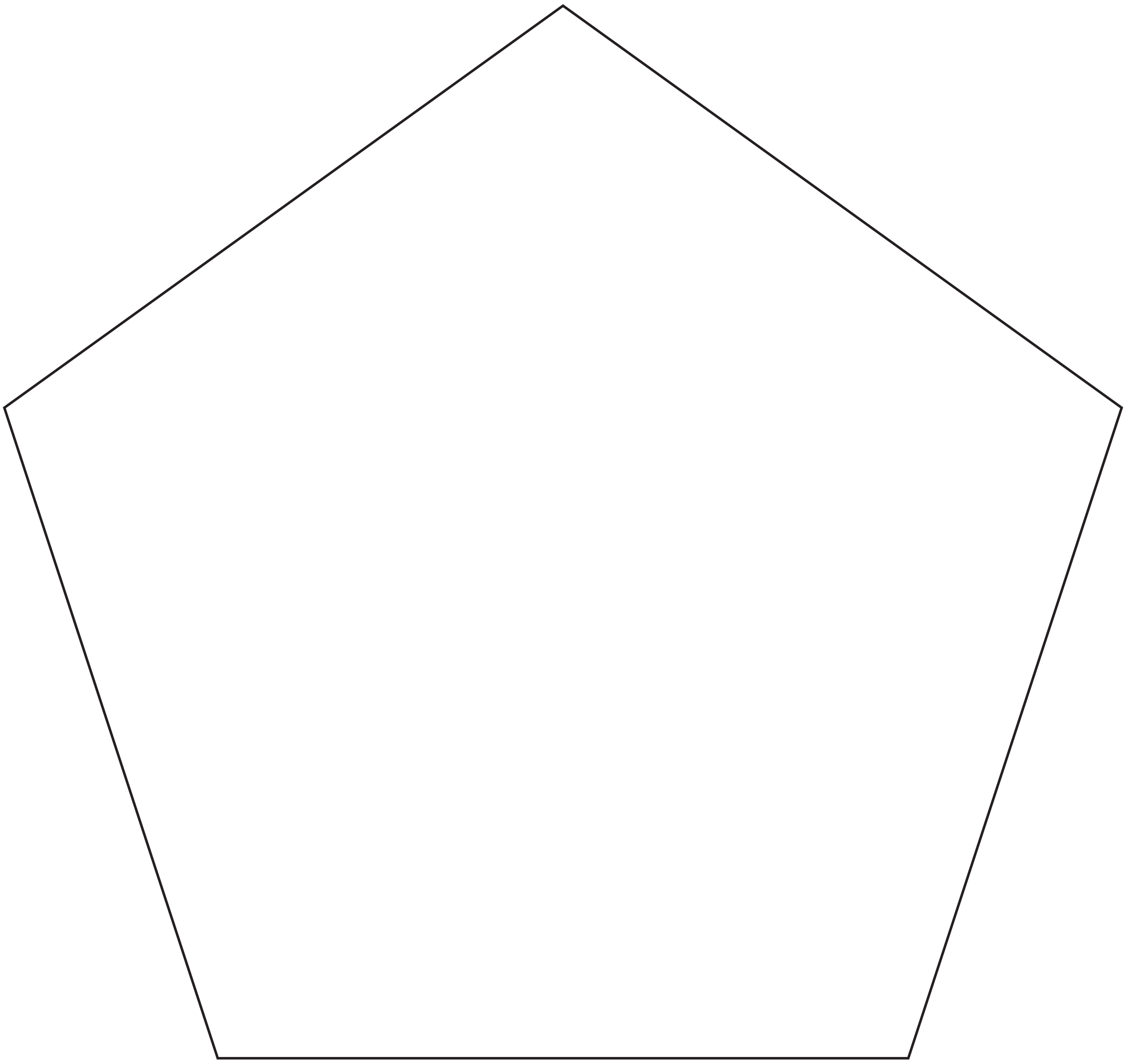
Equilateral triangle



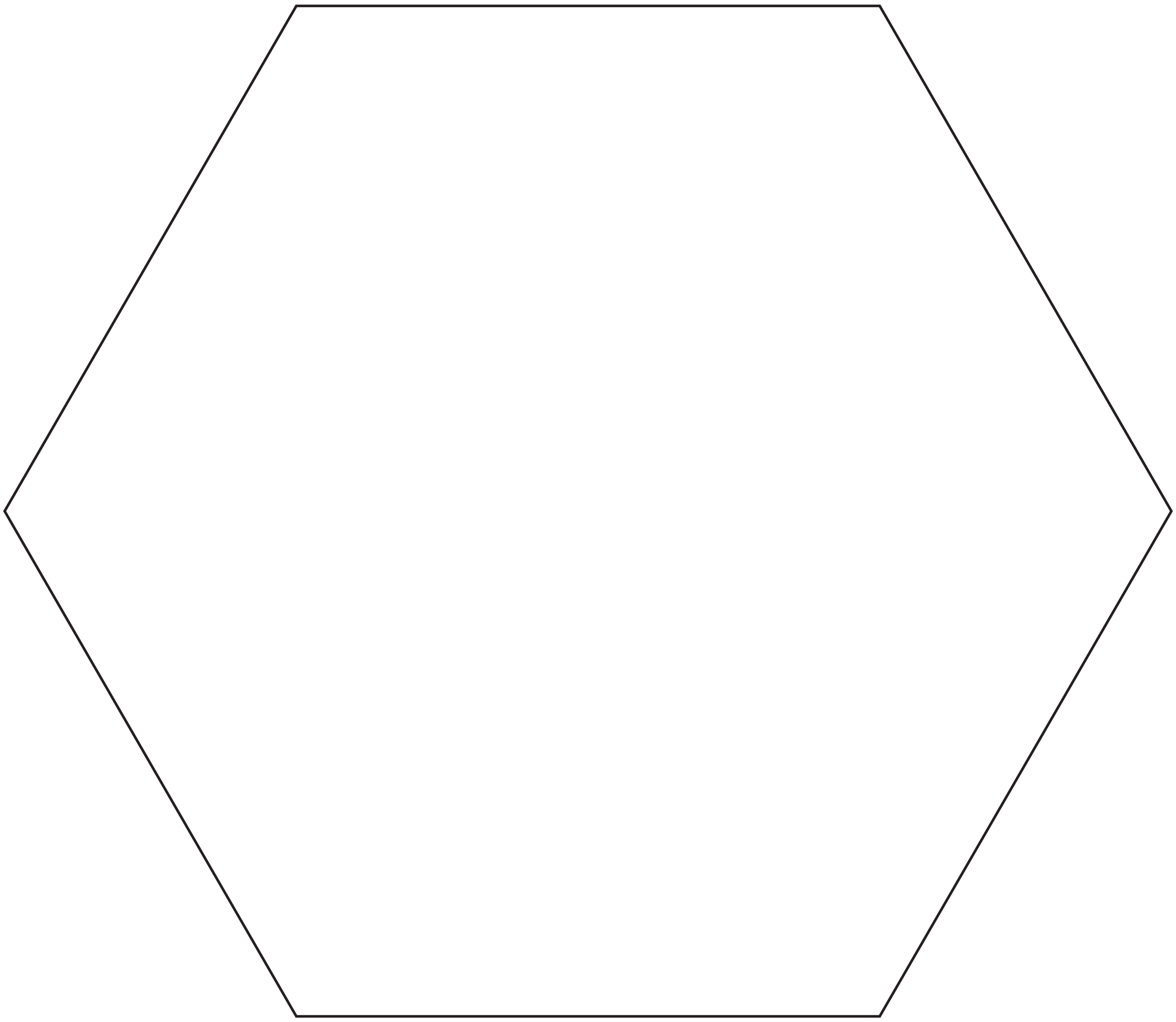
Square



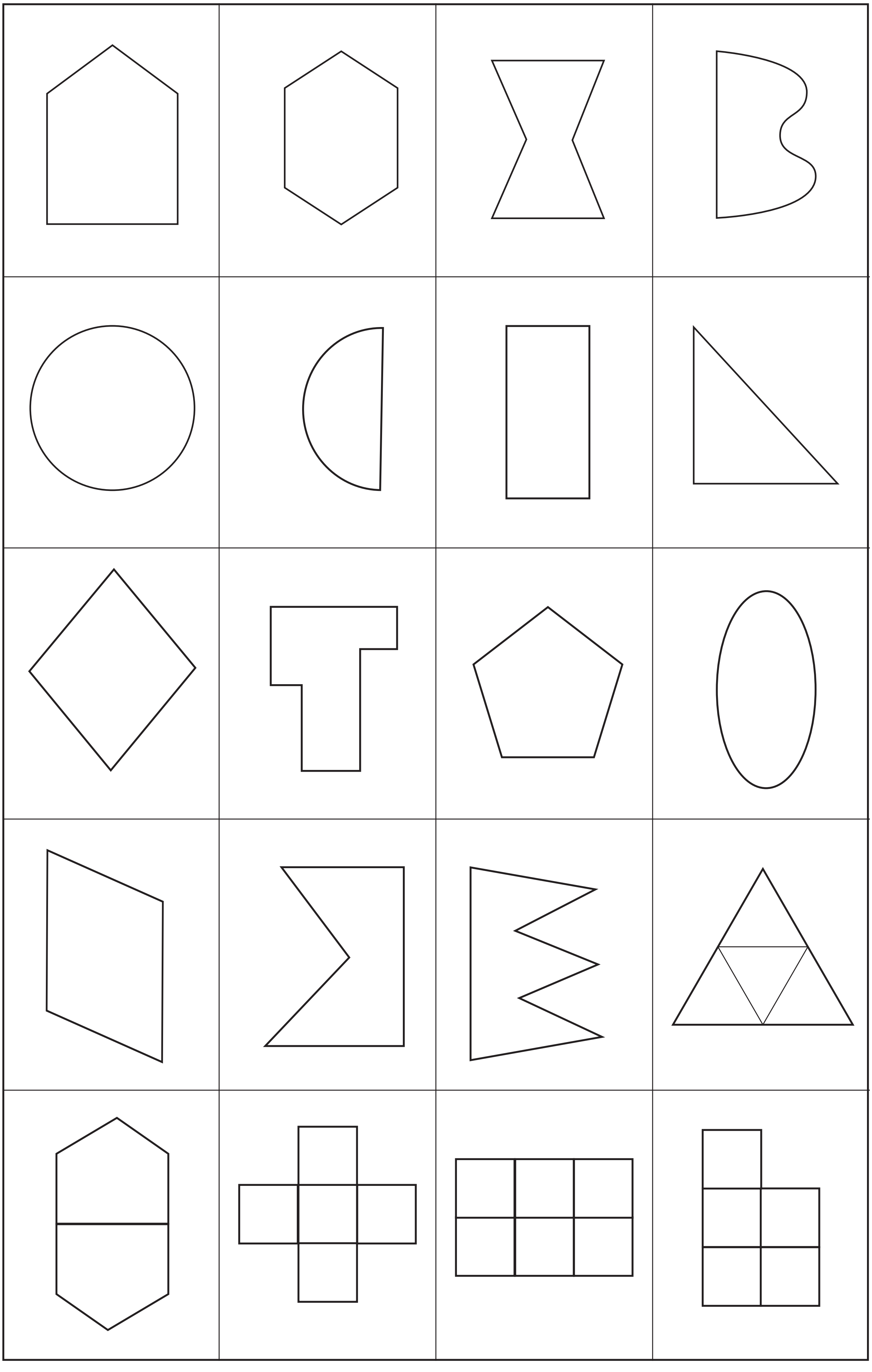
Regular pentagon



Regular hexagon



Term 3 Unit 20 Activity 20.1



circle

semi-circle

quadrilateral

square

rectangle

pentagon

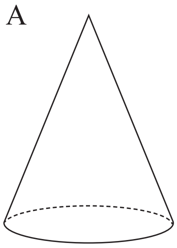
hexagon

heptagon

Term 1 Unit 24 Activity 24.2

24-hour	1 + 12 = 13 13:00	15:40		21:10		11:00		16:34	
12-hour	1: 00 p.m.	15 − 12 = 3 3:40 p.m.	11:30 a.m.		10:40 p.m.		6:45 p.m.		00:12 a.m.

Term 4 Unit 6 Activity 6.1

A


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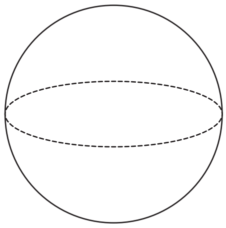

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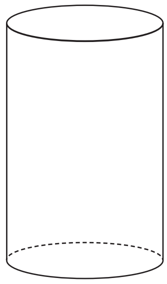

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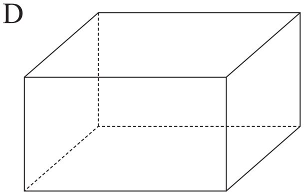

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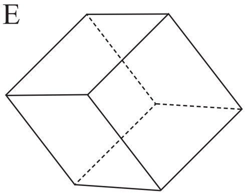

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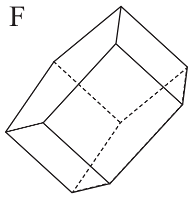

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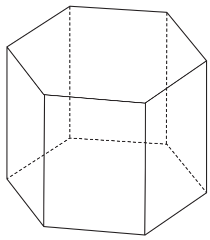

