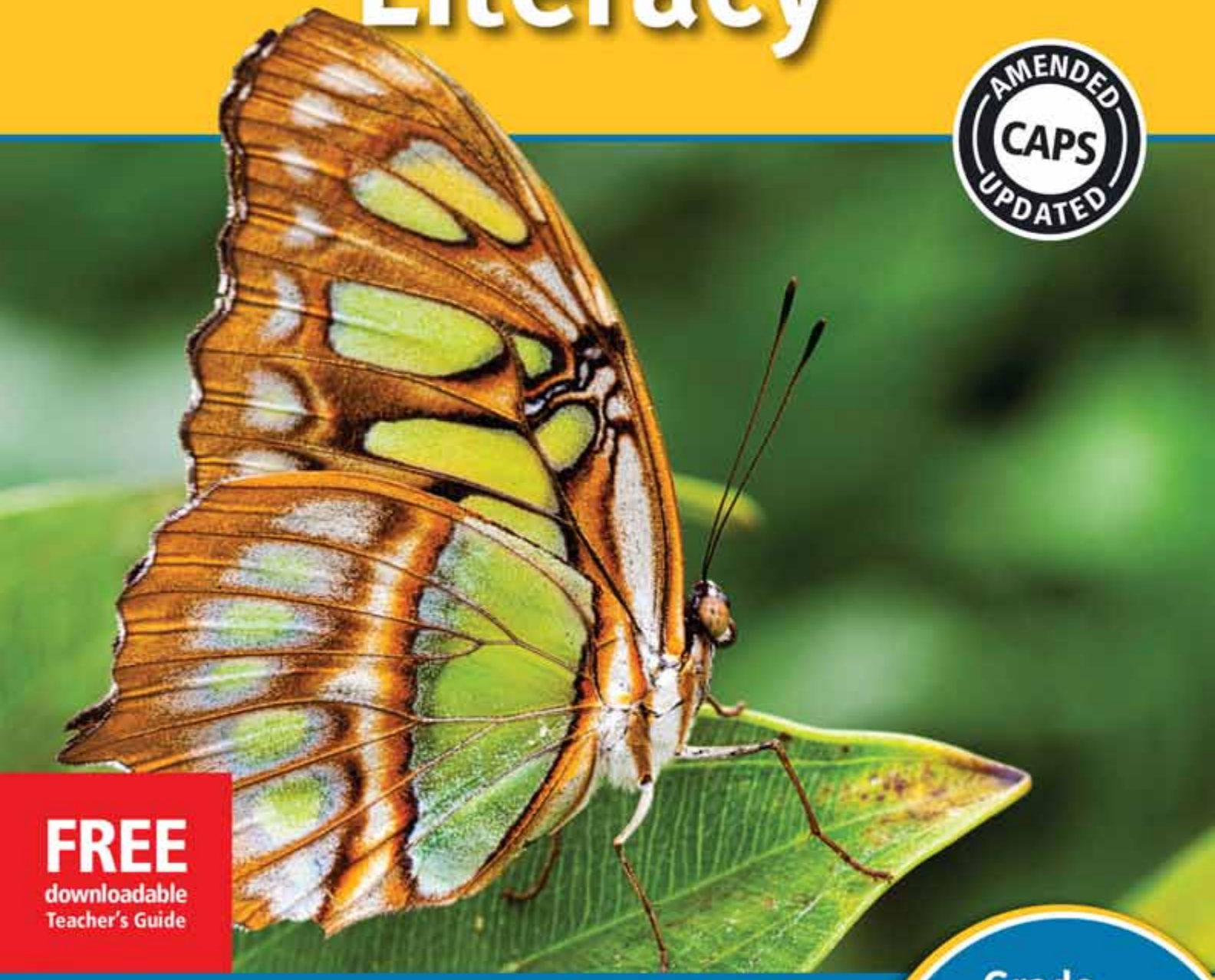
Study & Master

Mathematical Literacy



AMENDED CAPS UPDATED

FREE downloadable Teacher's Guide

Teacher's Guide

Grade 11

Karen Morrison • Karen Press

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SECTION 1

INTRODUCTION

Study & Master Mathematical Literacy Grade 11 is based on the Curriculum and Assessment Policy Statement (CAPS) issued by the Department of Basic Education in December 2011. The CAPS is an amended version of the National Curriculum Statement Grades R–12, and replaces the 2002 National Curriculum Statement Grades R–9 and the 2004 National Curriculum Statement Grades 10–12.

The general aims of the South African curriculum as stated in the CAPS:

a) The National Curriculum Statement Grades R–12 gives expression to what are regarded to be knowledge, skills and values worth learning. It will ensure that learners acquire and apply knowledge and skills in ways that are meaningful to their lives. In this regard, the curriculum promotes the idea of grounding knowledge in local contexts, while being sensitive to global imperatives.

b) The National Curriculum Statement Grades R–12 serves the purposes of:
- equipping learners, irrespective of their socio-economic background, gender, physical ability or intellectual ability, with the knowledge, skills and values necessary for self-fulfilment, and meaningful participation in society as citizens of a free country
- providing access to higher education
- facilitating the transition of learners from education institutions to the workplace
- providing employers with a sufficient profile of a learner's competences.

c) The National Curriculum Statement Grades R–12 is based on the following principles:
- social transformation: ensuring that the educational imbalances of the past are redressed, and that equal educational opportunities are provided for all sections of our population
- active and critical learning: encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths
- high knowledge and high skills: the minimum standards of knowledge and skills to be achieved at each grade are specified and set high, achievable standards in all subjects
- progression: content and context of each grade show progression from simple to complex
- human rights, inclusivity, environmental and social justice: infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa.

d) The National Curriculum Statement Grades 10–12 (General) is sensitive to issues of diversity such as poverty, inequality, race, gender, language, age, disability and other factors:
- valuing indigenous knowledge systems: acknowledging the rich history and heritage of this country as important contributors to nurturing the values contained in the constitution

- credibility, quality and efficiency: providing an education that is comparable in quality, breadth and depth to those of other countries.

e) The National Curriculum Statement Grades R–12 aims to produce learners who are able to:
- identify and solve problems and make decisions using critical and creative thinking
- work effectively as individuals and with others as members of a team
- organise and manage themselves and their activities responsibly and effectively
- collect, analyse, organise and critically evaluate information
- communicate effectively using visual, symbolic and/or language skills in various modes
- use science and technology effectively and critically showing responsibility towards the environment and the health of others
- demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation.

f) Inclusivity should become a central part of the organisation, planning and teaching at each school. This can only happen if all teachers have a sound understanding of how to recognise and address barriers to learning, and how to plan for diversity.

Time allocation: Grades 10–12

The instructional time allocation in Grades 10–12 is as follows:

Subject	Time allocation per week (hours)
I. Home Language	4,5
II. First Additional Language	4,5
III. Mathematics and Mathematical Literacy	4,5
IV. Life Orientation	2
V. Three electives	12 (3 × 4 h)

The CAPS states that 'the allocated time per week may be utilised only for the minimum required NCS subjects as specified above, and may not be used for any additional subjects added to the list of minimum subjects. Should a learner wish to offer additional subjects, additional time must be allocated for the offering of these subjects'.

What is Mathematical Literacy?

Mathematical literacy can be defined as 'an individual's capacity to use mathematics as a fully functioning member of a society' (Ball and Stacey, University of Melbourne).

The CAPS document identifies the following five key elements of the subject Mathematical Literacy:
- the use of elementary mathematical content
- real-life contexts
- solving familiar and unfamiliar problems
- decision-making and communication
- the use of integrated content and/or skills in solving problems.

In other words, the subject Mathematical Literacy aims to produce learners who have:

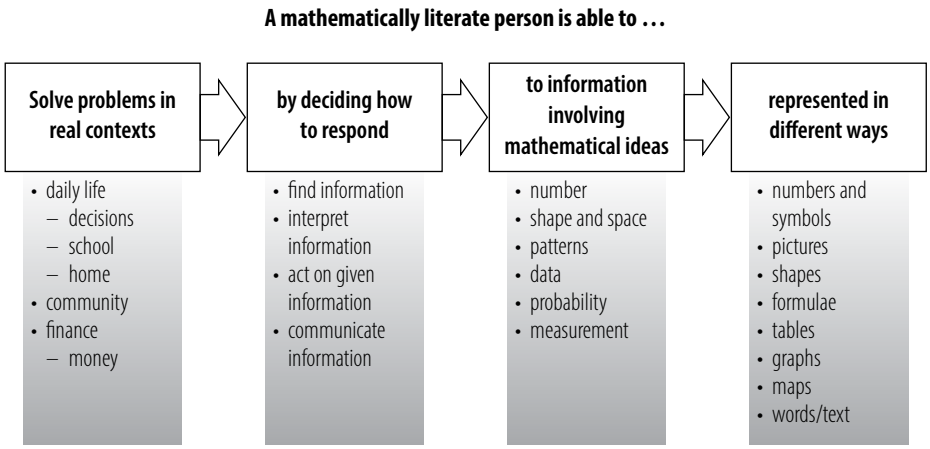
- a sense of self-worth and who are able to control aspects of their life related to mathematical understanding
- the skills and understanding to play a responsible role in our society
- the ability to calculate, estimate and use measuring instruments
- developed strategies and decision-making skills that allow them to be innovative and flexible in their approach to solving problems
- the ability to communicate results and explanations and the skills to work effectively and collaboratively with others
- the ability to draw sensible conclusions from information presented graphically and apply skills in data-handling and interpretation.

What does it mean to be mathematically literate?

Mathematical literacy is more than the ability to do basic arithmetic. It also includes:

- working confidently and competently with numbers, measures and diagrams in a range of real and realistic contexts
- choosing and applying a range of techniques and skills, including the use of technology (calculators and computers)
- understanding how numbers and measurements are collected, organised and displayed in tables, graphs and other forms
- developing and using decision-making and problem-solving strategies that suit both the problem and the context
- communicating results and solutions in appropriate ways.

The flow diagram below breaks down the steps that a mathematically numerate person will follow and details what is involved in each step.



Mathematics and Mathematical Literacy are not the same

Mathematics is an abstract subject that is often theoretical and that requires specific language, skills and methods to deal with subject-specific problems.

Mathematical Literacy takes mathematical knowledge and skills and applies them to everyday situations and problems. Mathematical Literacy is contextual and useful. When learners take processes and ideas from mathematics and apply them in contexts that are specific to their own lives, such as choosing a cellphone contract, they are mathematically literate. The following table shows some differences between Mathematics and Mathematical Literacy. It also shows how the content and context are interconnected when you are developing mathematical literacy.

Mathematical Literacy	Mathematics
Task and context	*Content*
Doubling a recipe	Equivalent fractions Multiplying and adding fractions
Reading instruments such as a thermometer, rain gauge or barometer	Measurement and units Understanding a scale
Deciding which cellphone contract is the most affordable	Equations in two variables that represent a relationship Solving simultaneous equations (graphically or algebraically)
Administering medicine	Reading a table of values to find amounts that correspond to given conditions (such as the age or mass of the patient) Ratio and calculation
Mixing plaster (for building)	Ratio and proportion Measuring amount in units for volume and mass
Mixing solutions (fertilisers or pesticides)	Calculating area and using ratio and proportion to mix necessary amounts
Planning a trip	Time–distance–speed relationships Using ratio and proportion or algebra Budgeting for petrol, meals, accommodation and other expenses Calculating with time (non-decimal amounts)

Financial literacy

Financial literacy is a large part of mathematical literacy and it has become increasingly important in modern life. Our society needs citizens who are able to understand the value of money and manage money in appropriate and responsible ways. When learners leave school and enter the world of work, they will have to engage actively with complex and specialised financial services just to manage their own money affairs. In addition, they will need to be aware of consumer issues and make plans for their longer-term financial wellbeing.

In recent times there have been many changes in our society including:

- technological developments (autobanking, internet banking, chip and pin card services)
- increased competition in financial markets (more banks want your money)
- a rise in questionable financial practices, including unethical loans, unfair interest rates and HP terms that include large 'balloon' payments
- changes in personal finances, including rising household debts
- changes in demographics (more poorer households who may not use formal banking systems, more young people having to make financial decisions without the guidance of older family members)
- increased consumer responsibility as younger people have access to banking services and debit and credit cards, which in turn leads to increased chance of being a victim of fraud.

These and other changes which are likely to occur in the future make it even more important that we produce learners who are financially literate.

Our approach to teaching Mathematical Literacy

Our approach is that learners develop understanding by making connections between what they are learning and their own lives.

Here is a summary of the steps in this process and how they are developed in the course:

Step 1: Learning basic skills (for example, how to carry out operations with fractions).

Step 2: Practising what you have learnt (for example, naming fractions of a whole, adding simple fractions).

Step 3: Using and applying learning in everyday contexts (for example, dividing an amount of money into different fractions, drawing pie graphs using fractions).

Step 4: Understanding the larger social and cultural uses of specific mathematics (for example, discussing the ways in which different societies have used fractions and how Egyptian fractions differ from those used today).

Step 5: Critically engaging with what you have learnt (for example, examining how fractions and percentages can be used in the media to mislead consumers).

This course offers a carefully planned and contextualised approach to the subject that allows teachers to:

- help learners see how mathematics can be valuable and useful in their lives, develop confidence and a sense of personal achievement and encourage ongoing interest and a willingness to find creative solutions to problems
- develop skills, concepts, understandings and attitudes that help learners deal with the mathematical contexts they have to manage in their lives
- ensure the learners develop and employ a range of problem-solving methods and grow their ability to think and reason logically and sensibly
- make sure learners have the levels of mathematical literacy they need to cope in an increasingly technology-reliant and information-rich society
- equip learners with the tools and skills they will need and use as they enter the world of work
- give learners the skills and confidence to use their own language and ways of expressing mathematical ideas and also grow their ability to make sense of mathematical ideas presented to them in various formats and ways.

Interpreting and communicating answers and calculations

Study & Master Mathematical Literacy offers a complete course that provides learners with the tools and opportunities to:

- construct their own knowledge and understanding rather than passively listening to the teacher (transmitted or received knowledge) by solving real-life problems, using real documents and investigating real issues, on their own, with a partner and in groups
- integrate and connect their learning, including connecting topics, content, procedures and ideas, as well as actively promoting connections to their own life experiences and ideas by applying skills in different contexts, integrating what they have learnt in one context with what they are doing in others (through margin notes)
- solve authentic, real-life (rather than contrived) problems, which are matched to the content of the course by using real documents, published case studies and statistics from the real world
- develop mathematical thinking, including communication and representation of answers and ideas, and moving towards more abstract and creative thinking by working in different ways, finding their own methods of recording their thinking, and using their own language

together with the language and notation of mathematics where appropriate to make their communication as clear and simple as possible.

The CAPS topic interpreting and communicating answers and calculations is built into the course and applies across both the basic skills and application topics. As they work through the material, learners will be expected to:

- make sense of their own strategies and solutions
- share their observations and solutions and understand other learners' observations and solutions.

Making sense of their own strategies and solutions

The habit of estimate–solve–check is developed and reinforced throughout the course. Learners are expected to estimate before they try to find solutions and check their solutions against their estimates to make sure they are sensible and correct. Strategies for doing this are presented in the examples and case studies, and are reinforced as learners work through the application topics in all four terms.

In addition, learners are expected to give explanations, justify and explain their methods and communicate their findings and answers to others, both formally and informally as they work through the course.

Sharing observations and solutions and understanding others' observations and solutions

Through taking part in pair, group and class discussions, learners will find that the ways in which they have communicated their workings and solutions are not always clear to others. Discussions with others, and seeing and discussing modelled solutions in their books (and in this teacher's guide) will help them see that better use of mathematical conventions and symbols, as well as more systematic presentation of results, will improve their communication of ideas and reduce ambiguity and confusion. This will help them to better understand solutions and ideas presented to them by others.

In addition, *Study & Master Mathematical Literacy* aims to point out very clearly to learners that there are several ways to approach mathematical problems and encourage them to be creative when they are doing and using mathematics in everyday contexts.

Your role as the teacher

Teaching Mathematical Literacy effectively means focusing on process skills in context rather than on straight mathematical content. This means that your classroom practice will revolve around:

- problem-solving, reasoning and decision-making
- communicating and representing ideas
- identifying relevance and making connections.

Teaching Mathematical Literacy effectively means that you cannot just use the textbook and get learners to memorise facts, learn rules for doing things and then write formal tests. Effective teachers of Mathematical Literacy need to approach the subject from a real-life contextual angle, where the mathematics is derived from actual situations or realistic models and learners can work through activities, investigations and problems in their own ways.

Making sure all learners are included

Many learners fail to reach their potential because they do not see how mathematical ideas are relevant to their lives and because they are not encouraged to connect what they are learning about mathematics to their existing experiences, skills and knowledge. This is a particular problem for learners who see the contexts in the textbook as irrelevant or inappropriate in their own situations.

In Mathematical Literacy, context is the driver for learning. When real-life situations are used, the learning becomes relevant and the educational value of the experience is increased. However, contexts are unique and you may find that some of the contexts offered in the course are not relevant or appropriate for some of the learners. In these cases, you may need to adapt the given activities to better suit your own situation.

The CAPS document details what the learners need to learn and suggests contexts for teaching. However, you can adapt this to meet specific needs by asking yourself what the learners already do or are interested in. Once you have established this, you can work out what to teach them by asking what the learner has to know to be able to do the thing they are interested in.