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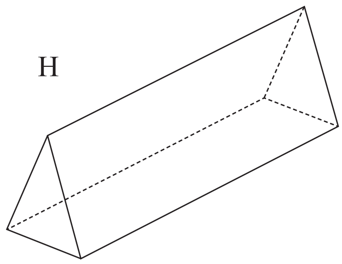

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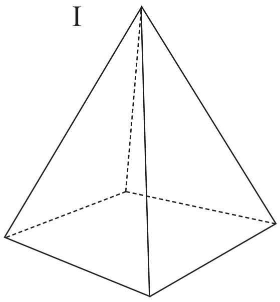

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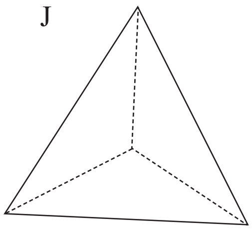

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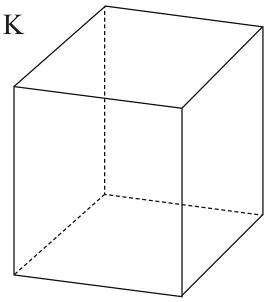

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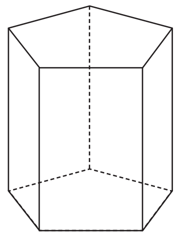

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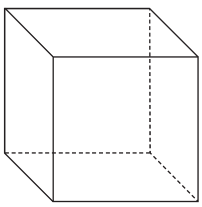

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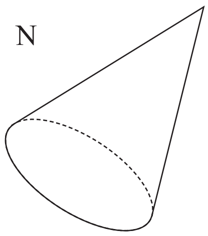

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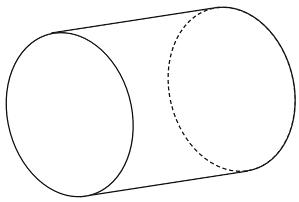

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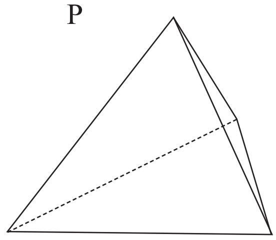

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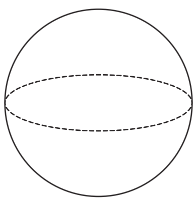

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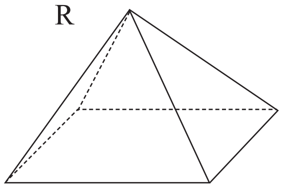

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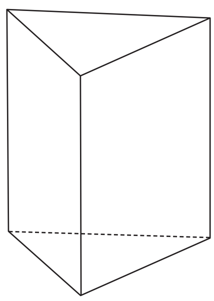

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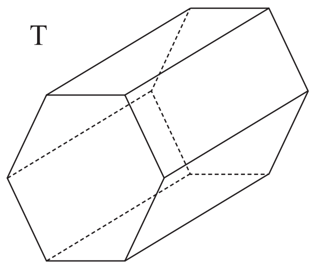

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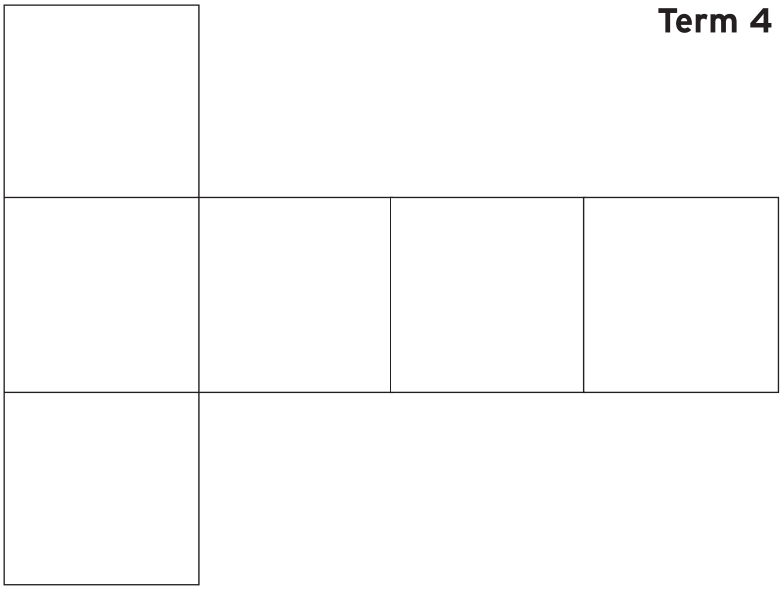

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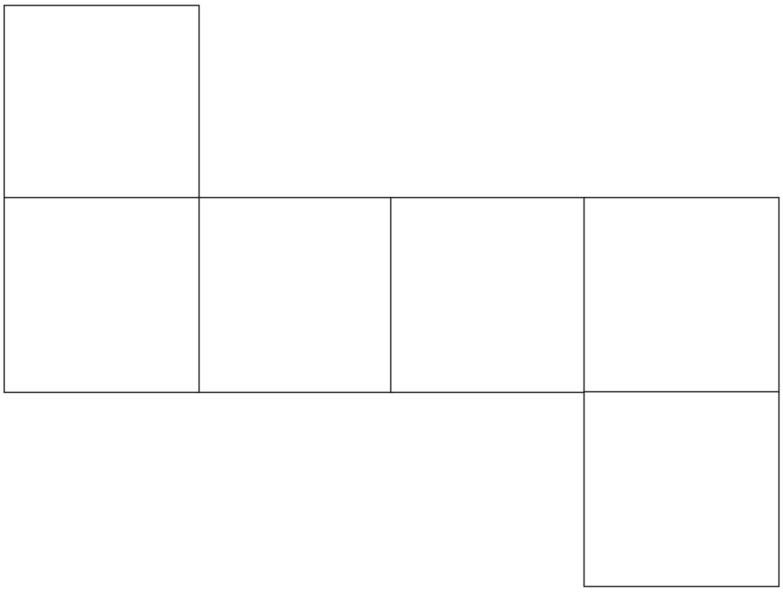

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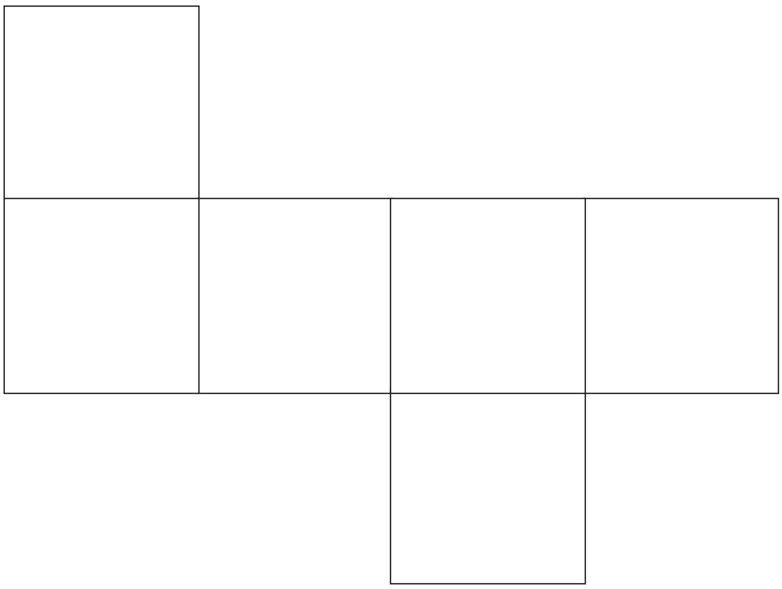

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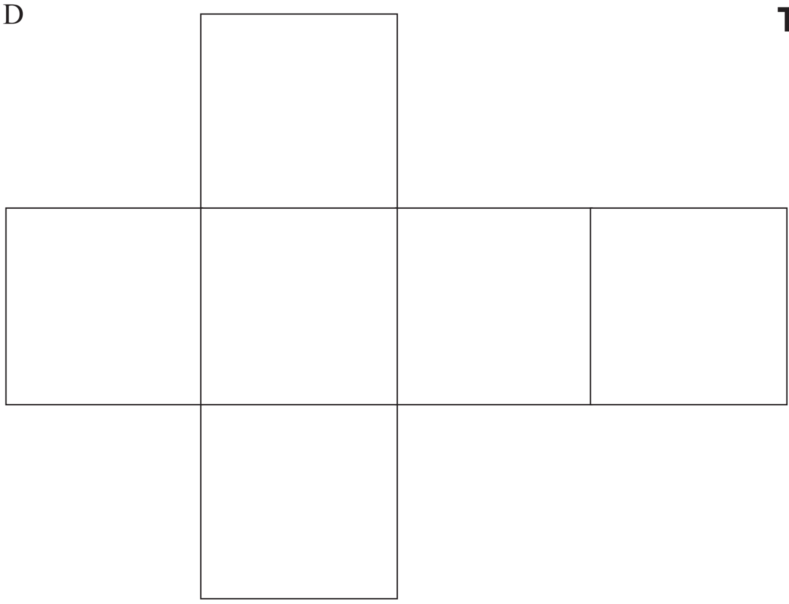

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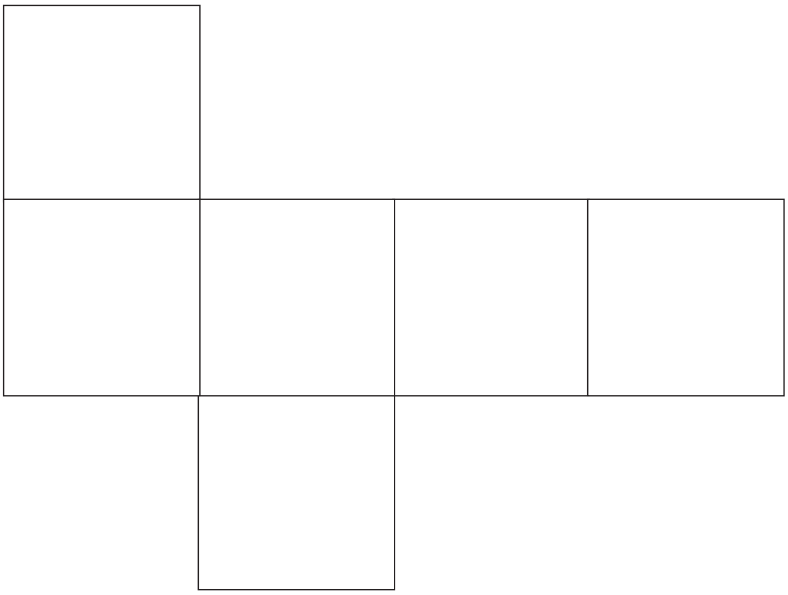