In Grade 11 the focus is on household, community, workplace and small business situations, and on the problems that individuals could have to deal with in any of these contexts. Learners build on the information and skills they developed in Grade 10, and continue to apply these to household and community situations such as the following, with some increase in the complexity of the problems they may have to deal with:

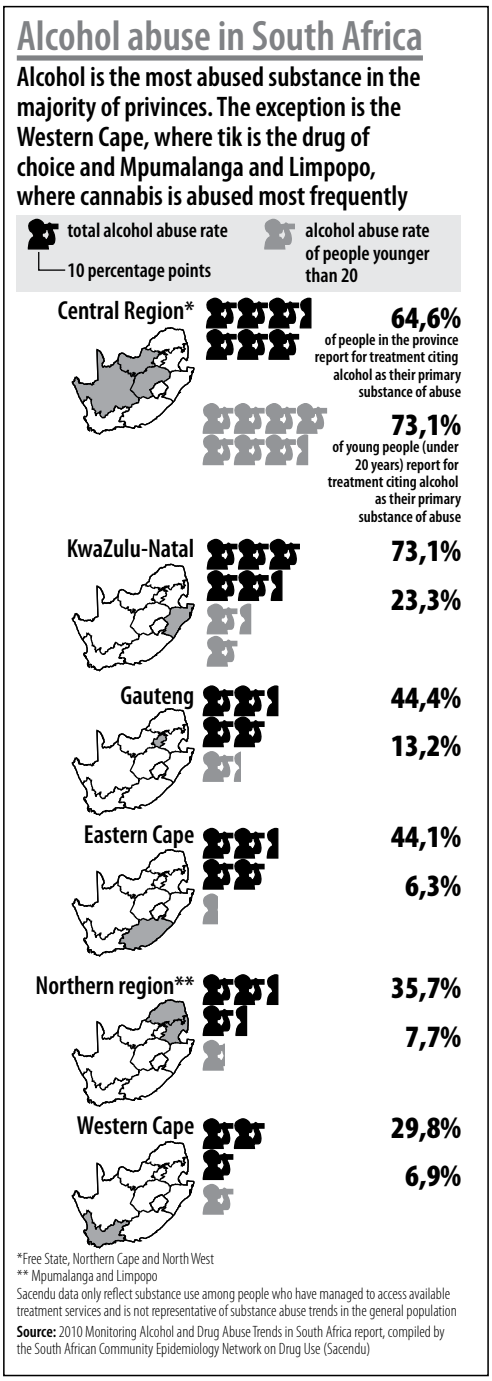
- household budgeting and financial planning
- time-keeping at sporting events
- relating speed to petrol consumption
- household utility bills and stepped tariffs
- VAT calculations
- compound interest on loans and investments
- bank fee packages
- electronic banking
- currency exchange calculations
- the buying power of different currencies
- budgeting for a school meals programme
- relating body mass to food mass and medicine dosage
- monitoring household water use
- planting schedules related to temperature
- interpreting detailed maps
- plans for houses and other small buildings
- small-scale construction projects
- working with assembly diagrams
- understanding and using probability calculations
- critiquing predictions
- different ways to present and interpret statistics.

The new focus on workplace and small business situations exposes learners to planning, problem-solving and financial monitoring insights and skills they need to develop to deal with real-life experiences such as:

- reading quotations from businesses
- budgeting before giving quotations to customers

- preparing invoices and receipts
- calculating cost price and setting selling price
- budgeting for projected expenditure
- budgeting for inflation
- reading payslips
- travel allowance claims
- understanding UIF.

It is also expected that in Grade 11 learners will actively research relevant information to solve problems using locally available data and resources – for example, finding out what building supplies really cost at local building suppliers' outlets; researching the current bank fees, loan terms and other options available at banks that they and their families use; using the real prices of locally available goods and services as a basis for planning a school meals programme.



You can help learners to apply their mathematical literacy skills to a broad range of contexts simply by bringing newspaper articles on diverse topics to class for discussion and analysis. Learners need to be able to apply the skills they are developing in the classroom to a general understanding of the social, economic and political information that surrounds them in everyday life. They can gain the confidence to do this by paying detailed attention to examples of daily news reports that include graphs, statistics and financial information. For example, the group of maps on the left that appeared in a Sunday newspaper in early 2012. It contains information that learners could find interesting, but that they might not bother to read because it is presented in 'mathematical' language. Ask learners to find their own examples of such items in newspapers, on the internet and from other sources, and spend some class time exploring and discussing the information they contain.

You will find other suggestions for alternative contexts in this Teacher's Guide and in the CAPS document itself.

Overcoming 'maths anxiety'

Many of the learners who opted for Mathematical Literacy in Grade 10 will have experienced some form of 'maths anxiety'. They may believe they are not capable of doing maths or that it is too difficult for them. Or, they may have experienced failure in mathematics classes and this might make them feel anxious about anything to do with maths. Or they may just have internalised attitudes and perceptions about mathematics that make it difficult for them to see how they will ever be able to succeed at anything mathematical – these include perceptions such as 'girls can't do maths' and 'my father was no good at maths and neither am I'.

One of your roles as a teacher of Mathematical Literacy is likely to be helping to reduce the levels of anxiety that learners feel and encouraging them to see that they already carry out tasks quite easily in everyday life that require them to apply mathematical thinking. Using context rather content is one of the first steps to helping learners consider and talk about the informal mathematics they use without really thinking about it, and this in turn can empower them and boost their confidence and motivation.

There are some things that you can say and some behaviour that you can encourage to help learners to overcome anxiety about mathematics:

- Don't give up immediately if you don't understand something.
- It does not matter if you get the wrong answer.
- You can work slowly – we are not in a race.
- If you get stuck on one part, move on and come back to it later.
- Ask another learner for help.
- Don't immediately think you are wrong.
- Ask for another explanation if you don't understand at first.
- Work in a group to solve the problem.
- Make sure you can explain how and why you got the answer.
- Listen to the questions that other learners ask because it might be about something you don't understand either.
- Make sure you understand the concept you are working on before you move on.
- Refer to the basic skills section at the back of the *Study & Master Learner's Book* when you forget how to do something.

Using resources to enhance learning

Calculators

The calculator is an important learning tool that learners can use to develop, explore and consolidate new ideas. Calculators are very useful when you want learners to investigate and discover number facts and patterns and make generalisations. Using a calculator allows the learners to focus on finding ways of solving a problem rather than on routine mechanical operations that can detract from the real point of the problem, particularly in learners who are not good at mathematics and who lack confidence in their own abilities.

Learners should have access to a simple calculator and be encouraged to use it for all the activities in this course.

Measuring equipment

There is no doubt that the use of real tools and apparatus can help learners develop and clarify their understandings of mathematics, particularly in the areas of measurement. Using tools and measuring instruments allows the learners to develop abstract ideas and form concepts from practical experience. This is just as important in Grade 11 as in lower grades.

Navigating the textbook

We have organised the content of the course to follow the sequence of topic sections set out in the CAPS 'Suggested work schedule for Grade 11'.
The first section of the course focuses on the basic skills topic patterns, relationships and representations. Thereafter, the learners work term by term through sections of the Applications topics as sequenced in the suggested work schedule.

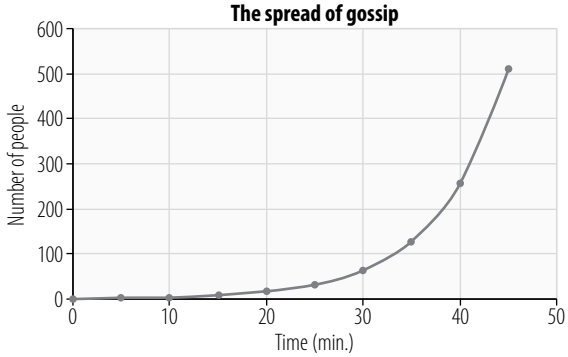
To help learners who are not sure about the calculation methods, formulae and other mathematical methods that were covered in Grade 10, this material is included in the *Study & Master Learner's Book* Grade 11 as a skills reference section. Learners are directed to relevant parts of this section in shoulder boxes placed throughout the applications sections of the Learner's Book, where they will find explanations and examples of techniques they need to use in a specific problem-solving context.


These concepts you learnt last year are covered on pages 497 to 537 in the Basics skills section.

The examples used in the basic skills section are interesting sources of information about contextual topics of interest to learners, such as:

- smoking habits of soccer players in a national team
- bacteria in potato salad
- the spread of gossip.

3. Debbie was secretly in love with Jabu. She told her friend Minki this in confidence. However, within three-quarters of an hour the whole school knew. Minki insisted that she only told two people. Debbie drew this graph to show Minki how problematic that was.



a. What does the graph show?

b. Complete this table of values based on the graph.

Time (minutes)	5	10	15	20	25	30	35	40	45
Number of people									

c. What type of relationship is this?

d. What is the constant ratio between the terms?

e. If the news continued to spread at the same rate, how many people would know Debbie was in love with Jabu after an hour?

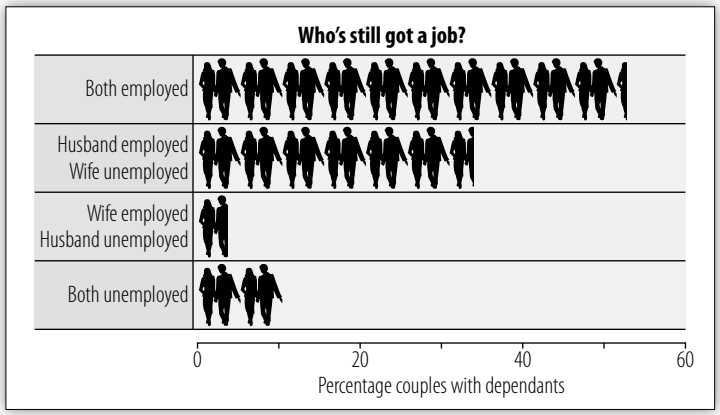
The relevance of the topics will encourage learners to read the 'mathematical' aspects of the graphs and charts with close attention, thereby strengthening their skills at interpreting data presented in this form. Some of the content in this section, such as methods for doing break-even analysis and calculating body mass index (BMI), is investigated in more detail in the application topics that follow.

The application topics use real-life South African as well as international examples as far as possible, to provide appealing and interesting contexts that will interest and engage Grade 11 learners. Information is presented in many different forms, so that learners become familiar with the many ways in which content that they need to understand can be structured. You should supplement the examples in the Learner's Book with as many locally relevant examples as

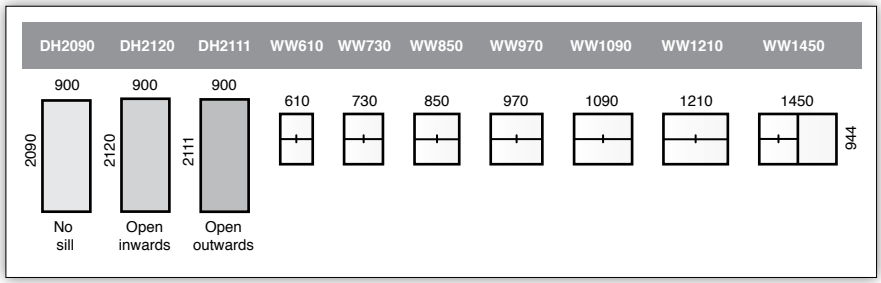
possible (such as accounts from local shops and your local municipality and maps of the region, city or neighbourhood where you live).

Examples of information in different forms in the Learner's Book:

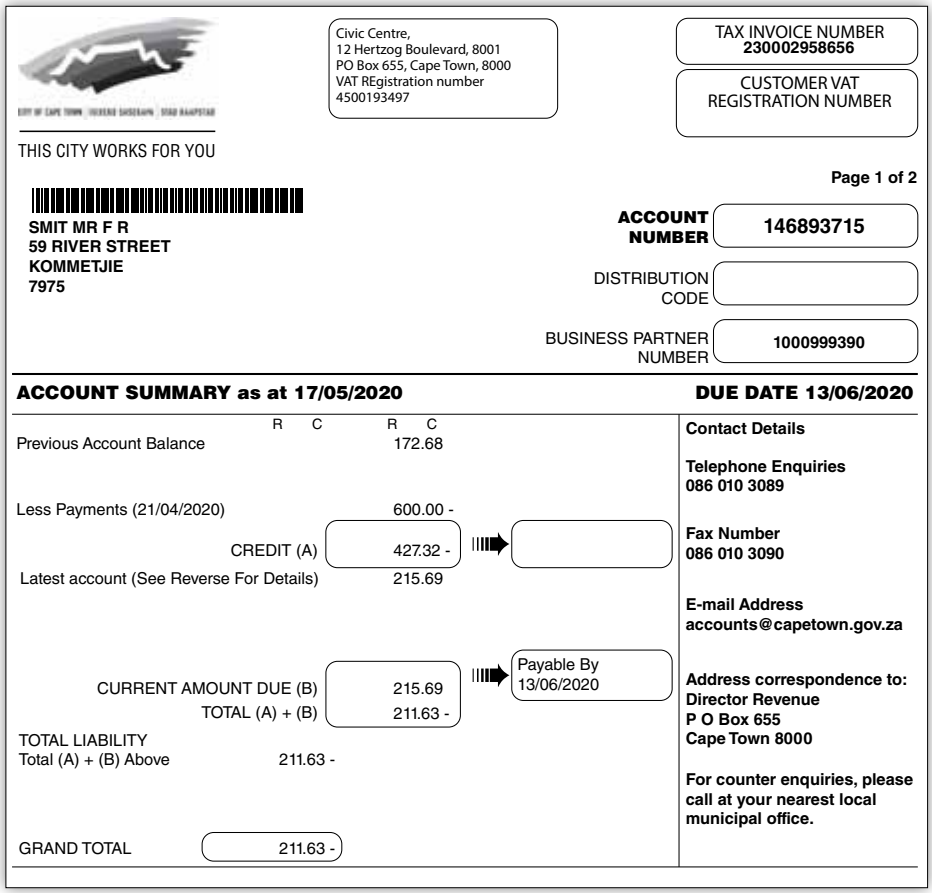
Information in graphs and charts

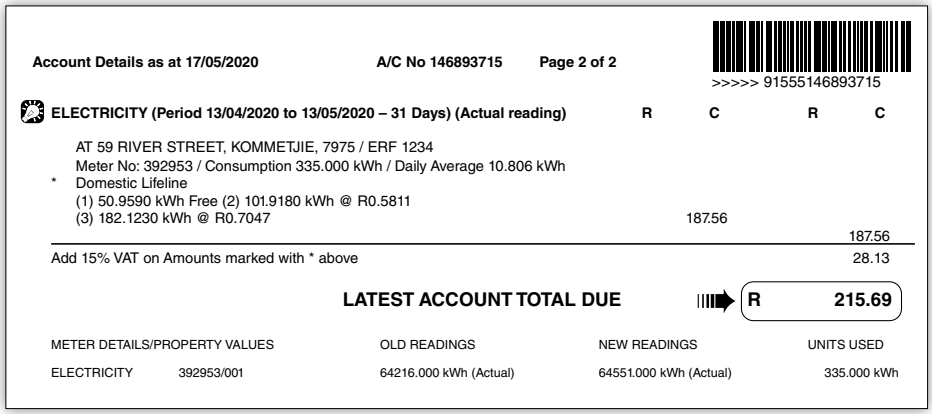


Information on diagrams



Information on documents





Account Details as at 17/05/2020 A/C No 146893715 Page 2 of 2

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ELECTRICITY (Period 13/04/2020 to 13/05/2020 – 31 Days) (Actual reading) R C R C

AT 59 RIVER STREET, KOMMETJIE, 7975 / ERF 1234
Meter No: 392953 / Consumption 335.000 kWh / Daily Average 10.806 kWh
* Domestic Lifeline
(1) 50.9590 kWh Free (2) 101.9180 kWh @ R0.5811
(3) 182.1230 kWh @ R0.7047 187.56

187.56

Add 15% VAT on Amounts marked with * above 28.13

LATEST ACCOUNT TOTAL DUE R 215.69

METER DETAILS/PROPERTY VALUES		OLD READINGS	NEW READINGS	UNITS USED
ELECTRICITY	392953/001	64216.000 kWh (Actual)	64551.000 kWh (Actual)	335.000 kWh

Information in tariff tables

INTERNATIONAL CALLS

Call charges to some popular international fixed-line destinations will decrease from 1 August.

Calls to popular international fixed-line destinations				
	Peak time (per minute)		Global off-peak time (per minute)	
	CURRENT	NEW	CURRENT	NEW
UK	R0,70	R0,60	R0,65	R0,60
USA	R0,70	R0,60	R0,65	R0,60
Germany	R1,30	R1,20	R1,00	R0,90
France	R0,90	R0,80	R0,90	R0,80
Portugal	R1,14	R1,04	R0,90	R0,80
Zimbabwe	R1,78	R1,68	R1,65	R1,55
Pakistan	R2,23	R2,13	R1,77	R1,66
Israel	R1,35	R1,25	R1,22	R1,12
China	R1,45	R1,35	R1,40	R1,30
Australia	R0,90	R0,80	R0,90	R0,80
Canada	R0,80	R0,70	R0,80	R0,70

- Changes are also applicable to Worldcall cards.
- Actual calls are charged per second with a minimum charge of 57c per call.
- Peak time (standard time) 08:00–20:00 Mondays to Fridays. Global off-peak time: 20:00–08:00 Mondays to Fridays and Fridays 20:00 to Mondays 08:00.

Information in text form

What do you get for FREE per month?

- Your first five electronic debit transactions[2]
- Your first four ATM cash deposits
- My Updates Lite (12 SMS notifications)
- Unlimited electronic balance enquiries
- Unlimited electronic inter-account transfers to any Savings and Investment account
- Prepaid airtime recharges at any Standard Bank self-service channel
- Internet and cellphone banking subscriptions

Cross-referencing

As learners work through the course, they are directed to other places in the book by link boxes in the shoulder. These links tell the learners where to find the maths skill they need to apply to solve a problem. These boxes link to the basic skills reference section and to places in the application topics where a particular skill was taught or used.

Representing data

You should already know how to draw a bar graph, line graph and pie chart. If you have forgotten how to do this, refer to pages 524 and 525.

Graphs are a very useful way to represent data because they allow you to see patterns and trends in the data at a glance.

Last year you drew bar graphs, line graphs and pie charts to represent single sets of data. In Term 1 this year you worked with double bar and line graphs that show two sets of data at the same time. This term you will also learn how to draw a stacked bar graph and to draw a scatter graph and use it to work out whether there is a connection between two sets of data.