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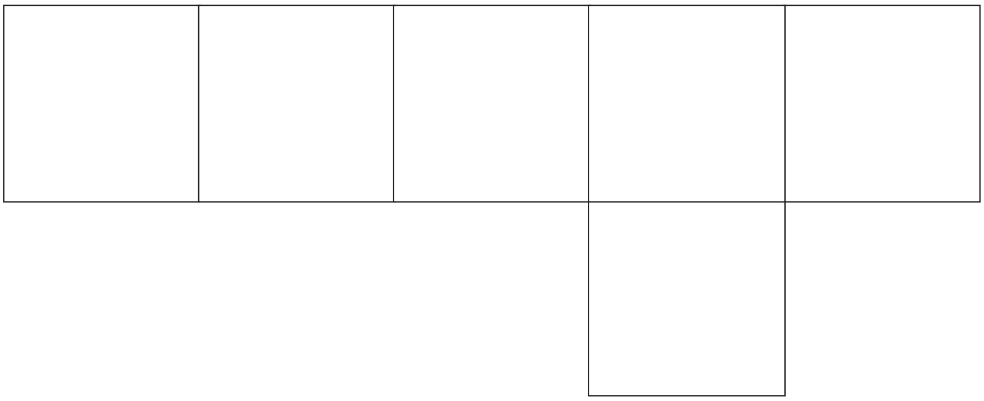
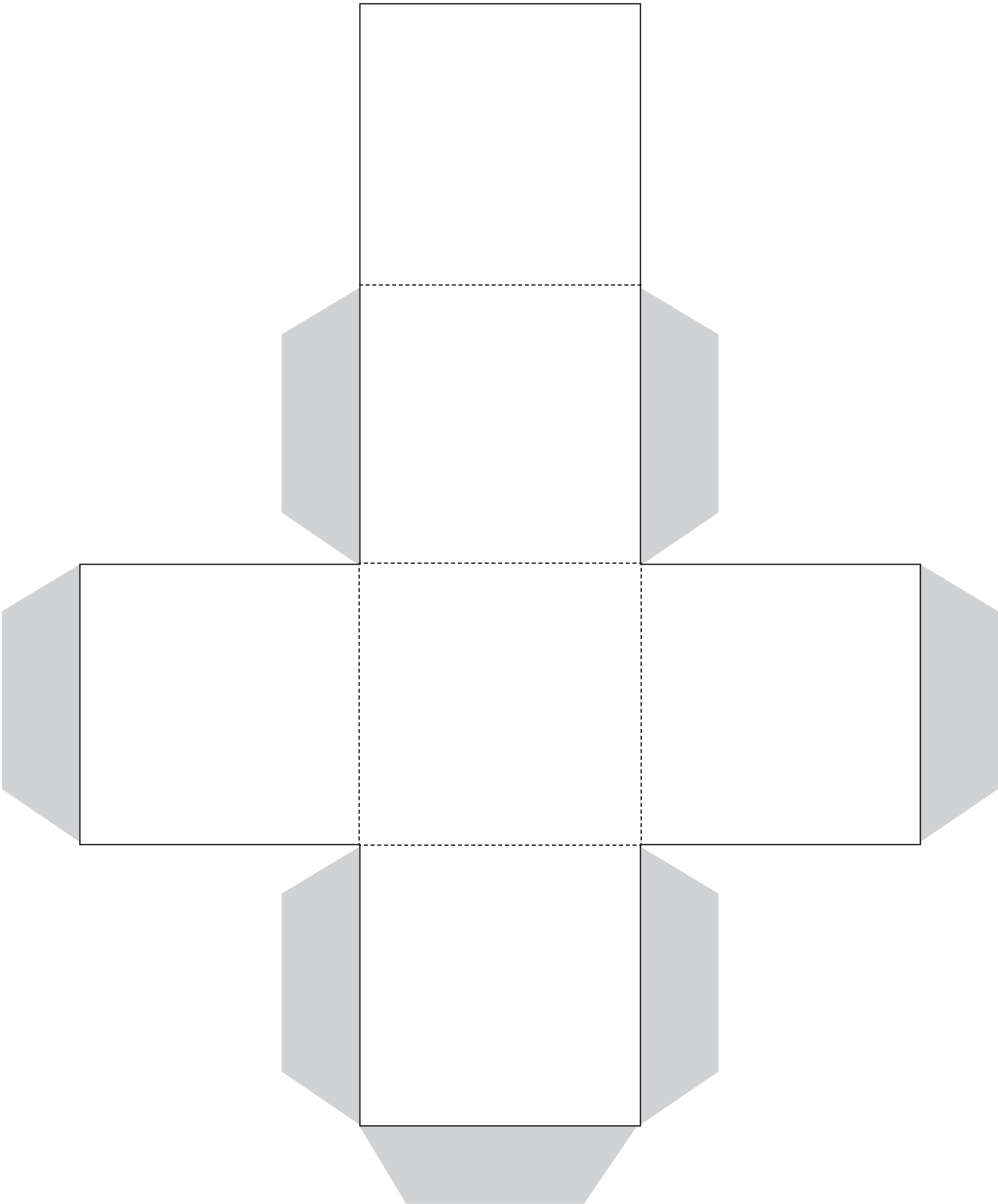
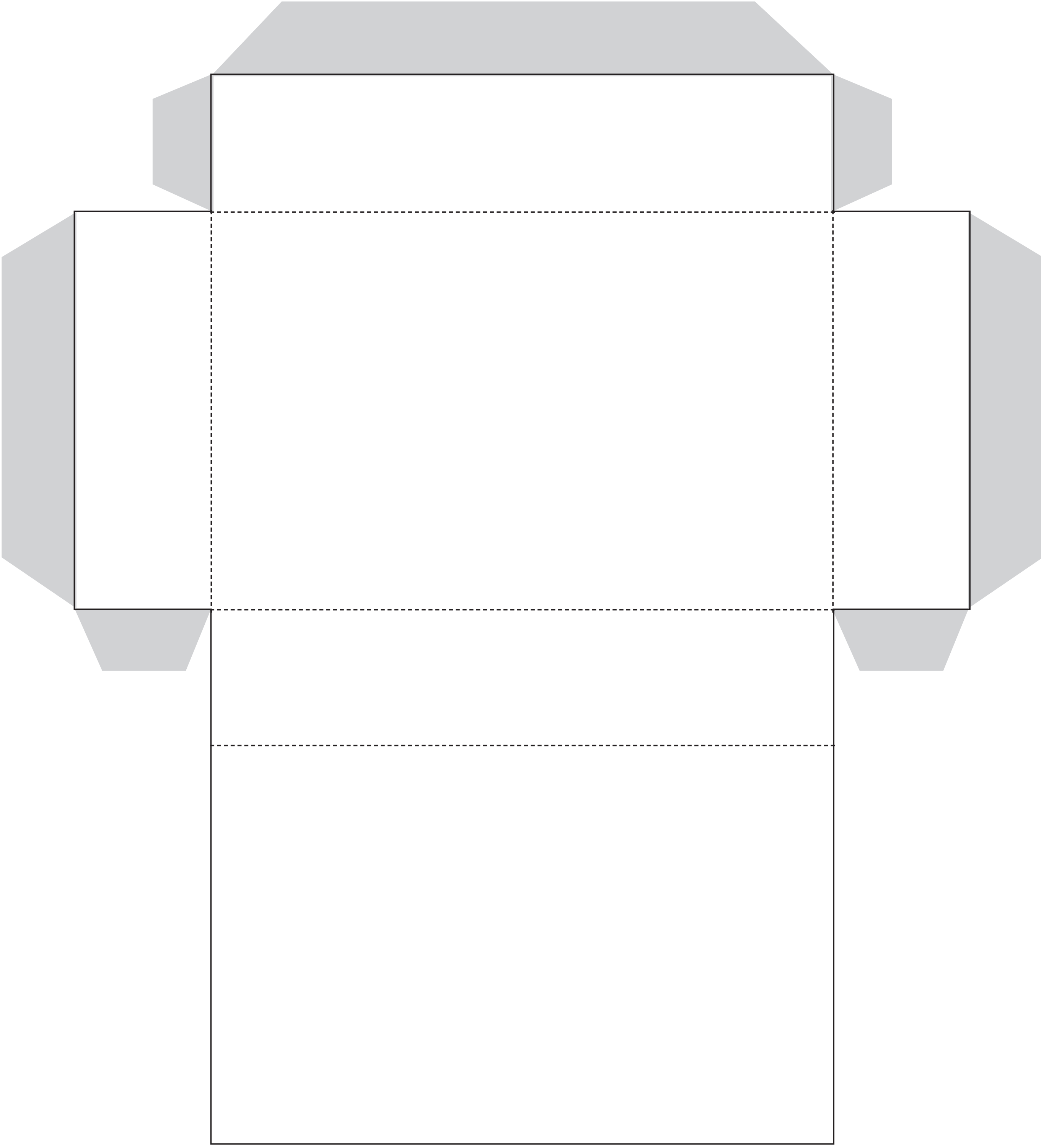