SECTION 2

PLANNING

Suggested work schedule

Below is a work schedule that outlines estimated time allocations per topic as well as a particular sequence of teaching. This work schedule follows exactly the recommendations given in the CAPS document.

Term 1			
Week	**CAPS topic**	**Unit**	**Pages**
1	Patterns, relationships and representations	Unit 1 Making sense of graphs that tell a story	2–8
2	Patterns, relationships and representations	Unit 2 Patterns and relationships	9–12
		Unit 3 Representing relationships in tables, equations and graphs	13–16
3	Patterns, relationships and representations	Unit 4 Working with two relationships at the same time	17–24
4	Measurement (Conversions and Time)	Unit 5 Conversions	28–45
5	Measurement (Conversions and Time)	Unit 6 Measuring time	46–68
6	Finance (Financial documents; Tariff systems; Income, expenditure, profit/loss, income-and-expenditure statement and budgets; Cost price and selling price; Break-even analysis)	Unit 7 Financial documents at home	75–86
		Unit 8 Financial documents at work	87–107
7	Finance (Financial documents; Tariff systems; Income, expenditure, profit/loss, income-and-expenditure statement and budgets; Cost price and selling price; Break-even analysis)	Unit 8 Financial documents at work (cont.)	87–107
		Unit 9 Tariffs	108–126
8	Finance (Financial documents; Tariff systems; Income, expenditure, profit/loss, income-and-expenditure statement and budgets; Cost price and selling price; Break-even analysis)	Unit 10 Income-and-expenditure statements and budgets	127–151

9	Finance (Financial documents; Tariff systems; Income, expenditure, profit/loss, income-and-expenditure statement and budgets; Cost price and selling price; Break-even analysis)	Unit 11 Cost price and selling price	152–167
		Unit 12 Break-even analysis	168–177
Assessment Assignment Control test (Measurement and Finance, integrated with Numbers and Patterns concepts)			
Term 2			
Week	**CAPS topic**	**Unit**	**Pages**
1	Finance (Interest; Banking; Inflation)	Unit 1 Interest and interest rates	185–202
2	Finance (Interest; Banking; Inflation)	Unit 2 Banking	203–227
3	Finance (Interest; Banking; Inflation)	Unit 3 Bank loans and investments	228–244
4	Finance (Interest; Banking; Inflation)	Unit 4 Inflation	245–256
5	Measurement (Measuring length, measuring weight, measuring volume, measuring temperature)	Unit 5 Measuring length and distance	261–273
		Unit 6 Measuring mass	274–292
6	Measurement (Measuring length, measuring weight, measuring volume, measuring temperature)	Unit 7 Measuring volume	293–309
		Unit 8 Measuring temperature	310–316
7	Maps, plans and other representations of the world (Scale and Map work)	Unit 9 Scale	322–326
		Unit 10 Maps	327–345
8	Maps, plans and other representations of the world (Scale and Map work)	Unit 10 Maps (cont.)	327–345
9	Revision		
Assessment Assignment Mid-year examinations (2 papers; $1\frac{1}{2}$ hours each; 75 marks each) (Finance; Measurement; and Maps; integrated with Numbers and Patterns concepts)			

Term 3			
Week	**CAPS topic**	**Unit**	**Pages**
1	Measurement (Perimeter, area and volume)	Unit 1 Perimeter, area and volume	350–375
2	Measurement (Perimeter, area and volume)	Unit 1 Perimeter, area and volume (cont.)	350–375
3	Measurement (Perimeter, area and volume)	Unit 1 Perimeter, area and volume (cont.)	350–375
4	Maps, plans and other representations of the physical world (Models and Plans)	Unit 2 Plans (instructions and assembly diagrams)	379–384
5	Maps, plans and other representations of the physical world (Models and Plans)	Unit 3 Floor and elevation plans	385–393
6	Maps, plans and other representations of the physical world (Models and Plans)	Unit 4 Using models to investigate shape and space	394–399
7	Finance (Taxation)	Unit 5 Taxation	404–413
8	Probability	Unit 6 Probability	416–434
9	Probability	Unit 6 Probability (cont.)	416–434
Assessment Investigation Control test (Measurement; Models and Plans; Finance; and Probability; integrated with Numbers and Patterns concepts)			
Term 4			
Week	**CAPS topic**	**Unit**	**Pages**
1	Finance (Exchange rates)	Unit 1 Exchange rates	440–452
2	Data handling	Unit 2 Data handling	456–493
3	Data handling	Unit 2 data handling (cont.)	456–493
4	Data handling	Unit 2 data handling (cont.)	456–493
5	Data handling	Unit 2 data handling (cont.)	456–493
6	Revision		
Assessment End-of-year examinations (2 papers; 2 hours each; 100 marks each) (covering all topics in the curriculum)			

SECTION 3

PROGRAMME OF ASSESSMENT

Programme of Assessment

The following tables provide the Programme of Assessment for Grade 11, showing the weighting of assessment tasks.

Table 1: The weighting of assessment tasks

	SCHOOL-BASED ASSESSMENT (25%)				EXAMINATION (75%)
	TERM 1	**TERM 2**	**TERM 3**	**TERM 4**	
GRADE 11	Assignment (10%)	Assignment (10%)	Investigation (10%)	Revision	Examination
	Test (20%)	Examination (30%)	Test (20%)		

The suggested Programme of Assessment assumes that:

- all the topics and sections are addressed throughout the year;
- the topics are weighted in accordance with the suggested minimum weightings for each topic outlined in the CAPS document;
- content and/or skills are integrated across a variety of topics throughout teaching and learning, and in the assessment activities;
- 1–2 weeks may be allocated as duration to complete and submit the assignment or investigation;
- the weightings for quarterly reporting will be allocated as 25% assignment or investigation and 75% control test or examination.

The structure of the papers

Table 2: Weighting per application topic

	Topic	Weighting (%)
BASIC SKILLS TOPICS	Interpreting and communicating answers and calculations	No weighting is provided for these topics. They will rather be assessed in an integrated way in the Application topics on both papers
	Numbers and calculations with numbers	
	Patterns, relationships and representations	
TOPIC	**PAPER 1**	**WEIGHTING (%)**
Application topics	Finance*	60% (± 5)
	Data Handling	35% (± 5)
	Probability	5%
TOPIC	**PAPER 2**	**WEIGHTING (%)**
Application topics	Maps, plans and other representations of the physical world	40% (± 5)
	Measurement	55% (± 5)
	Probability	5%

(N.B. The policy caters for the variance of ± 5% for each topic, except probability.)
*Section in Finance: Income, Expenditure, Profit/loss, Income and Expenditure Statements and Budgets, Cost price and Selling price).

Table 3: Percentage of marks to be allocated to the different assessment taxonomy levels in examinations in Grades 11

The four levels of the Mathematical Literacy assessment taxonomy	PAPER 1	PAPER 2
Level 1: Knowing	30% ± 5%	30% ± 5%
Level 2: Applying routine procedures in familiar contexts	30% ± 5%	30% ± 5%
Level 3: Applying multi-step procedures in a variety of contexts	20% ± 5%	20% ± 5%
Level 4: Reasoning and reflecting	20% ± 5%	20% ± 5%

The first question in paper 1 end of year exam should integrate content from Finance and Data Handling such that all the questions are pitched at cognitive level 1. The question should carry 20%, with ± 5% permissible deviation.

The same format should also be applied in paper 2.

For example: The first question in paper 2 end of year exam should integrate content from Measurement and Maps, plans and other representation of the physical world, such that all the questions are pitched at cognitive level 1. The question should carry 20%, with ± 5% permissible deviation.
The table that follows indicates which Learner's Book activities can be used as tests in Term 1 and Term 3.

Activities in *Study & Master Learner's Book* that may be used as tests

Topic	Section	Activities that can be used or adapted for control tests	Learner's Book page reference
Term 1			
Measurement and Finance, integrated with Numbers and Patterns concepts	Reading time formats	Term 1: 6.1 Reading different time formats	48
	Time, speed and distance	Term 1: 6.8 Calculations with time, speed and distance	67
	Tariffs	Term 1: 9.1 Reading and calculating tariffs	113
	Income-and-expenditure statements	Term 1: 10.3 Calculating and comparing changes in income-and-expenditure statements	135
	Budgets	Term 1: 10.4 Calculations with personal budgets	147
Term 3			
Measurement, Models and Plans, Finance and Probability, integrated with Numbers and Patterns concepts	Interest	Term 2: 1.6 Using graphs of interest growth	202
	Inflation	Term 2: 4.1 Calculating inflation-related price increases	249
	Taxation	Term 3: 5.1 VAT calculations Term 3: 5.2 Calculating UIF contributions	406 412

Topic	Section	Activities that can be used or adapted for control tests	Learner's Book page reference
	Measurement: Length Mass Volume Temperature	Term 2: 5.2 Reading odometers and trip meters	263
		Term 2: 5.5 Calculating cost of materials	272
		Term 2: 6.3 Calculating quantities of food related to body mass	280
		Term 2: 7.1 Calculating volumes for practical projects	297
		Term 2: 7.4 Calculating petrol consumption	305
		Term 2: 8.1 Reading and converting temperature information	313
	Perimeter, area and volume	Term 3: 1.3 Using formulae to calculate the perimeter and area of composite shapes	357
		Term 3: 1.4 Using formulae to calculate surface area and volume	363
	Working with scale	Term 2: 9.3 Using real distances to calculate measurements on a plan	326
	Plans	Term 3: 2.3 Reading and making sense of instruction diagrams	382
		Term 3: 3.2 Finding the size of items shown on a plan	386
	Models	Term 3: 4.3 Working out how much wood you need	397
	Probability	Term 3: 6.5 Calculating experimental probability	422
		Term 3: 6.10 Interpreting predictions used in the media	431

Assignments

Assignments are structured tasks that give learners clear guidelines about how to carry out the task, and where there is a well-defined solution to the task. The content and context of an assignment should be based on work already covered in the course, and it should allow learners to apply a method or approach that they have already learned to use. There are activities throughout the *Study & Master Learner's Book* that can be used as assignments for assessment purposes. They are indicated in the table that follows.

Investigations

Investigations are tasks in which learners go through a series of steps involving guided discovery to achieve an understanding of a concept and/or a method, and apply their mathematical literacy skills in new situations. An important aspect of this type of task is that learners should use insight and understanding of the context to make an appropriate decision based on their investigative work. There are extended investigative activities throughout the *Study & Master Learner's Book* that can be used for assessment purposes. They are indicated in the table that follows.

Note that an assignment or investigation may cover more than one topic or section, and it can be used to assess concepts and methods that have been learnt in both/all these sections. For example, an investigation that involves comparing costs of different cellphone options can be used to assess learners' understanding and skills relating to Patterns, relationships and representations (working with two or more relationships) and Finance (tariff systems).

Suggested assignments and investigations in the Learner's Book

Topic	Section	Assessment type and name	Learner Book page reference
Term 1			
Patterns, relationships and representations	Representations of relationships in tables, graphs and equations	**4.4 Assignment**: Making decisions using graphs	24
	Working with two or more relationships	**4.2 Investigation**: Comparing costs of solar and nuclear energy	20
Finance	Tariff systems	**9.4 Investigation**: Which water tariff is better?	125
	Break-even analysis	**12.3 Assignment**: Break-even analysis for a T-shirt business	177
Measurement	Time	**6.6 Assignment**: Read and interpret a tide table	61
Term 2			
Finance	Interest	**1.5 Investigation**: Compare interest options at different banks	199
	Banking, loans and investments	**2.3 Assignment**: Compare student fee packages offered by different banks	218
	Inflation	**4.3 Investigation**: How does inflation affect property prices?	256
Measurement	Measuring volume	**7.7 Assignment**: Calculate total water run-off in a settlement	309
Term 3			
Finance	Taxation	**5.3 Assignment**: An employer's budget for UIF contributions	413
Measurement	Measuring mass (weight)	**6.5 Investigation**: Collect body mass data and determine BMI weight status	288
	Perimeter, area and volume	**7.3 Assignment**: Calculate your household's basic water needs	301
Maps, plans and other representations of the physical world	Plans, conversions, area, finance	**4.2 Assignment**: Make a cylindrical package	395
	Models, surface area, volume	**4.4 Investigation**: Boxes and how much they hold	397
Probability	All sections	**6.4 Investigation**: How often do you throw a double?	420
		6.8 Investigation: Working with weather predictions	426
Term 4			
Data handling	All sections	**6.5 Investigation**: Collect body mass data and determine BMI weight status	288

Formal assessment: Examinations

In Grade 11, examination papers should be set, marked and moderated internally unless provincial education departments instruct otherwise.

Time and mark allocation

Grade 11 examinations should take place at the end of Term 2 and the end of Term 4. For each examination, learners will write two papers. The papers assess the same content in different ways and the cognitive demands of each paper differ (according to the levels of the assessment taxonomy). The time and mark allocations for each paper are given in the table.

June examinations **End of Term 2**	Paper 1 $1\frac{1}{2}$ hours 75 marks	Paper 2 $1\frac{1}{2}$ hours 75 marks
November examinations **End of Term 4**	Paper 1 2 hours 100 marks	Paper 2 2 hours 100 marks

The main differences between the two papers

Paper 1	**Paper 2**
• It assesses basic skills in familiar contexts.	• It assesses the ability to apply concepts in familiar and unfamiliar contexts.
• Questions are mainly at levels 1 and 2 (60% of marks at level 1; 35% at level 2).	• Questions are mainly at levels 3 and 4 (35% of marks at level 3; 40% of marks at level 4).
• There are a small number of multi-step procedures (level 3, 5% of marks).	• There are a small number of routine procedures (25% of marks) included to help learners make sense of the contexts in which problems are set.
• Contexts are limited to what is specified in the curriculum outline section of CAPS.	• Contexts may not be familiar to learners, in other words, they are not limited to those specified in the curriculum outline section of CAPS.

Setting internal examinations

Setting an examination paper is a fairly demanding task for most teachers. For this reason, teachers often choose to work together to set different questions/sections of the paper. We recommend that teachers try as far as possible to work cooperatively to set papers. Where this is not possible at a school, it may be possible to work with other teachers in the district to produce a collection of questions that can be used in examinations at different schools.

When you set an examination (or test) question, you need to keep track of:

- the topics being assessed
- the content/skills being assessed
- the proportion of marks allocated to different levels on the taxonomy.

A table such as the one below can help you organise and keep track of all the different things you need to consider. This is an exemplar for one question of a Paper 1 examination.

Question details			Content/skills				Taxonomy level					Total
Number	Context	Part	Finance	Measurement	Maps and plans	Data	1 (60%)	2 (35%)	3 (5%)	4 (0 %)	Subtotal	
1	Take-away business (familiar)	1.1 1.2 1.3 1.4	✗	✗	✗	✗	3 4	2 3 4	2		5 3 6 4	18
												100

Once the table is completed for all questions, you can add up the marks per taxonomy level to check that you have more or less the correct percentage for each level. If not, you can see from the table which levels have too many or too few marks and you can adjust the questions accordingly.

Selecting contexts

When you set examinations, you have to decide on a context for the questions.

For Paper 1, you can select documents, tables, graphs and diagrams from the *Study & Master Learner's Book* to use in the examinations. You can then set different questions related to each context. This may be as simple as changing the values used in the Learner's Book to make a new question.

For Paper 2 questions, you need to include some contexts that are familiar (these can again be drawn from the *Study & Master Learner's Book*) and some that are not familiar. The media is a good source of new contexts. (Remember that truly mathematically literate adults are able to read and make sense of articles, advertisements, graphs and other mathematical information they come across in daily life). We suggest that teachers keep a file of interesting articles, tables of data, graphs and other mathematically oriented materials they find through the year to use when setting examination questions. For example, during events such as the Comrades Marathon and Two Oceans Marathon, there may be different maps and statistics published in the newspapers. These can be used to set questions based on familiar concepts. Other sporting events, such as the Cape Argus Cycle Tour, the PSL Soccer Finals and even the Olympic Games can be used as the context for questions that are not familiar to the learners.

This is a section of the schedule of events for the 2012 London Olympics.

Date / time	Sport	Venue
25 July 16:00 – 20:45	Football	Millennium Stadium, Cardiff
	Women's preliminaries (2 matches)	
25 July 17:00 – 21:45	Football	City of Coventry Stadium, Coventry
	Women's preliminaries (2 matches)	
25 July 17:00 – 21:45	Football	Hampden Park, Glasgow
	Women's preliminaries (2 matches)	
26 July 12:00 – 16:45	Football	Hampden Park, Glasgow
	Men's preliminaries (2 matches)	

Date / time	Sport	Venue
26 July 14:30 – 19:15	Football	St James' Park, Newcastle
	Men's preliminaries (2 matches)	
26 July 17:00 – 22:00	Football	Old Trafford, Manchester
	Men's preliminaries (2 matches)	
26 July 19:45 – 21:45	Football	Millennium Stadium, Cardiff
	Men's preliminaries (1 match)	
26 July 19:45 – 21:45	Football	City of Coventry Stadium, Coventry
	Men's preliminaries (1 match)	

You could use the above schedule to set a question that assesses the concepts and skills related to time, distances between places, travelling problems, costs and even probability in an unfamiliar context. You could also combine it with maps and/or plans of a soccer field to set parts of questions in which students use the scale to determine dimensions and then analyse the layout of the venue in terms of seating, access, location of exits and other issues. Similarly, you could combine this with graphs showing medals by country and ask the learners to answer questions and analyse the data provided.

SECTION 4

UNIT-BY-UNIT

Dealing with different levels in the Mathematical Literacy assessment taxonomy

CAPS provides an assessment taxonomy framework to help teachers make sure their assessment meets different levels of cognitive demand. Some tasks and questions require only the recall of basic facts or simple calculations while others require learners to analyse and make sense of unfamiliar contexts and use varied methods and skills to solve problems.