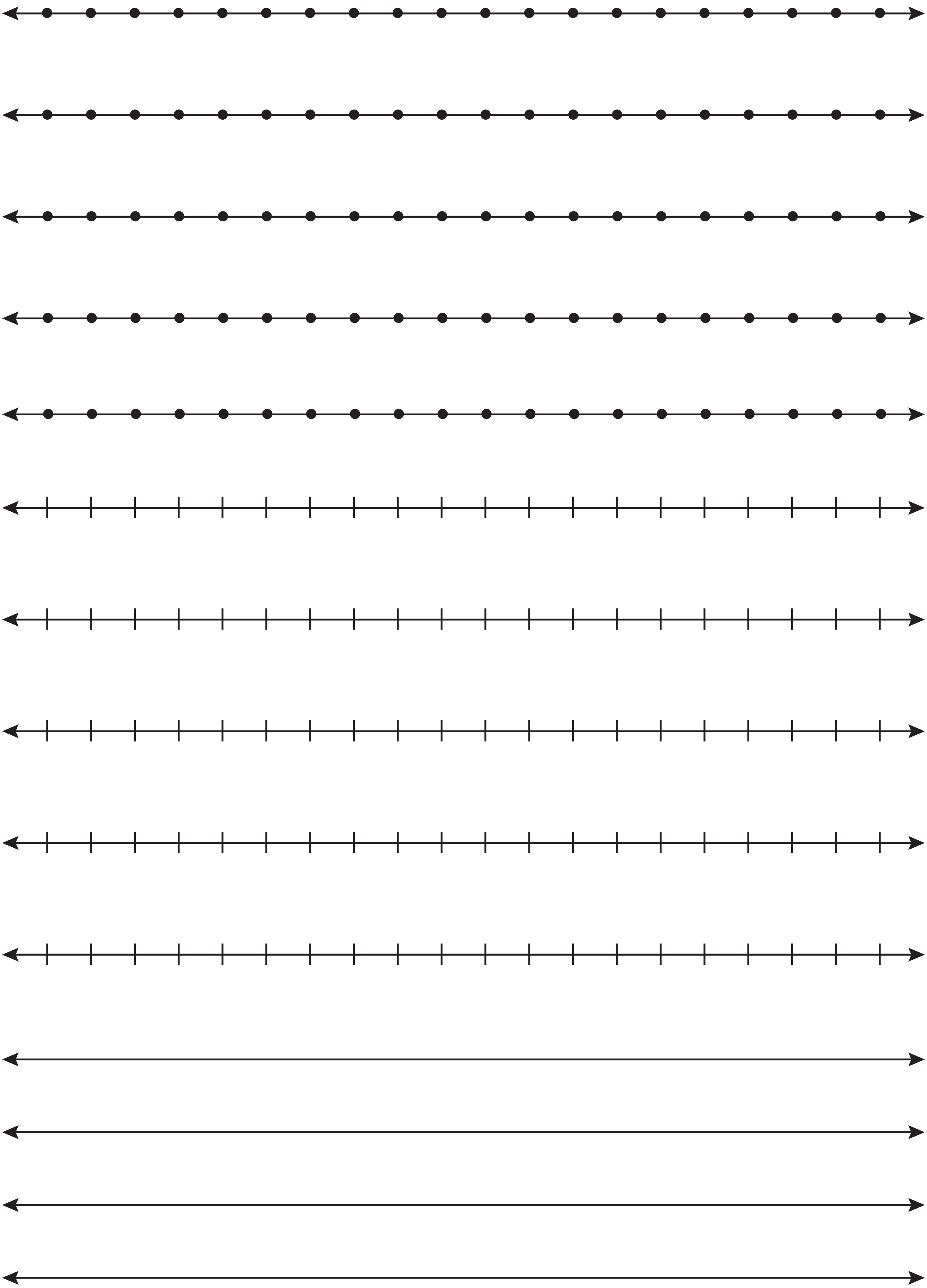
Term 4 Unit 7 Activity 7.1



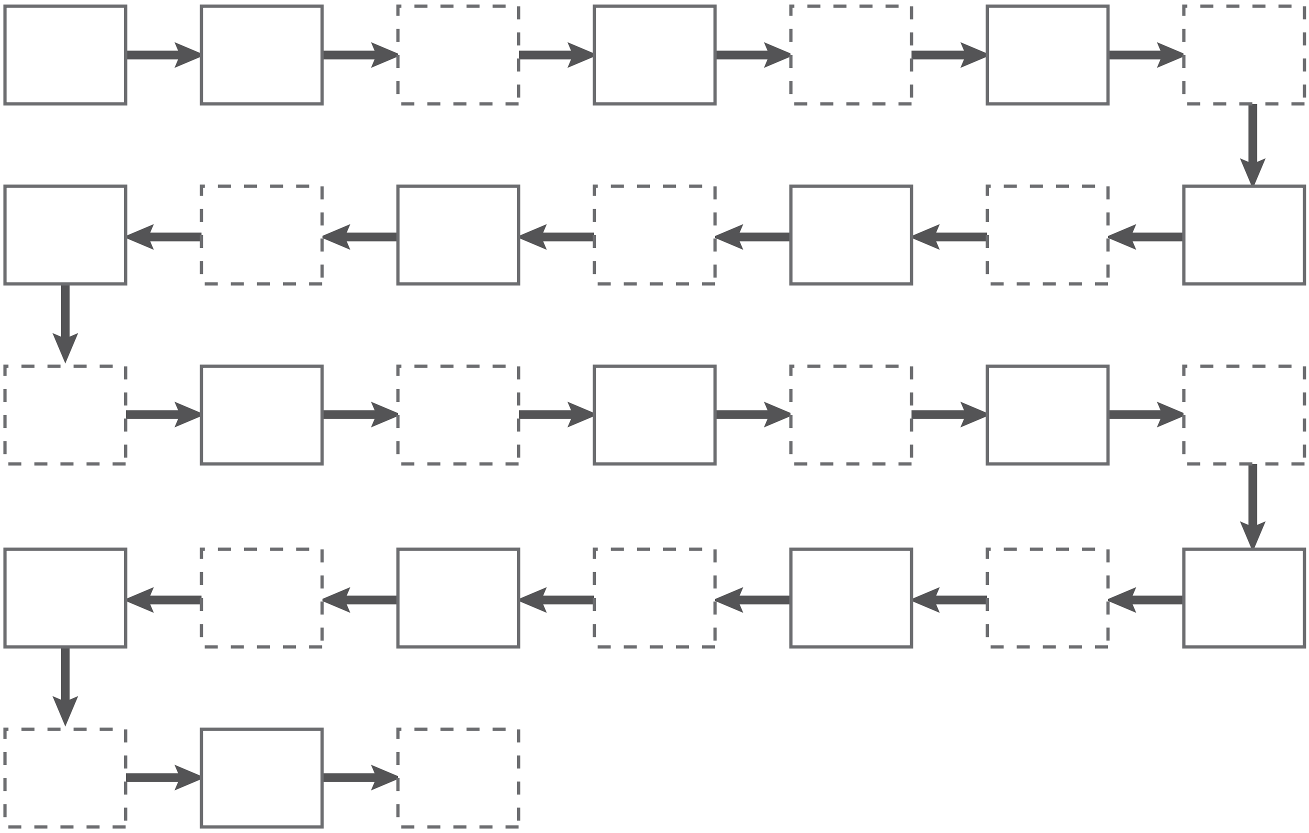
Term 4 Unit 7 Activity 7.1

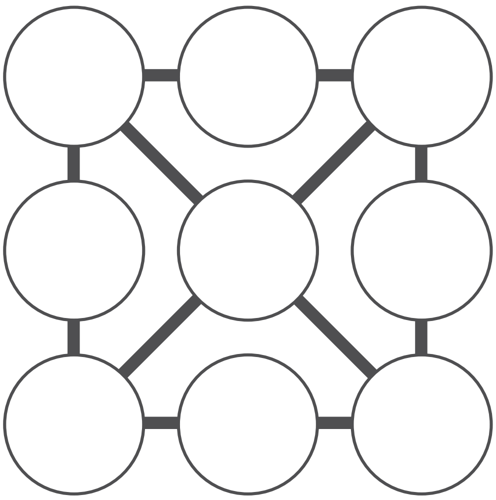


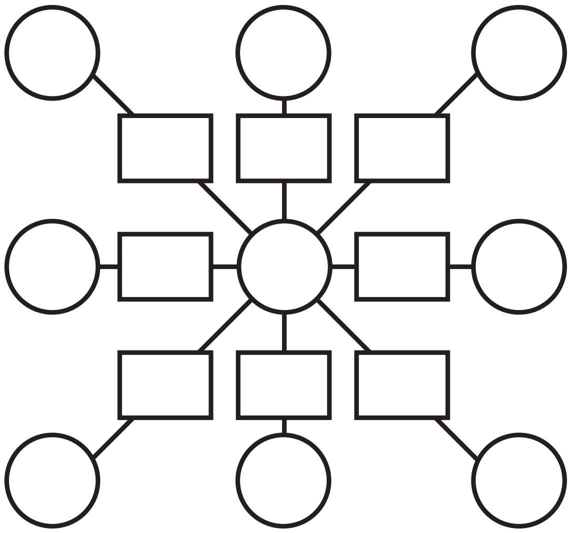
Number lines

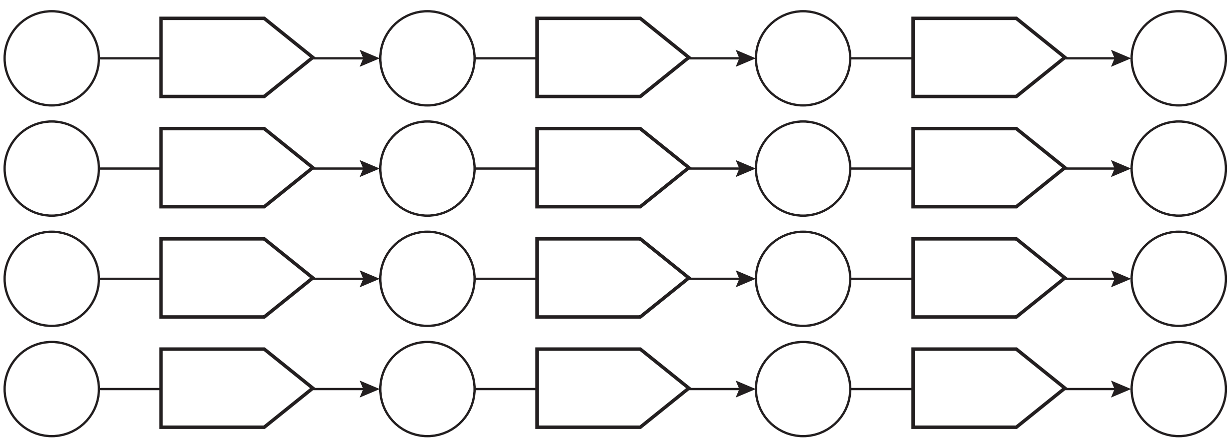


Number chains and calculation diagrams

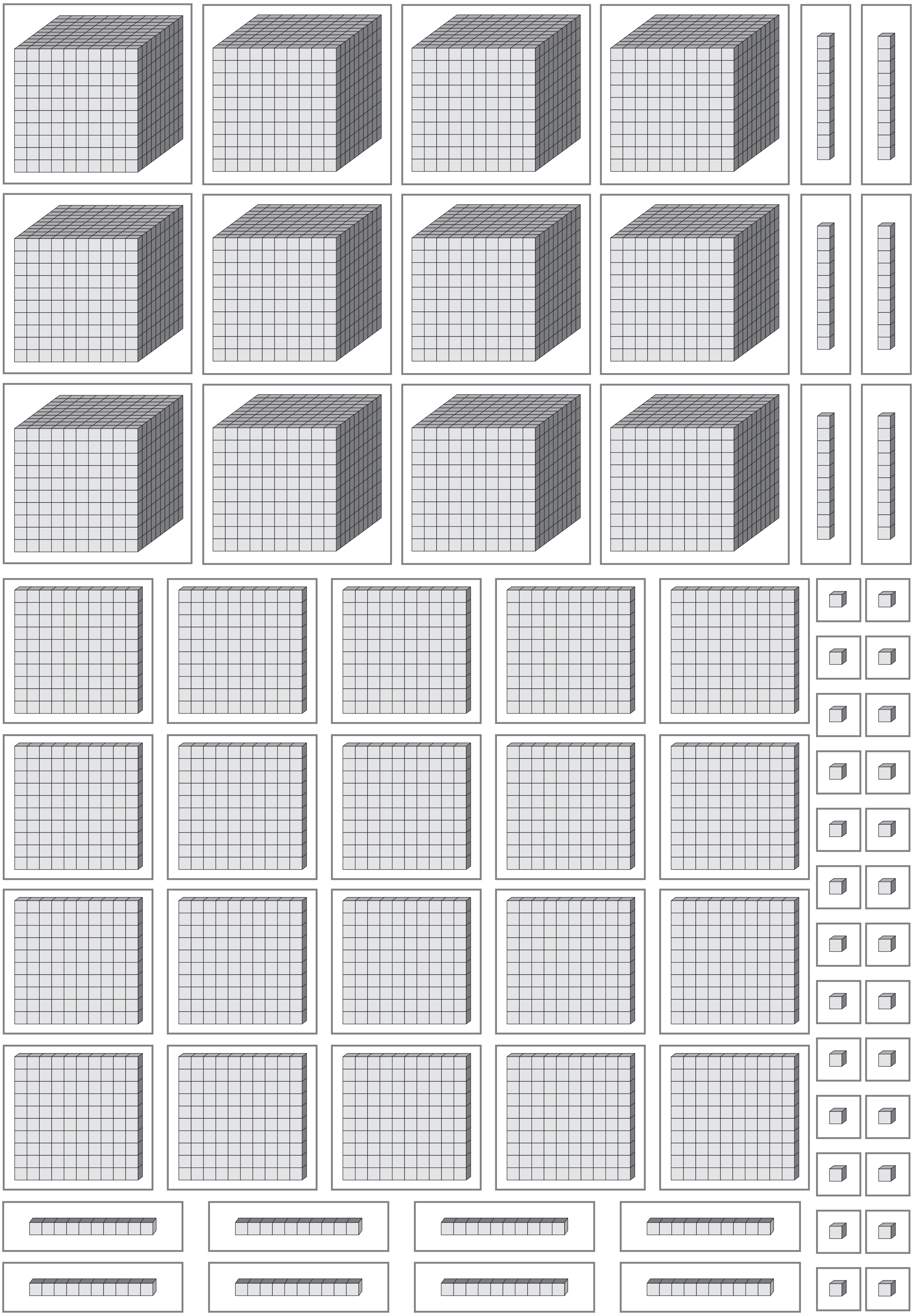








Dienes blocks



Number grid

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200

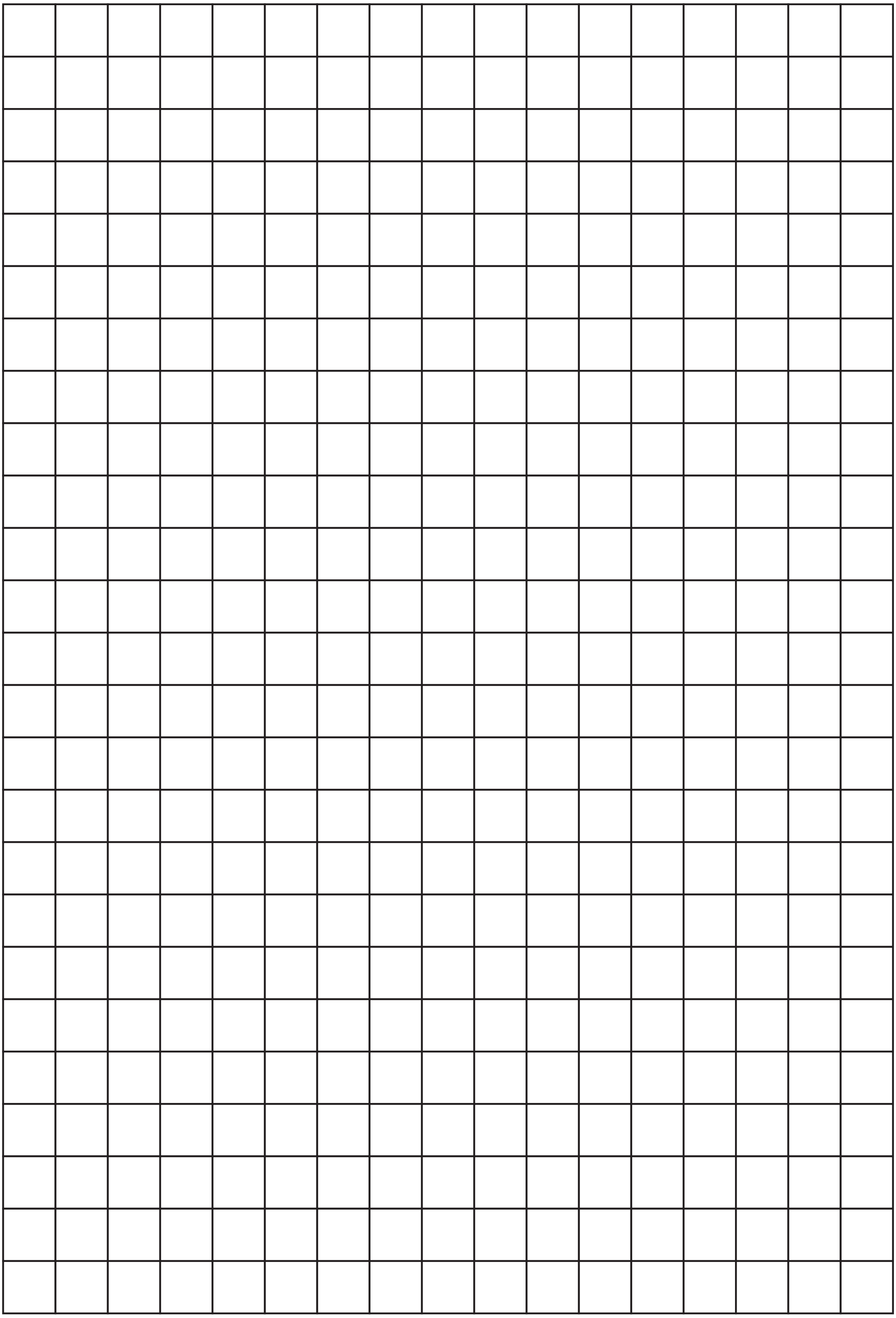
Number grids

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

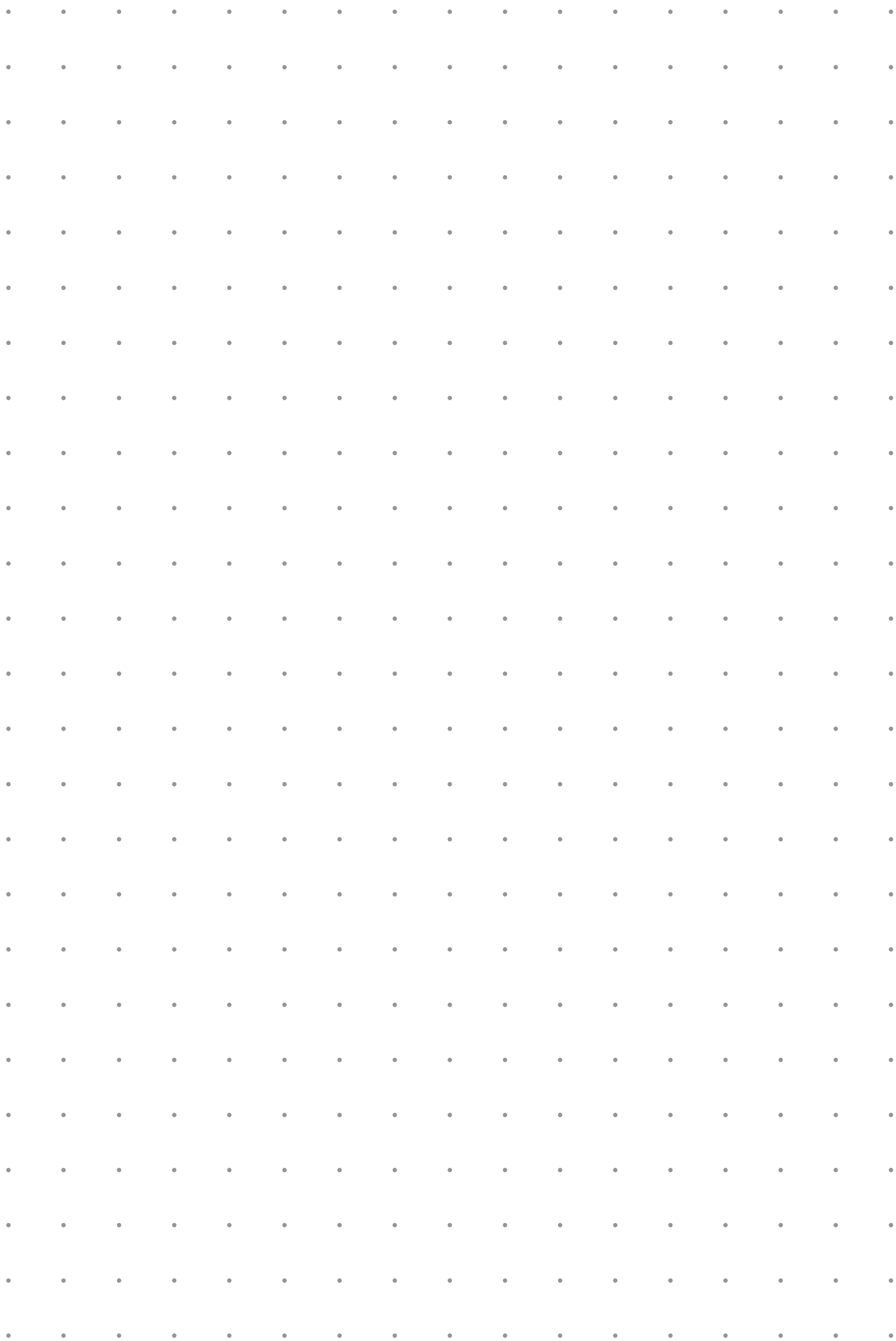
0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99
100	101	102	103	104	105	106	107	108	109

Square grid: 1 cm × 1 cm



Square grid: 2 cm × 2 cm

Square dotted grid



I have . . . (1)

Distribute the pack of cards in the class. If there are more cards than learners, give some learners each two cards. If there are too few cards, some learners can play in pairs and share a card. The first player reads his or her card. The learner who has the card with the answer, reads his or her card. The game continues until the chain ends with the first player answering the last question.