The four levels of cognitive demand are:
Level 1: Knowing
Level 2: Applying routine procedures in familiar contexts
Level 3: Applying multi-step procedures in a variety of contexts
Level 4: Reasoning and reflecting.

When you design assignments, investigations, tests and examinations, you need to ensure that the number of marks allocated to questions is roughly in the following proportions (about 5% in overall allocation).

Taxonomy level	Marks allocated to each level
Level 1	30%
Level 2	30%
Level 3	20%
Level 4	20%

In examinations, the focus of the different papers means that the percentage marks for different levels vary per paper, but they give the same overall percentages when combined (about 5% variance in allocations). These are given below.

Taxonomy level	Paper 1 allocation	Paper 2 allocation	Overall allocation
Level 1	60%	–	30%
Level 2	35%	25%	30%
Level 3	5%	35%	20%
Level 4	–	40%	20%

How the levels are built into the activities in the *Study & Master Learner's Book*

In order to prepare learners for tests, examinations and other formal assessment tasks, they need to practise answering questions at all levels on the taxonomy. The Learner's Book provides exercises and activities in each topic that fall into and across different levels of the Mathematical Literacy taxonomy.

The tables that follow contain examples of questions, calculations and exercises from each term's work sorted by level to show the differences between the demands of questions at different levels of the taxonomy.

Note that these tables do **not** list all the questions/activities in the *Study & Master Learner's Book*, they are intended only a general guide to help you select and/or develop suitable assessment questions of your own and to show that provision is made for each level in the course materials.

Term 1: Patterns, relationships and representations

Unit	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Unit 1 **Making sense of graphs that tell a story**	Read data directly from values on graphs: 1.1 question 1–2 1.2 questions 1–2 1.3 questions 1–3 1.4 questions 1–2			Analyse graphs and make deductions about whether or not they are misleading: 1.4 question 3
Unit 2 **Patterns and relationships**		Solve problems using constant ratios: 2.1 questions 1–3	Find data on a graph and use it to draw up a table of values and find a formula for a relationship: 2.2 question 3	Interpret a relationship shown in a table and predict future values: 2.1 question 4
Unit 3 **Representing relationships in tables, equations and graphs**	Read data directly from graphs: 3.1 question 2	Draw a graph from given values: 3.1 question 1 Complete a given table of values: 3.1 question 3b	Sort data, complete tables, draw graphs and then use graphs to answer questions: 4.3 question 1	Analyse data in tables and make deductions about trends in the data: 3.1 question 3c–e
Unit 4 **Working with two relationships at the same time**	Read data from break-even graphs 4.3 questions 1 and 2	Describe trends shown on graphs 4.1 questions 1 and 2 Estimate values from given graphs 4.1 question 3		Analyse graphs and make deductions and predictions based on the data: 4.1 question 3 4.3 question 2

Term 1: Measurement

Unit	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Unit 5 **Conversions**	Convert between metric units: 5.1 questions 1 and 2	Convert from imperial to metric units: 5.1 question 3	Make a scaled drawing and enlarge it using an appropriate conversion factor: 5.4 question 2	Design a sign, selecting appropriate scale and units: 5.4 question 3
Unit 6 **Measuring time**	Read values from a clock face: 6.1 question 1	Record and calculate time: 6.4 questions 1–5	Interpret time values on a timetable and answer questions related to times: 6.5 questions 1–3	Perform time calculations and relate them to other travel resources in order to plan a trip: 6.8 question 3 and 4

Term 1: Finance

Unit	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Unit 7 Financial documents at home	Read information from household bills: 7.1 question 1 Show how the total due was calculated on an account: 7.1 question 3	Calculate differences between budgeted and actual expenditure in a household: 7.3 questions 1 and 2		
Unit 8 Financial documents at work	Read information from a payslip: 8.3 question 1 Show how amounts were calculated: 8.3 questions 2 and 3	Check calculations on a document to see if total is correct: 8.1 question 1	Repeat calculations to produce a new bill using different values: 8.1 question 2	Collate information from different sources to prepare a travel claim: 8.5 question 2
Unit 9 Tariffs	Read tables of different tariffs: 9.1 question 1	Calculate costs and tariffs using given information: 9.1 questions 2 and 3 Complete a table of tariffs using given information: 9.1 question 4	Draw graphs to represent and compare different tariffs: 9.2 question 2	Choose appropriate strategies (including using table and drawing graphs) to compare the costs of services and tariffs in different contexts: 9.3 questions 1–3
Unit 10 Income-and-expenditure statements and budgets	Classify items on an income-and-expenditure statement: 10.1 question 1 Calculate profit and loss 10.2 questions 1–4	Prepare an income-and expenditure statement: 10.1 question 4 Prepare a household budget: 10.5 questions 1 and 2	Construct a two-year draft budget for a small business: 10.5 question 3 Prepare a budget for a single event: 10.7 questions 1–4	Analyse a budget for a school and make recommendations to improve its finances: 10.6 questions 1–4
Unit 11 Cost price and selling price	Find the cost price of an item by adding all the component costs: 11.1 questions 1–3	Compare cost and selling price and calculate the mark up: 11.3 questions 1–4 11.4 questions 1 and 2	Investigate various costs and decide on an appropriate selling price: 11.2 question 1 Calculate selling prices based on various profit levels and decide which is reasonable: 11.5 question 1	Conduct market research and use the results to suggest and defend the selling price of an item: 11.2 question 2
Unit 12 Break-even analysis	Calculate break-even values in the context of a given problem: 12.1 questions 1–3	Read values from graphs to find the break-even point and answer questions about it: 12.2 question 2	Draw graphs to compare options and tariffs: 12.2 question 1 and 3	

Term 2: Finance

Unit	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Unit 1 **Interest and interest rates**	Read and calculate interest rates: 1.1 question 1	Calculate simple interest rates and monthly repayments: 1.1 question 3	Perform compound interest calculations over multiple time periods: 1.2 questions 1 and 2 Complete a table to model different options for saving and answer questions based on the result: 1.4 question 3	Investigate and model the effect of changing balances on payments and total cost of loans: 1.3 questions 3 and 4
Unit 2 **Banking**	Identify fees and costs on bank documents: 2.2 questions 1 and 2	Calculate the cost of a late credit card payment: 2.4 questions 1 and 2	Complete a table showing amounts due and owing based on given information: 2.4 question 4	Compare fee options and investigate the best one for your own family: 2.1 question 3 Choose the best interest option for a small soccer club and justify choices: 2.5 question 2
Unit 3 **Bank loans and investments**	Perform simple interest calculations in the context of hire purchase agreements: 3.2 questions 1–4	Calculate the real cost of bank loans: 3.1 questions 1–4		Make decisions regarding investment options for a small business without scaffolded or guided questions: 3.3 questions 1–4
Unit 4 **Inflation**	Calculate price changes and rates of change: 4.2 question 1	Show by calculation how the price of an item changes when it is affected by inflation: 4.1 questions 2 and 3	Show by calculation how the price of an item might change if affected by inflation over multiple time periods: 4.2 question 2	

Term 2: Measurement

Unit	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Unit 5 Measuring length and distance	Read measurements from car odometers and trip meters: 5.2 questions 1 and 2 Measure lengths accurately using appropriate instruments: 5.3 questions 1–4	Calculate using measurements: 5.5 question 1	Calculate overall costs using given measurements and costs: 5.4 questions 1 and 2 5.5 question 2	
Unit 6 Measuring mass	Measure the mass of different items: 6.1 question 3	Calculate using measured values and recommended amounts per mass: 6.3 questions 1–3	Calculate correct dosages for medicines: 6.4 questions 1 and 2 Prepare a budget for a catering project using mass and cost of ingredients: 6.6 questions 1–3	Investigate and compare the stated and actual measurements of packaged foods and make decisions based on the findings: 6.2 questions 1–3
Unit 7 Measuring volume		Calculate volumes for practical purposes: 7.1 questions 1–3 Calculate petrol consumption rates, alcohol content and water run-off rates: 7.4 questions 1 and 2 7.5 questions 1–4 7.6 question 1	Calculate basic water needs using data from graphical sources: 7.3 questions 1–3 Use measured values in conjunction with other skills to complete an assignment on water run off in a settlement: 7.6 question 2	Investigate how much water a toilet cistern holds and make decisions about saving water based on findings: 6.1 question 4
Unit 8 Measuring temperature	Read and convert temperatures from graphs: 8.1 questions 2	Draw graphs of average temperatures and compare patterns: 8.1 question 7		Compile a planting calendar based on temperature information: 8.2 questions 1 and 2

Term 2: Maps, plans and other representations of the world

Unit	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Unit 9 **Scale**	Explain the meaning of a given scale: 9.1 question 1	Use a given scale to determine actual measurements: 9.1 questions 2 and 3 9.2 questions 1–3	Use a given scale together with measurements on a plan to determine length and other dimensions: 9.3 questions 1 and 2	Decide on an appropriate scale to use to draw a plan of a classroom block: 9.3 question 3
Unit 10 **Maps**	Describe the position of objects on a map: 10.1 questions 1–3 Read an index to find the location of streets: 10.2 questions 1–3	Interpret and follow a given set of directions and provide a set of directions between two places : 10.3 questions 1–3 Calculate time, distance and speed based on maps: 10.6 questions 1–5	Use a street map and index to find possible routes between places: 10.4 question 4 Identify a route between places on a map, measure the distance and use the scale to estimate distance between places: 10.5 questions 1–3	Make decisions about stopping points on a journey based on information available: 10.7 question 1d Compare two marathon routes using a map and an elevation map and answer questions related to the routes: 10.8 question 2h–j, 3

Term 3: Measurement

Unit	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Unit 1 Perimeter, area and volume	Know that area is expressed in square units: 1.1 questions 5–7 Identify from a given table which formula are needed for different calculations: 1.2 questions 1–10	Calculate perimeter and area by substituting values into formulae: 1.2 questions 1–10 Use formulae to find surface area and volume: 1.4 questions 1–3	Break composite shapes into more familiar pieces and find the area of each in order to find the area of the whole: 1.3 questions 1–6 Work out the dimensions you need to find the surface area and volume of an irregular solid and then use these to find the surface area and volume: 1.3 question 4	Use perimeter, area and volume calculations to complete a larger project without being told what calculations are needed: Assignment 1 p. 364–370 Assignment 2 p.371–375
Unit 2 Plans (instructions and assembly diagrams)	Read and write instructions: 2.1 questions 1 and 2 Read and make sense of diagrams: 2.3 questions 1 and 2	Interpret an assembly diagram to identify what is needed and what has to be done: 2.5 questions 1–3		Critically assess a set of poorly written instructions and reformulate them to be clear and sensible: 2.2 questions 1 and 2
Unit 3 Floor and elevation plans	Read values and dimensions from a diagram and/or design drawing: 3.5 questions 1 and 2 3.6 questions 1 and 2	Use given information to identify the numbers of different features on a plan: 3.1 questions 1 and 2	Measure dimensions on a plan and use the scale to determine actual dimensions: 3.2 question 1 Use plans in conjunction with other information to determine materials needed and/or costs: 3.2 question 2 3.3 questions 2–4	Describe items represented on a plan: 3.3 question 1 Decide on an appropriate scale in which to draw a plan and then draw it: 3.4 questions 1–4
Unit 4 Using models to investigate shape and space	Measure the dimensions of an item for which a model of packaging will be constructed: 4.2 questions 1 and 2	Build a model of a cylindrical package: 4.2 questions 3–5 Build a model of a simple building given a net and dimensions: 4.5 questions 1–4	Work out how much wood you need to build boxes of different dimensions: 4.3 questions 1–4 Build a model and use to solve problems: 4.4 questions 1 and 2	Use a model to analyse the space available and make a decision about the best placement of items to maximise available space: 4.6 questions 1 and 2

Term 3: Finance

Unit	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Unit 5 Taxation		Calculate VAT and inclusive prices: 5.1 questions 1–3	Calculate UIF for different time periods: 5.2 questions 1 and 2	Use the salary bill from a small business to investigate the effect that a salary increase would have on UIF contributions: 5.2 questions 3 and 4

Term 3: Probability

Unit	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Unit 6 Probability	Use terms associated with probability correctly: 6.1 questions 1 and 2 Identify all possible outcomes for an event using a tree diagram: 6.11 question 4	Express probability in percentages and numbers: 6.2 questions 1–5 Do experiments and record the outcomes: 6.3 questions 1–4 6.4 questions 1–5	Identify values from a table and use them to express the probability of certain events: 6.5 questions 4–6	Use a table of rainfall and weather probabilities to make and assess the chance of rain at different times: 6.7 questions 1–3 6.8 question 1 Critically assess the use of probability values in media sources and advertisements for products such as pregnancy tests: 6.8 question 2 6.9 questions 1–5 6.10 questions 1–3

Term 4: Finance

Unit	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Unit 1 **Exchange rates**	Rank countries in terms of the given buying power of their currencies: 1.3 question 1	Use given exchange rates to determine the value of one currency for a given value of another: 1.1 questions 1–4	Perform currency conversion calculations related to the buying power of the currency: 1.3 question 2	Explain how a strong or weak currency affects prices in different countries: 1.2 questions 2 and 3 Compare currencies using the idea of buying power for different items: 1.3 questions 3

Term 4: Data handling

Unit	Level 1: Knowing	Level 2: Applying routine procedures in familiar contexts	Level 3: Applying multi-step procedures in a variety of contexts	Level 4: Reasoning and reflecting
Unit 2 **Data handling**	Read information from a table of results: 2.1 question 1 Read data from a given frequency table: 2.6 question 1 Work out the angle size for sectors of a pie graph: 2.9 question 1 Read values directly from graphs: 2.10 question 1	Decide whether a sample is representative or not: 2.2 question 1 Complete a table to summarise data collected during a survey: question 2 Calculate the mean, median, mode and range: 2.7 questions 1–6 Draw and label graphs: 2.9 questions 1–5 2.11 questions 1–3 2.13 questions 1 and 2	Decide on appropriate questions to include on a questionnaire and then conduct the survey: 2.4 questions 1–8 Use raw data to draw up a grouped frequency table and answer questions based on the table: 2.6 question 2–3 Choose the most appropriate form of graph to represent different sets of data, giving reasons for choices: 2.16 question 1	Critique the questions and posted results of a survey: 2.2 question 3 Analyse measures of spread and central tendency to make deductions about trends in the data: 2.8 questions 2–6 Analyse graphs and make deductions about trends in the data and predictions for the future: 2.14 question 3 Interpret and critically analyse data presented in the form of different graphs: 2.17 questions 1–4

TERM 1

WORKED ANSWERS

You may want to reorganise the pages in this file so that the tables with taxonomy levels for assessment are next to the worked solutions for each term. Remember though that the tables contain examples of activities that fall into each level of the taxonomy and it they do not contain a definitive or complete list.

Unit 1
Making sense of graphs that tell a story

Learner's Book pages 2–8

Teaching tips

- Learners worked with graphs that tell a story in Grade 10. This unit aims to expose them to more examples of different types of graph to revise what they already know and build on the idea that information can be presented in a variety of different ways.
- The types of graph introduced in this unit will be used and reused as learners work through the course so it is important that you make sure they understand how to read and make sense of pictographs, pie charts, bar graph and line graphs.
- Learners should already know that graphs can be misleading (either accidentally or on purpose). They will look critically at the information presented and how it is presented to see how graphs can give a fair or a misleading picture.

Solutions

1.1 **Practise** reading and making sense of pictographs

Learner's Book page 2

1. **a.** The graph shows the number of tourists visiting the Cradle of Humankind on a monthly basis from August through to December.
b. October and November. A possible reason would be that October is the month when spring/summer begins and the weather is good.
c. August; 2000 tourists visited the Cradle of Humankind.
d. The graph would use rounded off figures as a pictograph provides a visual representation of the data and it is not exact.

2. **a.** The graph shows the growth in the world's population from 1650 to 2070.
b. From about 1930, the world's population has grown very rapidly.
c. 0,5 billion people
d. 7 billion people
e. A projected population is a value that is calculated using the current trend in the world's population growth. So, the value given for the world's population in 2070 is an estimated value.

3. **a.** This graph shows the employment/unemployment rate for couples with dependants.
b. There is no key as there is a scale at the bottom of the pictograph.
c. Using the scale you can work out that each picture represents 5%.

d. No.

e. A pictograph is easier to interpret by just looking at the pictures and it is also more eye-catching. A bar graph would require more attention from the readers if they wished to interpret the data.

1.2 **Practise** reading and making sense of pie charts

Learner's Book page 4

1. **a.** Favourite type of TV programme among Grade 11 learners

b. You cannot tell how many learners were interviewed as the data values are given as percentages.

c. Comedy

d. Reality and nature

e. You might get different results if the survey were conducted among 50 male Grade 11 learners.

2. **a.** The graph shows the smoking habits of soccer players in the national team.

b. The circle would represent all the players in the survey.

c. The majority of players are non-smokers.

d. Number of players who smoke every day $= \frac{17}{\cancel{100}_{20}} \times \frac{\cancel{15}^{3}}{1}$

$= \frac{51}{20}$

$= 2\frac{11}{20}$

Two players smoke every day.

1.3 **Practise** reading and making sense of bar graphs

Learner's Book page 6

1. **a.** The graph shows average monthly rainfall for Bloemfontein.

b. Precipitation in millimetres (mm)

c. The horizontal scale shows that each bar stands for the amount of rainfall for each month of the year

d. January, February and March

e. Approximately: 68 mm + 71 mm + 70 mm = 209 mm

f. Winter

2. **a.** The graph shows the average monthly rainfall for Springbok, Northern Cape.

b. In both graphs the vertical scale represents precipitation in millimetres (mm). However, in the graph that shows the rainfall in Bloemfontein, the scale goes from 0 mm to 80 mm, while on the graph that shows the rainfall in Springbok, the scale goes from 0 mm to 30 mm over the *same* distance on the vertical axis.

c. Approximately 27 mm fell during May.

d. Approximately 3 mm fell during January.

e. The rainfall pattern in Springbok shows that the most rain falls during winter and the least rain falls in summer. It is the opposite of Bloemfontein's rainfall pattern.

3. **a.** The graphs show the most frequently used drugs and the relative frequency with which they are used.

b. Alcohol followed by dagga

c. Having no vertical scale makes it difficult to make sense of the graphs as you do not know what the values on the vertical axis represent.

d. The vertical scale could possibly represent percentages of the group who were interviewed. If you add all the totals of each type of drug it comes to about 100%.

1.4 **Practise** reading and making sense of line graphs

Learner's Book page 7

1. **a.** The graph shows the number of tomatoes sold at Salie's Veggies over a period of one week.
   b. Wednesday and Sunday
   c. Salie should make sure that he has a good stock of tomatoes on Wednesdays and Saturdays.
2. **a.** The graph shows the number of burglaries in the southern suburbs from January to May.
   b. The number of burglaries decrease steadily from January through to May.
   c. The vertical scale must start at 0 so any changes and trends can be clearly seen.
3. Answers will differ.
4. **a.** The graph shows the frequency with which words from other languages are used in everyday speech.
   b. Eina
   c. Afrikaans
   d. Serious
   e. Answers will differ.

Unit 2
Patterns and relationships

Learner's Book pages 9–12

Teaching tips

- Learners worked with only three types of relationship in Grade 10: fixed (or constant relationships, relationships with a constant difference between terms and inversely proportional relationships). In this unit, they will build on those skills to understand and use relationships with a constant ratio between terms (compound growth) and unpredictable relationships where there is no constant or predictable pattern.
- Encourage learners to look for patterns in each example in this unit. Once they can see a pattern, it means that a relationship exists. If you can define the relationship mathematically, you can work out missing values and predict what the pattern will do.
- You may want to refer to the basic skills section and revise some of the work on proportion as you work through this unit.
- Encourage learners to suggest equivalent ways of expressing different relationships. The aim is for them to understand that a relationship can be expressed as an equation, as a table of values and a graph. This concept is covered more formally in Unit 3.

Solutions

2.1 **Practise** working with constant ratios

Learner's Book page 11

1.

Year	1	2	3	4	5
Rent	R3 800,00	R4 180,00	R4 598,00	R5 057,80	R5 563,58

2.

Year	1	2	3	4	5	6
Value of car	R99 000,00	R74 250,00	R55 687,50	R41 765,63	R31 324,22	R23 493,16

3.

Year	1	2	3
Annual salary	R184 000,00	R191 360,00	R199 014,40

4. **a.** A decreasing relationship
b. Population
c. $\frac{49}{50} = 0{,}98$
d. The population in 2024 will be 112 212.
e. Class discussion. Possible answers include: migration to the cities in search of employment and effects of HIV.

2.2 **Practise** working with relationships in which there is no obvious pattern

Learner's Book page 12

1.

	Client	C	A	F	B	G	E	D
a.	Height (m)	1,64	1,65	1,66	1,67	1,67	1,68	1,75
b.	Mass (kg)	63	55	64	64	64	75	79

c. There is no real pattern to the data so one can conclude that there is no relationship between height and mass.

2. **a.**

Client	A	B	C	D	E	F	G
BMI	20,2	22,95	26,56	25,80	26,57	23,23	22,95

b. Clients C, D and E are overweight.

3. **a.** Temperature
b. Depth
c. The temperature of the ocean decreases with increasing depth. Temperature decreases most rapidly up to a depth of 200 m. Temperature then decreases more gradually with increasing depth.

d.

Depth (m)	0	100	200	300	400	500	600	700	800	900	1 000
Temperature (°C)	27	24	11	9	8	7	6,5	6	5,5	5,25	5

e. There is no real pattern or rule that links the depth to the temperature.

Unit 3
Representing relationships in tables, equations and graphs

Learner's Book pages 13–16

Teaching tips

- This unit builds on and makes explicit the idea that information (particularly information about mathematical relationships) is not always presented in the way that we want or in ways that are useful and easy to understand.
- Collect everyday examples of patterns and relationships and ask the class to represent these in different ways. For example, you could find a graph

in the newspaper and ask the learners to draw up a table of values using the graph. You could also collect exchange rate data for a week, given in numbers or tables and ask the learners to graph the changes in value of the rand or another currency (this would work with share prices, daily temperatures, number of times a particular politician is mentioned on the front page and so on.)

Solutions

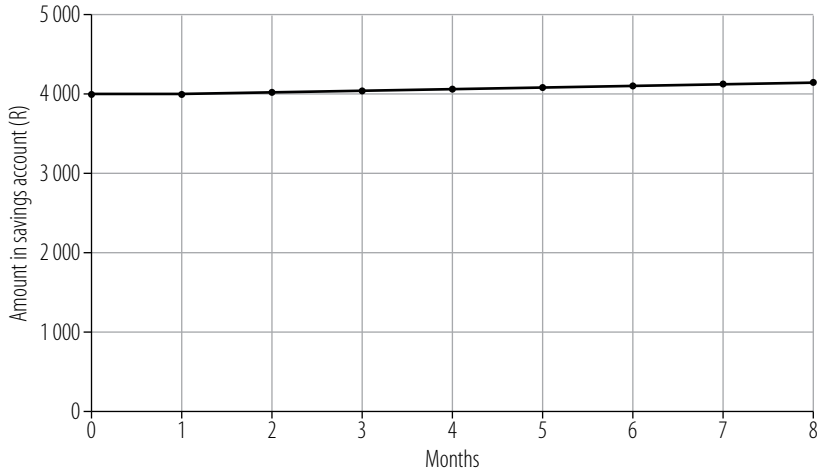
3.1 **Practise** representing data in different ways

Learner's Book page 15

1. a. × 1,005

b. Amount in month 7 = 1,005 × 4 101,00 = R4 121,51
Amount in month 8 = 1,005 × 4 121,51 = R4 142,12

c.



2. a. The graph shows the relationship between the percentage of visitors lost and the time a web page takes to load.

b. About 68% – just under 70%

c. At 5 seconds

d. 30 seconds

e. 10%

f. If a web page takes too long to load, visitors will not be prepared to wait and the page will not receive many visitors.

3. a. The graph shows the relationship between the number of people who know Debbie's secret and the time in minutes after she first told Minki.

b.

Time (min.)	5	10	15	20	25	30	35	40	45
Number of people	2	4	8	16	32	64	128	256	512

c. This is an exponential relationship. The number of people who know Debbie's secret doubles every five minutes.

d. Constant ratio: × 2

e. After 50 minutes: 512 × 2 = 1 024 people
After 55 minutes: 1 024 × 2 = 2 048 people
After 60 minutes: 2 048 × 2 = 4 096 people would know Debbie was in love with Jabu.

Unit 4
Working with two relationships at the same time

Learner's Book pages 17–27

Teaching tips

- In Grade 10 learners worked with graphs that show only one relationship at a time. In the real world, you are often expected to deal with more than one relationship at the same time. The Learner's Book gives many practical examples to show where this happens, but you should stress that whenever you compare two sets of data on the same graph, you are working with two different relationships. Remember though, that the learners only need to deal with two relationships in Grade 11, they will handle multiple relationships in Grade 12.
- The concept of a break-even point is introduced in this unit. Break-even is the point at which a business earns as much money as it has spent. In other words, the costs and the income are exactly the same. When you graph this relationship you get two lines. Both lines normally go up (towards the right on the graph because the costs increase over time and the amount earned also increases). Point out to learners that the lines may not start at the same point and that they don't usually go up at the same rate. When the two lines cross, the business has reached its break-even point. At this point, the costs and income are exactly the same (they are at the same place on the graph). Work through the simple example with the class and make sure they understand the concepts before moving on. This topic is handled again in more detail in Unit 12 where learners are expected to apply the basic skills and understanding from this unit to solve problems and make decisions in context.

Solutions

4.1 **Practise** interpreting graphs that show two relationships

Learner's Book page 19

1. **a.** Average time spent watching television and average time spent doing homework
b. As the learners move into higher grades, the amount of time they spend watching television decreases and the amount of time they spend doing homework increases.
c. The amount of time spent on homework increases.
d. 90 minutes per day
e. about 44 minutes per day

2. **a.** The graph shows the sales of product A and product B over four years.
b. The sales of product A increase steadily for the first three years and then increase even more during the fourth year.
c. The sales of product B decrease slightly during the first year and thereafter the sales increase steadily.
d. During the third and fourth years
e. The company earned the same from product A and product B at the end of the second year. You can tell this from the fact that the two graphs intersect at that point.
f. About R1 500

4.2 **Investigation:** Comparing costs of solar and nuclear energy

Learner's Book page 20

1. This graph shows the comparative cost of nuclear energy and solar energy from 1998 to 2021.
2. At the bottom of the vertical axis the cost is represented by a small R and at the top of the vertical axis the cost is represented by a large R. This indicates that the cost increases as you go up the axis.
3. As there is no actual scale on the vertical axis it is impossible to give a value. All you can say is that solar energy was considerably more expensive than nuclear energy in 1998.
4. The cost of nuclear energy has increased over time. A possible reason could be the increased cost of building a nuclear power station and also the increased cost of implementing safety regulations.
5. The cost of solar energy has decreased over time. A possible reason could be that the technology has improved in recent times and, therefore, the solar power systems are more cost-effective.
6. In 2010
7. The person who drew this graph wanted to show the predicted costs of nuclear and solar power in 2021. They would have drawn the graph based on current trends in the costs of nuclear and solar power.
8. As there is no scale on the vertical axis, it is impossible to give a value. You can however see that solar energy will be considerably cheaper than nuclear energy in 2021.

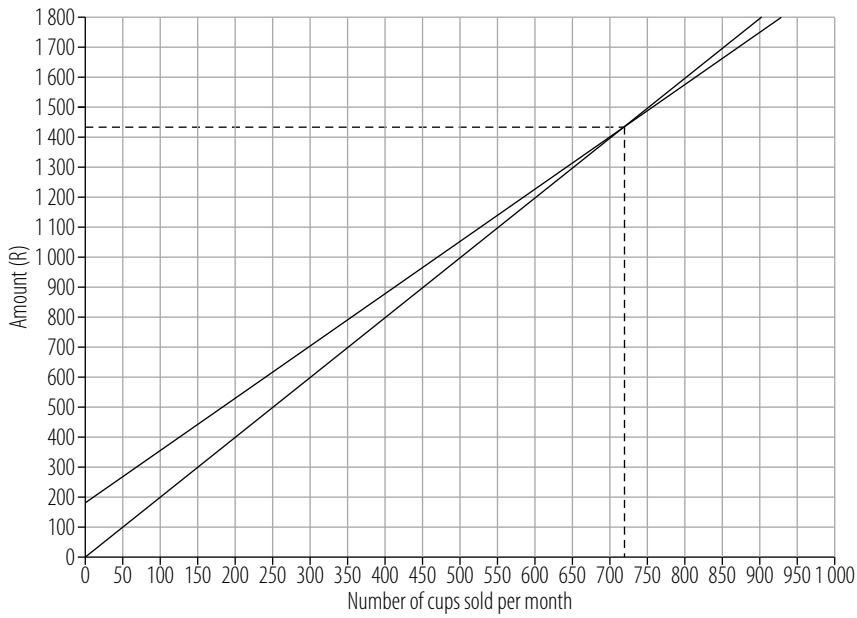
4.3 **Practise** working with break-even values

Learner's Book page 22

1. a.

Number of cups	50	100	150	200	250	300	350	400
Cost (R)	267,50	355	442,50	530	617,50	705	792,50	880
Income (R)	100	200	300	400	500	600	700	800

b.



c. R1 440

d. 720 cups

e. Her profit margin will decrease.

2. Answers will differ. Encourage learners to motivate their answers.

3. **a.** Class discussion. Possible answers include: rent, utility accounts or staff wages.

b. R20

c. R20

d. the break-even point

e. Profit = revenue – cost = R40 – R30 = R10

4.4 **Assignment:** Making decisions using graphs

Learner's Book page 24

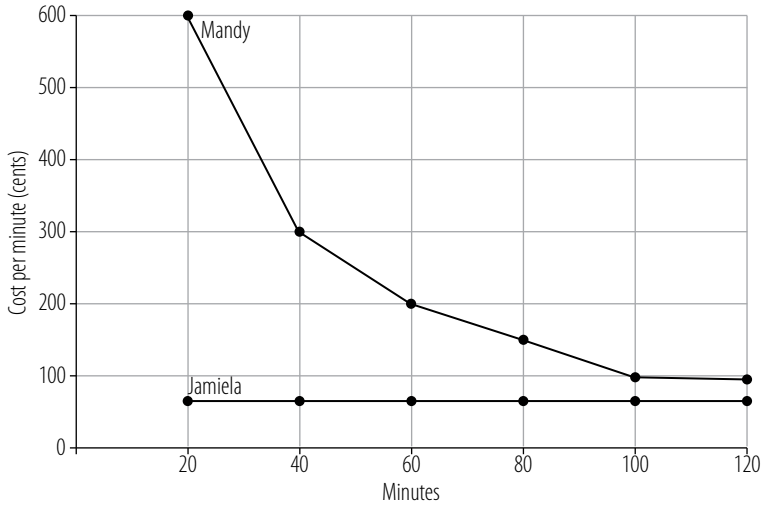
1. **a.** Mandy

Minutes	20	40	60	80	100	120
Cost (cents per minute)	600	300	200	150	98	95

b. Jamiela

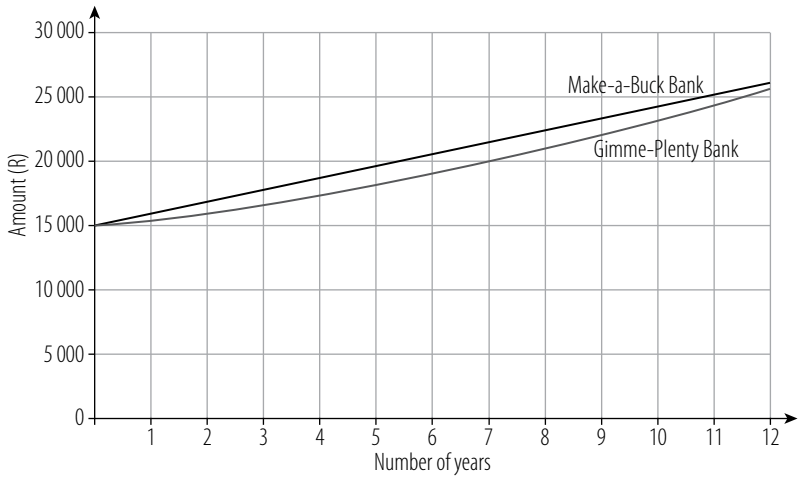
Minutes	20	40	60	80	100	120
Cost (cents per minute)	65	65	65	65	65	65

c.



d. The graph shows us that Jamiela has the cheaper option irrespective of how much airtime is used.

2. **a.**



b. From the graph we can see that Make-a-Buck Bank gives the best return on the investment over three years. We can check this by doing a calculation.

Make-a-Buck Bank: $A = P(1 + in) = 15\,000(1 + 0{,}06 \times 3) = R17\,700$

Gimme-Plenty Bank: $A = P(1 + i)^n = 15\,000(1 + 0{,}045)^3 = R17\,117{,}49$

c. From the graph we can see that Make-a-Buck Bank gives the best return on the investment over ten years. We can check this by doing a calculation.

Make-a-Buck Bank: $A = P(1 + in) = 15\,000(1 + 0{,}06 \times 10)$
$= R24\,000{,}00$

Gimme-Plenty Bank: $A = P(1 + i)^n = 15\,000(1 + 0{,}045)^{10}$
$= R23\,294{,}54$

» Revise and consolidate: Patterns, relationships and representations

Learner's Book page 26

1. a. This compound bar graph shows the levels of employment compared to level of education for people aged 18 to 64 years.

b. For which country is the data?
For which years was the data collected?
Other answers could also be correct.

2. a.

Number of learners	1	2	3	4	5
Total cost (R)	313,50	332,00	350,50	369,00	387,50

b. The cost increases by R18,50 for each additional learner.

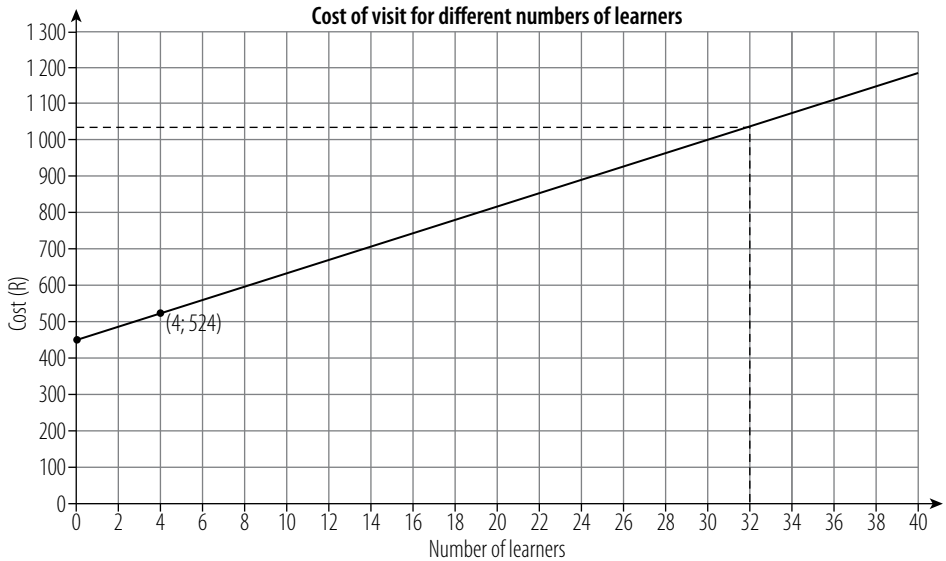
c. C = cost
N = number of learners
C = R295 + R18,50 × N

d. C = R295 + R18,50 × 12
= R517

e. C = R295 + R18,50 N
R443,00 = R295 + R18,50 N
R443,00 – R295 = R18,50 N
R148 = R18,50 N
$\frac{R148}{R18,50} = N$
$\therefore N = 8$
Eight learners went on the trip.

f.