I have 0. Who has 19 more?	I have 19. Who has this plus 1 multiplied by 2?	I have 40. Who has 10 fewer?	I have 54. Who has this plus 6?	I have 10. Who has 17 more?	I have 14. Who has half of this multiplied by 3?	I have 21. Who has 10 more?	I have 30. Who has this divided by 6?	I have 27. Who has double this?	I have 5. Who has this plus 1, multiplied by 3?
I have 60. Who has this minus 15?	I have 45. Who has this plus 13?	I have 13. Who has double this?	I have 26. Who has 10 more?	I have 36. Who has half of this plus 6?	I have 24. Who has double this?	I have 48. Who has this minus 9?	I have 37. Who has 9 more?	I have 46. Who has 1 fewer divided by 5?	I have 18. Who has 2 more?
I have 20.Who has double this plus 1?	I have 41. Who as 2 fewer?	I have 39. Who has 5 fewer?	I have 34. Who has 1 more?	I have 35. Who has this minus 2?	I have 33. Who has twice as much?	I have 66. Who has this minus 60, plus 5?	I have 11. Who has 6 more?	I have 17. Who has 3 fewer?	I have 31. Who has this minus 1, divided by 3?
I have 8. Who has 4 more?	I have 12. Who has half of this?	I have 6. Who as 1 fewer, divided by 5?	I have 1. Who has this multiplied by 9?	I have 9. Who has this plus 3, divided by 4?	I have 3. Who has double this plus 4?	I have 10. Who has a dozen more?	I have 22. Who has this divided by 11?	I have 2. Who has this minus 2, multiplied by 6?	I have 9. Who has 87 more divided by 2?

I have . . . (2)

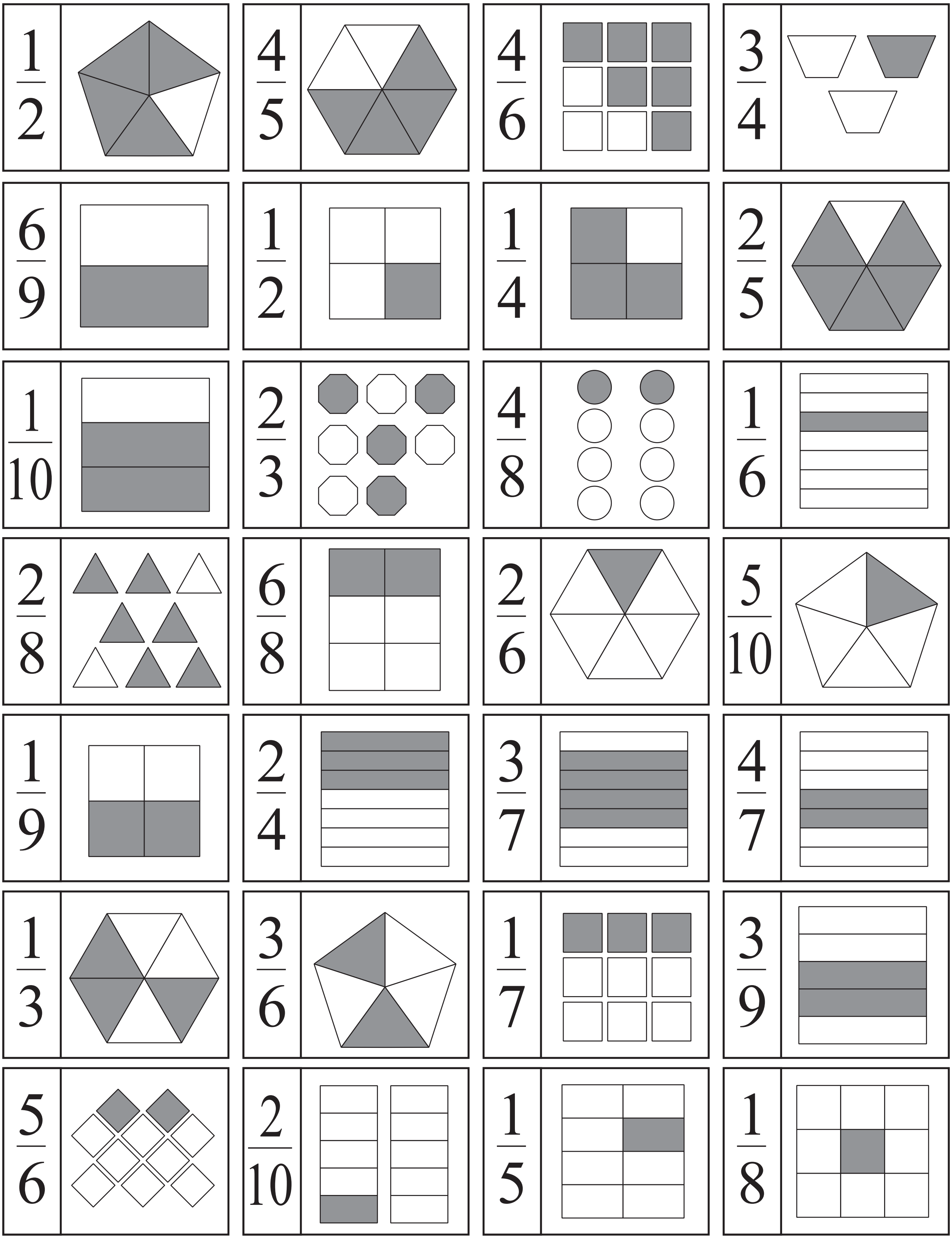
I have 8. Who has 4 more?	I have 12. Who has half of this?	I have 45. Who has 8 more?	I have 18. Who has 7 more?
I have 6.Who has 1 fewer, plus 5?	I have 10. Who has double this?	I have 53. Who has 7 fewer?	I have 51. Who has 2 fewer?
I have 20. Who has this, plus 3, minus 6?	I have 17. Who has this plus 10?	I have 46. Who has half of this plus 6?	I have 25. Who has double this plus 1?
I have 27. Who has 5 fewer?	I have 22. Who has double this?	I have 29. Who has 40 more?	I have 49. Who has 7 fewer?
I have 44. Who has this, plus 4?	I have 48. Who has half of this?	I have 69. Who has this minus 10?	I have 140. Who has this minus 50?
I have 24. Who has this minus 8?	I have 16. Who has 9 fewer?	I have 59. Who has 11 more?	I have 90. Who has this minus 15?
I have 7. Who has this plus 8?	I have 15. Who has double this minus 12?	I have 70. Who has double this?	I have 75. Who has 40 fewer?
I have 42. Who has 20 more?	I have 50. Who has twice as much?	I have 62. Who has this minus 12?	I have 100. Who has this, minus 60, plus 5?
I have 35. Who has this minus 12?	I have 23. Who has 9 fewer?	I have 14. Who has double this?	I have 28. Who has 9 fewer?
I have 19. Who has this minus 10?	I have 9. Who has 4 more?	I have 13. Who has double this?	I have 26. Who has half of this minus 5?

Fraction snap

$\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$\frac{3}{4}$
$1\frac{2}{3}$	$\frac{1}{3}$	$\frac{2}{4}$	$1\frac{2}{4}$
$\frac{2}{2}$	$\frac{3}{3}$	$1\frac{2}{6}$	$1\frac{4}{6}$
$\frac{4}{4}$	$\frac{5}{5}$	$1\frac{3}{5}$	$\frac{2}{5}$
$1\frac{3}{6}$	$\frac{3}{6}$	$1\frac{3}{8}$	$\frac{5}{8}$
$1\frac{1}{7}$	$\frac{6}{7}$	$1\frac{7}{10}$	$\frac{3}{10}$

Fraction dominoes: Enlarge and copy onto stiff card

This game is for two, three, four or more players. Play it like dominoes that you play with 28 cards. Each players gets the same number of cards (seven each if there are four players). The player who has two-sevenths starts playing. The next player has to match the fraction symbol four-fifths to the diagram next to two-sevenths. If the next player does not have the matching card, he or she knocks and loses a round. The first player who has played all his or her cards, wins. The rest of the players continue playing until they have played all their cards.



Mental maths grid

Mental calculations							
Name:							
	Task 1	**Task 2**	**Task 3**	**Task 4**	**Task 5**	**Task 6**	**Task 7**
Number							
Shade the blocks below to show your progress.							
10							
9							
8							
7							
6							
5							
4							
3							
2							
1							

Reflection

What do I do well?

....

....

....

What can I do better next time?

....

....

....

Grade 5

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