Number of learners	1	2	3	4
Total cost (R)	468,50	487,00	505,50	524,00



g. The cost for 32 learners is R1 042.

3. a. The top graph shows the cost of overall losses incurred by natural disasters and the bottom graph shows the cost of insured losses incurred by natural disasters.

b. 1988
The value of insured losses was about $15 billion.

c. The Kobe earthquake in 1995

d. Overall losses peak in 1995 as a result of the Kobe earthquake. Overall losses drop to below $100 billion in 1996, but increase again from 2007 to 2009. Overall losses drop again in 2000 and remain fairly low until losses rise steeply in 2005 as a result of Hurricane Katrina and the Kashmir earthquake.

e. i. $150 billion

ii. $260 billion

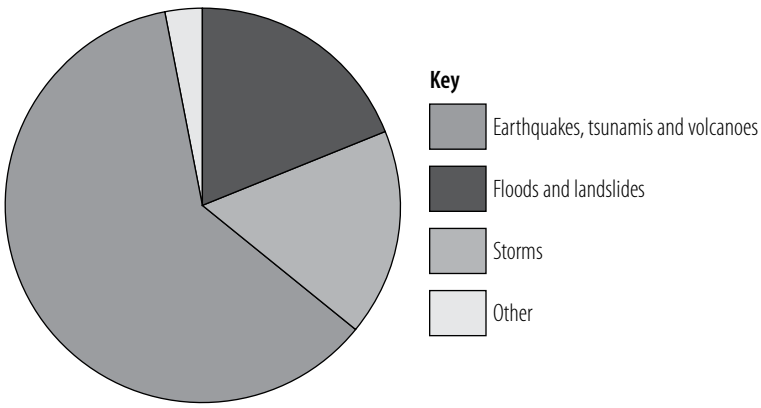
4. a. Work out the size (in degrees) for each sector.

Floods and landslides: $\frac{42}{380} \times 360° = 68{,}21°$

Storms: $\frac{65}{380} \times 360° = 61{,}58°$

Earthquakes, tsunamis and volcanoes: $\frac{232}{380} \times 360° = 219{,}79°$

Other: $\frac{11}{380} \times 360° = 10{,}42°$



b. $380 × 6,20 = R2 356 billion

Unit 5
Conversions

Learner's Book pages 28–45

Teaching tips

- Learners should already be familiar with conversions between units in the metric system as they did extensive work on this in Grade 10. They will briefly revise the basic concepts in this unit and also revise area and volume conversions to remind them that these use powers of 10 as a conversion factor.
- Learners should easily be able to convert between units in the metric system. Encourage them to use the conversion tables on pages 29 to 33 as necessary. If necessary, make transparencies or posters of these to display in the classroom.
- A new concept in this unit involves converting between metric and imperial units. The Imperial system of measurement is based on British units that use a non-decimal system (for example there are 12 inches in

one foot and 16 pounds in one stone). There are only three countries that officially retain this system: the United States of America, Liberia in West Africa and Myanmar in South-East Asia. All other countries have officially adopted the metric system. However, in many countries, there is still a tendency to use some Imperial units. For example, in South Africa, surfers still talk about the size of waves in feet, in the UK, many distances are still given in miles and older people everywhere usually talk about height in feet and inches (he is six foot four) and sometimes mass in pounds (he lost over 30 pounds).

- It is important to teach learners to convert between these systems, particularly as they may use books and instruction manuals or technical guidelines printed in the USA. You will find a table of sensible (estimated and rounded off) conversion factors to help learners do these conversions.
- The USA and Canada also use the Fahrenheit scale for temperature. It is easy to convert between Fahrenheit and Celsius using the formula that learners are given in this unit.
- Lastly, learners will revise the basic concepts of scale (you may to need revise the basic skills section on ratios before you do this). This will be revisited and reinforced in Term 2 when learners work with maps and plans in more detailed contexts.

Solutions

5.1 **Practise** conversions

Learner's Book page 33

1. **a.** Closer to 2 m
b. 2 kg is bigger.
c. 25 rulers
d. 40 inches
e. 2 bags of flour
f. 1 000 plots
g. 10 plots
h. 1,5 ℓ of paint will be needed.

2. **a.** 12,78 m = 1 278 cm 1 278 cm × 0,4 = 511,2 inches
b. 405 m = 0,405 km 0,405 km × 0,6 = 0,24 miles
c. 0,125 km = 12 500 cm 12 500 cm × 0,4 = 5 000 inches
5 000 inches ÷ 12 = 416,67 feet
d. 304,5 mm = 0,3045 m 0,3045 m ÷ 0,3 = 1,015 feet (30 cm = 1 foot)
e. 79,4 km = 79 400 m 79 400 m × 1,1 = 87 304 yards
f. 3 miles × 1,6 = 4,8 km = 4 800 m
g. 105 g = 0,105 kg = 105 000 mg
h. 100,125 kg = 100 125 g = 0,100 125 tonnes
i. 12,1 g = 12 100 mg = 0,0121 kg
j. 197 520 mg = 197,520 g = 0,19752 kg
k. 0,09 t = 90 kg = 90 000 g
l. 352,076 kg = 352 076 000 mg = 352 076 g
m. 50 ℓ = 50 000 ml
n. 124,05 ml = 0,12405 ℓ
o. 50 000 ml = 50 ℓ
p. 202,3 ℓ = 0,2023 kl
q. 300 ml = 0,000 3 kl
r. 0,6905 kl = 690,5 ℓ
s. 1 200 cm^2 = 0,12 m^2
t. 0,78 m^2 = 7 800 cm^2
u. 10,2 km^2 = 10 200 000 m^2
v. 350 cm^3 = 350 000 mm^3
w. 98,4 m^3 = 98 4000 000 cm^3
x. 350 075 mm^3 = 350,075 cm^3

3. a. 2 eggs
14,2 g caster sugar
0,43 ℓ milk (430 ml milk)
57 g cake crumbs
225 g stoned dates
225 g stoned raisins
57 g finely chopped mixed peel
$\frac{1}{4}$ teaspoon ground nutmeg
450 g cooking apples

b. Adapting the above recipe that serves six people, to serve 150 people means that the quantities must be increased by a factor of 25.
50 eggs
10,75 ℓ milk
1,43 kg cake crumbs
5,63 kg stones dates
5,63 kg stoned raisins
1,43 kg chopped mixed peel
$6\frac{1}{4}$ teaspoon ground nutmeg
11,25 kg cooking apples

5.2 **Practise** calibrating household measuring equipment

Learner's Book page 36

Answers will differ. Discuss answers in class.

5.3 **Practise** choosing appropriate measuring units

Learner's Book page 39

Answers will differ and should be discussed in class.

5.4 **Practise** converting scale measurements

Learner's Book page 45

1. a. i. 1 cm
ii. 1 cm : 2 000 cm
2 000 cm = 0,02 km

b. i. 5 mm
ii. 1 : 55 000 000 = 5 mm : 275 000 000 mm
275 000 000 mm = 275 km

c. i. 1 cm
ii. 1 cm : 2 000 000cm
2 000 000 cm = 20 km

d. i. 5 mm
ii. 1 : 110 000 = 5 mm : 550 000 mm
550 000 mm = 0,55 km

2, 3. Answers will differ.

4 a. Length of car in photo: 82 mm
Scale of photograph: 82 mm : 4 750, or 1 : 58

b. Answers will differ.

Unit 6
Measuring time

Learner's Book pages 46–68

Teaching tips

- In this unit, learners will build on their previous skills in working with time and apply what they know to record times and use given times to plan trips. In planning trips, remind them to think about real-life factors such as traffic, actual travelling speed, stopping time (for breaks, petrol and food) and how these can affect the length of a journey.
- Time measurement can be more complicated than other conversions for learners because there are a number of different conversion factors (for example, 60 for seconds to minutes and hours, but 24 for hours to days and 52 for weeks to years). Time is also non-decimal, so 12 minutes is twelve-sixtieths of an hour and not 0,12 hours. Similarly 1,2 hours is 1 hour and two-tenths of an hour (which is 12 minutes, and not 2 minutes). Make learners aware of this as they often try to use their calculators to convert time measurements forgetting that the calculator only uses decimal conversions.
- Some time measurements are given with a decimal point because this is how the time is displayed on a watch or stopwatch. Remind learners that in South Africa this technically should be written with a decimal point, but that it often won't be in the media.

Solutions

6.1 **Practise** reading different time formats

Learner's Book page 48

1. Old-fashioned clock: 11:54
Modern clock: 8:55
Digital watch: 7:29

2. Old-fashioned clock: 11:54 a.m. or p.m.
Modern clock: 8:55 a.m. or p.m.
Digital watch: 7:29 a.m. or p.m.

3. Old-fashioned clock: 11:54 or 23:54
Modern clock: 8:55 or 20:55
Digital watch: 07:29 or 19:29

4. **a.** **i.** 12/5/1945 **ii.** 5/12/1945
b. **i.** 31/1/2002 **ii.** 1/31/2002
c. **i.** 11/11/2020 **ii.** 11/11/2020
d. **i.** 1/6/1991 **ii.** 6/1/1991

6.2 **Practise** converting time from one unit to another

Learner's Book page 49

1. **a.** 5915 s **b.** 21 779,4 s **c.** 4 752 min.
d. 959 460,3 s **e.** 94,56 min. **f.** 45 172,09 s
g. 32 598,03 s **h.** 50 808,48 s
i. If there are *3 leap years* in the 10 year period:
Total number of days = (3 × 365) + (7 × 365) + 17 = 3 670
If there are *2 leap years* in the 10 year period:
Total number of days = 3 669

2. **a.** 78 hours; half a week; 4 days
b. 15 010 s; 24 : 13 : 10; 3,5 days; 95 : 8 : 10
c. 4 000 min.; 1 week
d. 11 : 23 : 0,99; 12 : 3 : 1,55
e. 500 days; 18 months; 1,9 years

3. **a.** It depends on the configuration of the moon.
b. Easter – it changes from year to year because it also depends on configuration of the moon. It is always full moon close to Easter.
c. Learners discuss the information they found about important festivals in different religions.

6.3 **Practise** calculating elapsed time

Learner's Book page 53

1. **a.** 05 : 13 : 03 **b.** 05 : 18 : 18 **c.** 07 : 48 : 30
d. 06 : 26 : 49 **e.** 05 : 10 : 59 **f.** 08 : 42 : 53
g. 05 : 44 : 30 **h.** 05 : 46 : 26 **i.** 09 : 09 : 11
j. 07 : 36 : 58

2. E A B G H D J C F I

3. **a.** 11 : 35 : 54 **b.** 13 : 46 : 24 **c.** 14 : 27 : 39
d. 15 : 49 : 23 **e.** 11 : 45 : 30 **f.** 13 : 09 : 41
g. 12 : 26 : 57 **h.** 14 : 35 : 09 **i.** 14 : 09 : 44
j. 12 : 47 : 25

4. E A G J F B I H C D

6.4 **Practise** recording and calculating elapsed time

Learner's Book page 53

Answers will differ.

6.5 **Practise** reading and interpreting timetables

Learner's Book page 60

1. **a.** Three exams (English is not written during this week.)
b. No. The German and Portuguese exams are written at the same time indicating that a learner can study either German or Portuguese.
c. No. The Geography and Sport and Exercise Science exams are at the same time indicating that a learner can either study Geography or Sport and Exercise Science.
d. English HL – 2 hours
Mathematics – 3 hours
Music – 3 hours
Tamil – $2\frac{1}{2}$ hours
Civil Technology – 3 hours
A learner will spend $13\frac{1}{2}$ hours writing exams.

2.

	Days of the week				
Hours	**Monday 21/02**	**Tuesday 22/12**	**Wednesday 23/02**	**Thursday 24/02**	**Friday 25/02**
9:00	English HL and FAL P1 (2 h)	Geography (Theory) P1 (3 h) Sport and Exercise Science P1 (2 h)	isiZulu, isiXhosa, Siswati, isiNdebele HL and FAL P1 (2 hrs) SAL ($2\frac{1}{2}$ h)	Civil Technology (3 h)	Mathematics P1 (3 h) Mathematical Literacy P1 (3 h)
14:00	German HL and SAL, Portuguese HL and FAL P3 ($2\frac{1}{2}$ h) Hindi, Gujarati, Urdu, Tamil, Telegu HL and FAL P3 ($2\frac{1}{2}$ h)	Geography (Map work) P2 ($1\frac{1}{2}$ h)	Music P1 Theory (3 h)	Music P2 Comprehension ($1\frac{1}{2}$ h)	

6.6 **Assignment:** Read and interpret a tide table

Learner's Book page 61

1. 6:56 a.m., 8:11 p.m., 7:52 a.m., 8:44 p.m., 8:37 a.m., 9:12 p.m., 9:17 a.m., 9:36 p.m., 9:53 a.m., 10:00 p.m., 10:27 a.m., 10:25 p.m., 11:01 a.m.

2. 1:42 p.m., 1:01 a.m., 2:20 p.m., 1:54 a.m., 2:32 p.m., 2:40 a.m., 3:22 p.m., 3:23 a.m., 3:50 p.m., 4:02 a.m., 4:17 p.m., 4:40 a.m., 4:38 p.m.

3.

Tides	**8 Sep.**	**9 Sep.**	**10 Sep.**	**11 Sep.**	**12 Sep.**	**13 Sep.**	**14 Sep.**
Low tide		1:01 a.m.	1:54 a.m.	2:40 a.m.	3:23 a.m.	4:02 a.m.	4:40 a.m.
High tide	6:56 a.m.	7:52 a.m.	8:37 a.m.	9:17 a.m.	9:53 a.m.	10:27 a.m.	11:01 a.m.
Low tide	1:42 p.m.	2:20 p.m.	2:32 p.m.	3:22 p.m.	3:50 p.m.	4:17 p.m.	4:38 p.m.
High tide	8:11 p.m.	8:44 p.m.	9:12 p.m.	9:36 p.m.	10:00 p.m.	10:25 p.m.	

4.

	8 Sep.	**9 Sep.**	**10 Sep.**	**11 Sep.**	**12 Sep.**	**13 Sep.**	**14 Sep.**
Moonset	3:51 a.m.	4:47 a.m.	5:40 a.m.	6:31 a.m.	7:22 a.m.	8:12 a.m.	9:02 a.m.
Moonrise	5:16 p.m.	5:54 p.m.	6:29 p.m.	7:03 p.m.	7:36 p.m.	8:10 p.m.	
Sunrise	7:13 a.m.	7:13 a.m.	7:14 a.m.	7:14 a.m.	7:14 a.m.	7:15 a.m.	7:15 a.m.
Sunset	7:49 p.m.	7:39 p.m.	7:38 p.m.	7:37 p.m.	7:36 p.m.	7:35 p.m.	7:34 p.m.

5. Low tide is at 1:01 a.m., so that would be a good time to launch a boat.

6. High tide is at 9:53 a.m. and 10:00 p.m. So some time round about 9:53 a.m. would be a good time (not 10:00 p.m. as it would be dark).

7.

	8 Sep.	9 Sep.	10 Sep.	11 Sep.	12 Sep.	13 Sep.	14 Sep.
Time difference	12:36	12:26	12:24	12:23	12:22	12:20	12:19

8. The sun is rising slightly later each day and setting slightly earlier each day. This means that the days are becoming progressively shorter, indicating that the seasons are changing and autumn or winter is approaching.

6.7 **Practise** drawing up a timetable

Learner's Book page 62

Answers will differ.

6.8 **Practise** calculations with time, speed and distance

Learner's Book page 67

1. time $= \frac{\text{distance}}{\text{speed}} = \frac{580 \text{ km}}{75 \text{ km/h}} = 7{,}73 \text{ h}$

2. distance = speed × time = 65 km/h × 0,5 h = 32,5 km

3. distance = speed × time = 88 km/h × 24 h = 2112 km

4. distance = speed × time = 3,8 m/s × (12 × 60) s = 2 736 m

5. time $= \frac{\text{distance}}{\text{speed}} = \frac{1{,}29 \text{ m}}{12 \text{ m/h}} = 0{,}1075 \text{ h} = 6{,}45 \text{ min.}$

6. speed $= \frac{\text{distance}}{\text{time}}$

$= \frac{90 \text{ km}}{6{,}075 \text{ h}}$

$= 14{,}81 \text{ km/h}$

$6 : 4 : 30{,}5$

$= (6 + \frac{4}{60} + \frac{30{,}5}{60 \times 60})$ h

$= 6{,}075$ h

6.9 **Practise** using time, speed and distance to plan journeys

Learner's Book page 67

1. Time required $= \frac{\text{distance}}{\text{speed}} = \frac{75 \text{ km}}{60 \text{ km/h}} = 1{,}25 \text{ h}$

The driver must allow time for picking up the children and dropping them off at school in time to get to their classrooms by 08:00. He would probably need to leave the depot at 06:15 or earlier allowing an extra half an hour for picking up the children and dropping them off at school.

2.

Truck number	Journey distance	Departure time	Number of rest stops	Total length of rest stops	Arrival time
5419	850 km	09:30	1	0,5 h	18:30
0617	1 640 km	10:15	3	1,5 h	04:09 the following day
8198	2 200 km	05:00	4	2 h	05:00 the following day
3319	930 km	11:00	1	0,5 h	20:48
2823	3 175 km	04:00	6	3 h	14:45 the following day

3. **a.** If they make the journey without any stops,
time $= \frac{\text{distance}}{\text{speed}} = \frac{900 \text{ km}}{120 \text{ km/h}} = 7{,}5$ hours
They should make about three stops.

b. If the average length of each stop is 30 minutes, it will add an extra 1,5 hours to their journey, making the journey 9 hours in total.

c. They should leave Polokwane at 6:00 a.m. if not earlier.

d. 3:00 p.m. or 15:00

4. Answers will differ.

5. Class discussion.

1. **a.** **i.** 15 miles **ii.** 15,70 miles
b. **i.** 0,4 km **ii.** 0,39 km
c. **i.** 110 yards **ii.** 109,36 yards
d. **i.** 1,8 m **ii.** 1,83 m
e. **i.** 16 000 cm **ii.** 16 093 cm
f. **i.** 4 inches **ii.** 3,94 inches
g. **i.** 34 884 000 mg **ii.** 34 884 000 mg
h. **i.** 0,23 kg **ii.** 0,23 kg
i. **i.** 3 136 kg **ii.** 3 149,44 kg
j. **i.** 125 000 ml **ii.** 125 000 ml
k. **i.** 120 015 ml **ii.** 120 015 ml
l. **i.** 0,255 m^2 **ii.** 0,255 m^2
m. **i.** 500 cm^2 **ii.** 500 cm^2
n. **i.** 5 000 m^2 **ii.** 5 000,15 m^2
o. **i.** 0,16 km^2 **ii.** 0,16 km^2
p. **i.** 49 000 mm^2 **ii.** 49 000 mm^2
q. **i.** 9 120 000 000 mm^3 **ii.** 9 120 000 000 mm^3
r. **i.** 1 000 ha **ii.** 999,97 ha

2. Answers will differ. Learners should give reasons for their answers.

3. Learners can check each other's enlargements.

4. **a.** 1 885 min. **b.** 97 818 s
c. 31 092 min. **d.** 12 173 h
e. 1 007,27 s **f.** 847,12 min.
g. 8 178,35 s **h.** 931,31 min.
i. 5 221 days
There could be more than one answer. This would depend on how many leap years are included in the 14 years and the number of days in the three months.

5. **a.** 36 hours
b. 220 days
c. 1,5 days
d. 2 years

6. **a.** 98 years 58 days 12 hours
b. 1:9,12
c. 57 days 4 hours 25 minutes
d. 4:51:45

7. **a.** Learners can compare their answers (timetables).
b. 11 days 12 hours
c. Gujarati FAL
d. 20,5 hours or 22,5 hours if you are writing Maths Paper 3.

8. **a.** $t = \frac{199 \text{ km}}{90 \text{ km/h}}$
$= 2{,}21$ hours
b. Distance from Aliwal North to Queenstown
$= 364 - 199$
$= 165$ km
Time taken = 1:09
$= 1\frac{9}{60}$ h
$= 1{,}15$ h
Average speed $= \frac{\text{distance}}{\text{time}}$
$= \frac{165}{115}$
$= 143{,}48$ km/h

c. Time = $\frac{\text{distance}}{\text{speed}}$

Willem and Marianne Fourie: Time = $\frac{584}{100}$ = 5,84 hours

Parents: Time = $\frac{584}{110}$ = 5,31 hours

Arrival time: Willem and Marianne Fourie:

5,84 hours = 5 hours ($\frac{84}{100}$ × 60) minutes

= 5 hours 40 mins

7:45 + 5:40 = 13:25

Arrival time: Parents

5,31 hours = 5 hours ($\frac{31}{100}$ × 60) minutes

= 5 hours 19 minutes

8:20 + 5:19 = 13:39

Willem and Marianne Fourie arrive first.

d. Distance from East London to Queenstown = 220 km

Time = $\frac{\text{distance}}{\text{speed}} = \frac{220}{20}$ = 20 hours.

They should allow two days for the journey.

Unit 7
Financial documents at home

Learner's Book pages 75–86

Teaching tips

- There are no new concepts in this unit. Learners will work with different versions of the household accounts and other documents that they worked with in Grade 10.
- Remind the learners that some of the documents in this unit may look different to the ones that they see at home because different provinces or municipalities and different companies have different formats and layouts for these accounts.
- It will be useful to collect a range of household accounts for learners to look at. Keep people's privacy in mind and black out any personal details before you distribute these accounts to the class. Discuss this with the learners as identify theft and fraudulent use of bank details is a common problem nowadays.

Solutions

7.1 **Practise** reading household utility bills

Learner's Book page 78

1. A
- **a.** Mr FR Smit
- **b.** 146893715
- **c.** electricity
- **d.** R0,00
- **e.** R148,49
- **f.** R170,77
- **g.** 9 January 2020
- **h.** Payments can be made at the City of Cape Town cash office or BSA, Checkers, Shoprite or the Post Office.

B
- **a.** Your name
- **b.** 0123456789123
- **c.** telephone rental and usage
- **d.** R0,00
- **e.** R563,16 (with discount)
- **f.** R647,63
- **g.** 8 July 2019

h. If you pay at a counter, the full page must accompany payment. Alternately you could pay by mail.

C **a.** Mr MN Makgamathe **b.** A0795180
c. cellphone usage **d.** R0,00
e. R236,25 **f.** R271,69
g. date not given **h.** MTNSP's bank account

2. a.
- Address and contact number or email address of company
- Date of statement
- Opening balance
- Payment received
- Invoice number and date for each purchase in the period covered by the account
- For how long amounts on unpaid accounts have been owing
- Bank details for the company or other payment instructions
- Remittance advice (payment slip)
- Penalties for late payment of the amount owing

3. a. The amount of R1 205,17 owing was calculated as follows:
- The monthly property rates are calculated based on the municipal valuation of the property: R555,53
- The charge for water consumption for the month: R299,56
- An amount of R75,44 is charged for refuse removal of the contents of a standard 240-ℓ bin.
- A sewerage disposal charge of R199,41 is also included.
- 15% VAT was added to the water, refuse and sewerage amounts, which brings the total to R1 205,17.

b. On 04/11/2019, the balance brought forward shows an amount of R167,50, A payment of R167,50 was made on 30/11/2019. This payment is indicated by –R167,50. From 04/11/2019 to 03/12/2019, Fred Smith ran up an account of R254,29. This amount is now owing.

c. The previous account balance was R172,68. An amount of R600,00 was paid into the account leaving a credit balance of R427,32. The latest account for the current month involves an amount of R215,69 owing. This amount of R215,69 is subtracted from the credit balance of R427,32 leaving a new credit balance of R211,63.

7.2 **Practise** reading invoices, receipts and account statements

Learner's Book page 83

Discuss learners' answers in class.

7.3 **Practise** calculations with household financial documents

Learner's Book page 86

Note: These answers are estimates. Learners' answers may differ.

1.

Item	Estimate for April – June
Rates	R850
Electricity	R1 400
Food	R7 000
School Fees	R2 550
Taxi/bus/train fares	R1 800

2.

Item	Actual amount spent April – June	Difference from budgeted amount	
Food	R7 395,05	R604,00	+7,56% overbudgeted
Petrol	R2 090,03	–R590,03	–39,34% underbudgeted
Car repairs	R3 101,20	–R2 351,20	–313,41% underbudgeted
Cellphone	R861,00	R339,00	+28,25% overbudgeted
DVD rentals	R145,00	R35,00	+19,44% overbudgeted
Books and magazines	R410,50	R89,50	+17,9% overbudgeted
Medical expenses	R7 310,00	–R5810,00	–387,33 underbudgeted

3. They need to budget much more for petrol, car repairs and medical. From January to March they spent about R6 000 on food whereas from April to June they spent R7 395,05. If this trend continues they will need to budget about R9 000 for food from July to September.

Unit 8
Financial documents at work

Learner's Book pages 87–107

Teaching tips

- This unit focuses on documents used in the workplace. Some of these documents (such as invoices, receipts and statements) are the same as those learners worked with in the context of household finances, however, there are many workplace documents that may be new to learners.
- You might need to explain the difference between an invoice and a statement. Statements are issued to people or companies who have accounts. The statement may list several invoices. You can use a company cellphone account as an example. Company A may have ten cellphone contracts for its workers. Each month the service provider will send company A a statement of account showing how much they owe. The statement will list ten invoice amounts, one for each cellphone contract.
- As you work through the examples using different documents, focus on why these documents are important and how they can help their business owners manage their financial affairs effectively.

Solutions

8.1 **Practise** reading quotations

Learner's Book page 90

1. **a.** The total amount is R1 273,60. The contractor has rounded up to the nearest hundred.

b. The total cost is R411.00. The supplier has underquoted by R15.

2.

Quotation
To:
remove old plantings in front of house – R376,25
replace with new flowering plants – R800
compost and mulch for 7 m^2 – compost R94,50/m^2
mulch R85,20/m^2
prune 5 existing trees @ R64,50/tree
plant 4 new trees @ R201,25/tree
Total cost: R3 561,65

8.2 **Practise** working with invoices and receipts

Learner's Book page 94

1. Harli Clothing: R250
Pipe Plumbers: R58,21
Rent: R1 500

2.

RECEIPT	3 May 2020
Received for:	
2 long-sleeved T-shirts	R172,50
1 Skirt (velvet and lace)	R258,75
1 Woollen Jacket	R546,25
3 Winter leggings	R103,47
Total	**R1 080,97**
AB for Lelanie's Dream Dresses	

3. **a.** Invoices 28, 32 and 36 have not been paid.
b. R235,49
c. R1 224,64
d. Yes. Receipts 307, 309 and 316 do not correspond to any of the invoices.
e. The owner should check the invoices and receipts that do not reconcile.

8.3 **Practise** reading payslips

Learner's Book page 98

1. **A** **a.** Nombulelo Krussers
b. line operations manager
c. 01/05/2020 to 01/06/2020
d. 40 hours
e. R33,48 p/h
f. 5 hours
g. R50,22
h. PAYE (14%): R222,64

B **a.** Lanelle Riley
b. cashier
c. 09/01/2020 to 13/01/2020
d. 40 hours
e. R18,75 p/h
f. none
g. not applicable
h. PAYE (25%): R187,50

C **a.** Sharon Miller
b. drill operator and store manager
c. 23 May 2019
d. 8 hours
e. R18,75 p/h
f. none
g. not applicable
h. none

D **a.** Gavin Steenkamp
b. digital analyst
c. 1 October 2019 to 1 November 2019
d. monthly wage (hours not given)
e. not given
f. overtime: 3,5 hours
Sundays: 4 hours
g. overtime: R500 p/h
Sundays: R750 p/h
h. PAYE: R5 780

2. **A** (33,48 × 40) + (50,22 × 5)
= 1 339,20 + 251,10
= R1 590,30

B 18,75 × 40 = R750,00

C 18,75 × 8 = R150,00

D 15 000 + (500 × 3,5) + (750 × 8)
= 15 000 + 1 750 + 3 000
= R19 750

3. **A** R1 590,30 – R222,64 = R1 369,66
B R750,00 – R187,50 = R562,50
C no deductions
D R19 750 – R2 768,00 = R16 982,00

8.4 **Practise** calculations with payslips

Learner's Book page 101

a. R4 608,00 **b.** R0 **c.** R4 686,00
d. R898,54 **e.** R3 787,46 **f.** R527,00
g. R100,00 **h.** R204,00 **i.** R68,00
j. R0,00 **k.** R8,99 **l.** R85,27
m. R813,73

8.5 **Practise** using travel allowance claim forms

Learner's Book page 104

1. **a.** 1 030 km
b. 675 km
c. Fuel cost: 675 × 75,6c = R510,30
Maintenance cost: 675 × 32,3c = R218,03
Total refund: R728,33

2. **a.**

Date	Opening km	Closing km	Total
21/5	49 568	49 621	53
22/5	49 710	49 755	45
25/5	49 932	49 975	43
25/5	50 044	50 073	29
25/5	50 189	50 197	8
Total			178

b. Fuel costs: 178 × 68c = R121,04
Maintenance costs: 178 × 29,2c = R51,98
Total refund: R173,02

8.6 **Practise** reading business bank documents

Learner's Book page 106

1. **a.** High Heel Shoe Repairs
b. current account
c. one month
d. R26 310,23 credit
e. cash deposit, cash withdrawal, staff salaries paid (withdrawal), interest credited, debit order, stop order, cash withdrawal, service fees deducted
f. interest of R53,69 earned
g. R346,15 (service fee)
h. R6 645,25
i. R6 296,19
j. R25 961,17 credit

2. **a.** Safe-Ride Airport Shuttles
b. savings account
c. one month
d. R5 000 credit

e. cash deposit, EFT deposit, interest credited to account, service fees deducted
f. interest of R58,97 earned; interest rate: 5,5% p.a.
g. R310,00 (service charge)
h. R310
i. R7 923,97
j. R12 614,07 credit

3. a. Stefania Sweet and Savoury
b. 24-month fixed deposit
c. three months
d. R35 000 credit
e. interest reinvested
f. interest amounts of R1234,96; R124,40 and R124,84 earned; interest rate: 4,25% p.a. capitalised monthly
g. No bank fees charged
h. R0
i. R373,20
j. R35 373,20 credit

Unit 9
Tariffs

Learner's Book pages 108–126

Teaching tips

- Learners worked with tariffs in Grade 10 to determine the best options for cellphone packages and other options.
- Tariffs can be a bit more complicated than normal pricing because they are usually stepped, which means that the tariff rate (the amount charged) changes depending on how much or how little you use.
- The skills developed in this unit are important because they equip learners to choose tariffs critically to suit their specific needs. Companies often try to get customers to take the tariff option (package) that gives the company the most profit, these tariffs may not be the best in terms of the customer's needs.
- As with previous units on financial documents, it will be useful to have a range of different advertisements and brochures that list tariffs so that learners can work with them and become familiar with the options and the ways in which small print is presented.

Solutions

9.1 **Practise** reading and calculating tariffs

Learner's Book page 113

1. a. 1 August
b. The first set of tariffs give the peak time tariffs for international calls. Peak time is from 08:00 to 20:00 Monday to Friday.
The second set of tariffs gives the off-peak time tariffs for international calls. Off-peak time is from 20:00 to 08:00 the following morning, Monday to Friday and from 20:00 Friday to 08:00 the following Monday.
c. 90 s = 1,5 min.
Tariff = R1,04 × 1,5 = R1,56

2. a. For 3 September, the new tariffs apply.
Tariff = 6 × R1,35 = R8,10 assuming calls made during peak time;
3 September falls in the week.

b. 230s = $\frac{230}{60}$ min. = 3,83 min.
We will use current tariff at off-peak time.
Tariff = 3,83 × R1,65 = R6,32

c. Tariff = 17,5 × R1,66 = R29,05
(The call is before 08:00 and after 1 August, so we will use new tariff at off-peak time.)

d. Tariff = 20,25 × R0,6 = R12,15
We will use the new tariff at peak time.

3.

		Percentage decrease in peak time	Percentage decrease in off-peak time
a.	**Germany**	$\frac{0,1}{1,30} \times \frac{100}{1} = 7,69\%$	$\frac{0,1}{1} \times \frac{100}{1} = 10\%$
b.	**USA**	$\frac{0,1}{0,7} \times \frac{100}{1} = 14,29\%$	$\frac{0,05}{0,65} \times \frac{100}{1} = 7,69\%$
c.	**Australia**	$\frac{0,1}{0,9} \times \frac{100}{1} = 11,11\%$	$\frac{0,1}{0,9} \times \frac{100}{1} = 11,11\%$

4.

Stage	Departure point	Fare	Luggage	Cost
Stage 1	Pretoria	R275	1 piece	Free
	Midrand	R275	2 pieces	R25
	Johannesburg	R275	3 pieces	R50
Stage 2	Swinburne	R225	4 pieces	R75
	Pietermaritzburg	R225		
Stage 3	Ixopo	R175		
	Mzimkulu	R175		
	Kokstad	R175		
Stage 4	Mount Frere	R125		
	Qumbu	R125		
	Mthatha	R125		
Stage 5	Idutywa	R75		
	Butterworth	R75		

5. a.

Name	Connection fee
Weekender	R91,20
Weekender Plus	R91,20
Talk 100	R91,20
Talk 200	R91,20
Talk 500	R91,20

b.

Name	Free minutes
Weekender	100
Weekender plus	120
Talk 100	100
Talk 200	200
Talk 500	500

c. R1,37 per minute

d. Mon – Fri: 07h00 – 20h00

e. No tariff offers free SMSes.

f. International off-peak costs R0,68 + Telkom off-peak tariff. So, a call to China using Telkom's current tariffs would cost R0,68 + R1,40 = R2,08 per minute.

g. Talk 500 has the most expensive monthly charge of R570.

h. You get 500 minutes per month free call time that you can use anytime. Also, your peak standard rate is R1,37 per minute and you get free voicemail. The other services offered are standard.

9.2 **Practise** using graphs to find tariff information

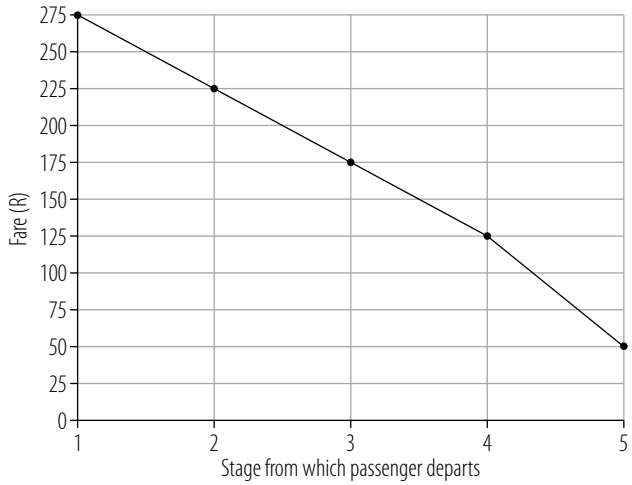
Learner's Book page 120

1. a. She can speak to him for just over 13 minutes each evening.

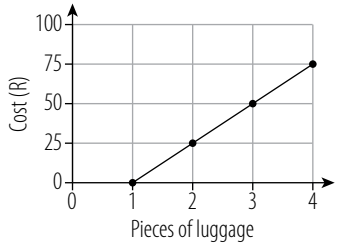
b. 3 hours = (3 × 60 × 60) s
= 10 800 s/w (seconds per week)
Each day of the week Siphokazi can speak for $\frac{10\,800}{7}$ s
= 1 542,86 s/d (seconds per day)

2. a.

Stage	1	2	3	4	5
Fare	R275	R225	R175	R125	R50



Pieces of luggage	1	2	3	4
Cost	0	R25	R50	R75



3. a. 11%

b. Percentage discount = 50%, which means a reduction of R490

c.

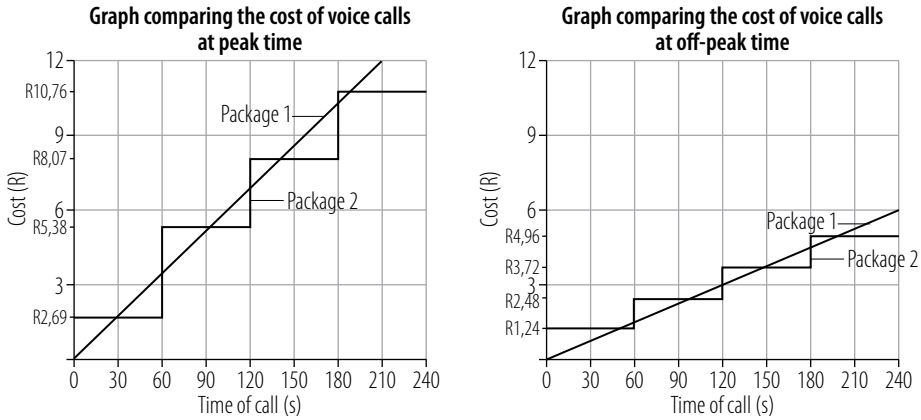
Month	Toll charges paid	Discount not received
January	R420	15%: $\frac{15}{100}$ × R420 = R63
February	R656	26%: $\frac{26}{100}$ × R656 = R170,56
March	R568	26%: $\frac{26}{100}$ × R568 = R147,68

April	R795	37,5%: $\frac{37,5}{100} \times$ R795 = R298,13
May	R497	15%: $\frac{15}{100} \times$ R497 = R74,55
June	R870	45,9%: $\frac{45,9}{100} \times$ R870 = R399,33

9.3 **Practise** comparing tariffs

Learner's Book page 125

1. Prepaid cellphone package 1 bills per second and prepaid cellphone package 2 bills per minute.



2. Package 2 seems to be best overall. From the graphs we can see that if you make a call of longer than $1\frac{1}{2}$ minutes during off-peak time, package 2 is cheaper.

9.4 **Investigation:** Which water tariff is better?

Learner's Book page 125

1. **a.** **i.** City B **ii.** City A

b. For a consumption of 8 kl per month:
City A: 5 × R3,80 + 3 × R5,75 = R36,25
City B: 6 × R0 + 2 × R4,32 = R8,64
City B is cheaper.

For consumption of 25 kl per month:
City A: (5 × R3,80) + (10 × R5,75) + (10 × R6,25) = R139,00
City B: (6 × R0) + (4,5 × R4,32) + (9,5 × R9,22) + (5 × R13,66)
= R175,33
City A is cheaper.

c. Perfection Laundry Services in city A:
Water account = (5 × R3,80) + (10 × R5,75) + (15 × R6,25)
+ (20 × R8,80) + (50 × R9,95) + (20 × R12,05)
= R1 084,75

Perfection Laundry Service in city B:
Water account = (6 × R0) + (4,5 × R4,32) + (9,5 × R9,22)
+ (15 × R13,66) + (15 × R16,87) + (10 × R22,25)
= R787,48
Mrs Dlamini should budget R1 084,75 for her laundry business in city A and Loyiso should budget R787,48 for his laundry business in city B.

2. Learners discuss their answers.

Unit 10
Income-and-expenditure statements and budgets

Learner's Book pages 127–151

Teaching tips

- In Grade 10, learners worked with income-and-expenditure statements and budgets in the contexts of individual and household finances, planning for a holiday and personal projects. This year they will extend this work to include business and workplace contexts.
- Revise the basic concepts with the class and make sure they understand that an income-and-expenditure statement is a document that records actual figures for a past period. A budget is a document that lists what you expect to earn and spend for a given period in the future.
- Remind the learners that the names given to various types of income and expenses should not be applied too strictly – they sometimes overlap, for example, a bill for building maintenance could be either a variable or occasional expense.
- Give learners practice in drawing up budgets for various projects and events and relate these to the world of work where possible. Remind them that budgeting is an important element of running a business both in terms of managing expenses, but also in making sure you make a profit.

Solutions

10.1 **Practise** analysing and preparing income-and-expenditure statements

Learner's Book page 132

1. a. Singh family household income-and-expenditure for the year

Income (total for the year)		**Expenditure (total for the year)**	
Fixed income		**Fixed expenditure**	
Salary M Singh (net)	77 200,00	Rent January – June	
Wages J Singh (net)	36 000,00	6 × R3 200	19 200,00
		Rent July – December	
		6 × R3 575	21 450,00
		Medical Aid	28 800,00
		Household and car insurance	11 424,00
		Annual AA membership	780,00
Variable income		**Variable expenditure**	
Commission L Singh (net)	19 543,00	Telephone	6 133,49
Interest on bank savings	2 986,00	Electricity	5 381,30
		Food, and so on	28 596,45
		Fix roof leak	3 297,60
		Petrol, car service	14 784,95
Occasional income			
Cash sale of old wardrobe	1 250,00		
Total income	**R136 979,50**	**Total Expenditure**	**R139 847,74**

b. Joe & Flora's Garden Services income-and-expenditure for the year

Income (total for the year)		Expenditure (total for the year)	
Fixed income		**Fixed expenditure**	
Regular weekly garden maintenance for 16 clients	62 400,00	Rent for part of Joe's house	6 000,00
Bank loan to purchase new equipment	12 000,00	Repayment for bakkie (hire purchase agreement)	13 200,00
		Insurance on plants and equipment	5 800,00
		Bank charges (12 × R99)	1 188,00
		Interest on bank loan	1 068,00
Variable income		**Variable expenditure**	
Planting new gardens for 15 clients	28 950,00	Telephone	3 618,07
Clearing old vegetation for 25 clients	17 360,00	Electricity	4 951,18
Sale of seedlings (about 220 trays per month)	5 704,80	Seedlings from wholesale supplier	3 400,00
		Petrol, car repairs and so on	11 788,45
		Fertiliser, mulch, compost	4 950,00
		Wages to part-time workers (gross)*	31 200,00
Occasional income		**Occasional expenditure**	
Sale of three old lawnmowers	R900,00	New lawnmowers	R99 163,70

* This is variable as they are part-time staff.

2. Joe & Flora's Garden Services

Running costs

Rent for part of Joe's house
Repayment for bakkie (hire purchase agreement)
Telephone
Electricity
Insurance on plants and equipment
Petrol, car repairs and so on
Wages to part-time workers (gross)
Bank charges
Interest on bank loan

Production costs

Cost of seedlings from wholesale supplier
New lawnmowers
Fertiliser, mulch, compost

3. a. Mapetla has a credit balance – her expenditure is less than her income.

b.

Mapetla's statement February–October			
Income		**Expenditure**	
Bursary	10 800,00	Rent	7 875,00
Wages from restaurant	8 550,00	Cellphone	2 331,00
Contribution from Dad	7 200,00	Books for courses	15 126,75
Birthday cheque from Gran (Mapetla only receives this in Feb)	2 000,00	Stationery	2 160,00
		Clothes, shoes	6 411,00
		Food and toiletries	5 611,95
Interest on savings	675,00	Dentist	3 114,00
		Contributions to household cleaning stuff	1 350,00
Total income	**R29 225,00**	**Total expenditure**	**R43 980,30**

c. This extended statement is an estimated statement as it has been calculated based on Mapetla's income and expenditure for February.

Some of the items will be variable. For example, it is unlikely that she will spend R1 680,75 on books every month.

d. Mapetla's overall balance for the nine months shows a debit balance as her expenditure is more than her income, however, if she has bought most of her text books in February, she will not be spending R1 680,75 for the remaining eight months. Also, she would probably not spend R346,00 at the dentist every month. If we take these changes into account, her expenditure would not exceed her income.

4.

Joe & Flora's Garden Services (Branch 2) income-and-expenditure for the year			
Income (total for the year)		**Expenditure (total for the year)**	
Regular weekly garden maintenance for 24 clients	93 600,00	Rent	3 000,00
		Transport cost	18 000,00
		Telephone	1 809,04
Planting new gardens for 5 clients	9 650,00	Electricity	2 475,59
		Seedlings from wholesale supplier	1 700,00
Clearing old vegetation for 5 clients	3 472,00	New lawnmowers	6 000,00
		Insurance on plants and equipment	2 900,00
Bank loan to purchase new equipment	6 000,00	Fertiliser, mulch, compost	2 475,00
Sale of seedlings (about 110 trays per month)	2 852,40	Wages to part-time workers (gross)	15 600,00
		Bank charges	1 188,00
		Interest on bank loan	534,00
Total income	**R115 574,40**	**Total expenditure**	**R55 681,63**

10.2 **Practise** calculating profit and loss

Learner's Book page 135

1. Income – expenditure = R7 843,00 – R7 911,45
= –R68,45
Lou's Cycle repairs made a loss of R68,45 for the year.

2. Income – expenditure = R2 101 – R1 021
= R1 080
Dumile Walks Your Dog made a profit of R1 080 for the year.

3. Income – expenditure = R28 336,70 – R29 018,25
= –R681,55
Fast Best Copy Shop made a loss of R681,55 for the year.

4. Income – expenditure = R5 539,20 – R4 921,85
= –R617,35
Vegetable Value made a profit of R617,35 for the year.

10.3 **Practise** calculating and comparing changes in income-and-expenditure statements

Learner's Book page 135

1. a.

Items of income that increased	**Items of income that decreased**
Salary J Robinson	M Robinson interest on bank savings

b.

Items of expenditure that increased	Items of expenditure that decreased
Rates, water, refuse services Telephone Electricity Food and groceries Medical aid Household and car insurance Petrol, car service School and college fees	Bond repayments on house

c. Year 1 ended with a credit balance – income exceeded expenditure.
Year 2 ended with a debit balance – expenditure exceeded income.

d. **i.** Electricity for year 2 – electricity for year 1
= R5 142,19 – R4 761,29
= R380,90
Percentage increase: $\frac{380,90}{4\ 761,29} \times \frac{100}{1} = 8\%$

ii. Home bond repayments year 2 – home bond repayments year 1
= R47 718 – R48 200
= –R482
Percentage decrease: $\frac{482}{48\ 200} \times \frac{100}{1} = 1\%$

iii. Telephone year 2 – telephone year 1
= R5 638,20 – R5 269,35
= R368,85
Percentage increase: $\frac{368,85}{5\ 269,35} \times \frac{100}{1} = 7\%$

iv. Food and groceries year 2 – food and groceries year 1
= R35 031,42 – R32 436,50
= R2 594,92
Percentage increase: $\frac{2\ 594,92}{32\ 436,50} \times \frac{100}{1} = 8\%$

v. Wages and salaries year 2 – wages and salaries year 1
= (R136 032 + R62 890) – (R130 800 + R66 200)
= R1 922
Percentage increase: $\frac{1\ 922}{(130\ 800 + 66\ 200)} \times \frac{100}{1} = 0,98\%$
Salary year 2 – salary year 1 = 136 032 – 130 800
= 5 232
Percentage increase: $\frac{5\ 232}{130\ 800} \times \frac{100}{1} = 4\%$
Wages year 2 – wages year 1 = 62 890 – 66 200
= –3 310
Percentage decrease: $\frac{3\ 310}{66\ 200} \times \frac{100}{1} = 5\%$

vi. Income from bank interest year 2 – income from bank interest year 1
= R1 803,20 – R1 840
= –R36,80
Percentage decrease: $\frac{36,80}{1\ 840} \times \frac{100}{1} = 2\%$

e.

Income (total for year 3)		Expenditure (total for year 3)	
Salary J Robinson (net)	141 473,00	Bond repayments on house (decr 1%)	47 240,82
Wages M Robinson (net)	62 890,00	Rates, water, refuse services	8 678,02
Interest on bank savings	1 803,20	Telephone (incr by 8%)	6 032,87
		Electricity (incr 8%)	5 553,57
		Food and groceries (incr by 8%)	37 833,93
		Medical aid	21 388,50
		Household and car insurance	9 845,33
		Monthly payments on new car	15 588,00
		Petrol, car service	17 463, 60
		School and college fees	43 197,00
Total income	**R206 166,20**	**Total expenditure**	**R212 821,64**

M Robinson's wages will not necessarily decrease in year 3. They are more likely to stay the same or increase. Interest on bank saving could increase, decrease or stay the same, depending on the interest rate. Payments on the new car are likely to remain the same. All the other items on the income – and – expenditure statement will probably increase. If the bond repayments follow the same trends as in year 2, they will decrease by 1%. However, this will depend on the interest rates.

f. As can be seen from the income-and-expenditure statement, the Robinson family is likely to end year 3 with a debit balance.

2. a. In year 1 the business showed a profit.
In year 2 the business showed a loss.

b. Income year 2 – income year 1
= R141 212,00 – R144 860,00
= –R3 648,00
Percentage decrease = $\frac{3\ 648}{144\ 860} \times \frac{100}{1} = 2{,}52\%$

c. Production costs year 1: R55 050,00
Production costs year 2: R59 976,00
Production cost year 2 – production cost year 1
= R59 976,00 – R55 050,00
= R4 926.00
Percentage increase = $\frac{4\ 926}{55\ 050} \times \frac{100}{1} = 8{,}95\%$

d. Running costs year 1: R80 300
Running costs year 2: R83 533,00
Running cost year 2 – running cost year 1
= R83 533,00 – R80 300,00
= R3 233,00
Percentage increase = $\frac{3\ 233}{80\ 300} \times \frac{100}{1} = 4{,}03\%$
The production cost went up much more than the running costs.

e.

Income (total for year 3)		Expenditure (total for year 3)	
Photocopies (A4)	7 705,35	**Running costs**	
Printing A1 plans for architects	27 231,04	Wages and salaries	50 849,86
Printing fancy stationery	31 717,07	Rent	16 715,54
		Electricity, phone	11 469,31
		Office administration	7 864,67
		Production costs	
		Printer rentals	30 070,20
		Paper	22 879,50
		Ink	12 394,15
Total income	**R137 653,46**	**Total expenditure**	**R152 243,23**

10.4 **Practise** calculations with personal budgets

Learner's Book page 147

1. a. Nomonde's net salary = R63 420 – R5 785
= R57 635 p.a.

Nomonde's annual expenses	
Transport	R130 × 52 = R6 760
Food, groceries and entertainment	R1 200 × 12 = R3 890
Phone and internet	R400 × 12 = R4 800
Clothes, books, stationery	R7 220
Total annual expenses	**R 37 070**

Nomonde earns enough to cover her annual expenses.

b. Her saving per year = R57 635 – R37 070
= R20 565

Her saving per month = $\frac{\text{R20 565}}{12}$ = R1 713,75

c. Expenses next year = R37 070 + 5,6% of R37 070
= R39 145,92

Nomonde would need to earn R39 145,92, which would not be a problem even if she is paid the same salary.

2. a. Each weekend Nomande earns: 6 × R55 = R330,00

Number of weeks to save R24 000 = $\frac{24\,000}{330}$
= 72,73 weeks of saving

She would have to save her earnings for 73 weekends.

b. Yes, she is not able to save R1 713,75 each mouth.

c. Amount she can afford to pay each month = R1 713,75 + (4 × R330)
= R3 033,75

3. a. If we assume that there are four weeks in a month,
Brendan's monthly salary = R2 750 × 4
= R11 000 net

Savings = R11 000 – R5 345
= R5 655

Percentage of earnings he can save every month
= $\frac{5\,655}{11\,000} \times \frac{100}{1}$
= 51,41%

b. Total cost of computer = R4 500 + 1,5% of R4 500
= R4 567,5

Monthly payment = $\frac{\text{R4 567,5}}{12}$ = R380,63

Brendan can easily afford to make the repayments.

c. We are not given any details about the computer and also we are not told how old it is. R4 500 sounds rather expensive for an old computer and since Brendan has the money, he would probably be better off paying a bit more and buying a new computer.

10.5 **Practise** preparing personal, household and business budgets

Learner's Book page 148

Learners work out personal budgets.

10.6 **Practise** changing a budget to suit changing circumstances

Learner's Book page 149

1. **Grade 1**
   Cost for one set of all the textbooks = R122,70
   Total cost for Grade 1 textbooks = R122,70 × 264
   = R32 392,80
   Cost of the teachers' guides = 4 × 3 × 49,95
   = R599,40
   Total cost for Grade 1 = R32 992,20
   Grade 2
   Cost for one set of all the textbooks = R131,70
   Total cost for Grade 2 textbooks = R131,70 × 212
   = R27 920,40
   Cost of teachers' guides = 4 × 3 × R49,95
   = R599,40
   Total cost for Grade 2 = R28 519,80
   Grade 3
   Cost for one set of all the textbooks = R137,70
   Total cost for the Grade 3 textbooks = R137,70 × 280
   = R38 556,00
   Cost of teachers' guides = 4 × 3 × R49,95
   = R599,40
   Total cost for Grade 3 = R39 155,40
   Total cost for all textbooks = R32 992,20 + R28 519,80 + R39 155,40
   = R100 667,40
2. Yes, the school budget had enough money to cover the cost of the textbooks.
3.

Amended budget for textbooks for Grades 1, 2 and 3			
	Grade 1	**Grade 2**	**Grade 3**
Increased number of learners	275	221	291
Cost of books before discount	33 742,50	29 105,70	40 208,40
Cost of books after discount	32 561,51	28 087,00	38 801,11
Cost of teachers guides after discount	578,42	578,42	578,42
Total cost per grade	**R33 139,93**	**R28 665,42**	**R39 379,53**

   Revised total for textbooks = R33 139,93 + R28 665,42 + R39 379,53
   = R101 184,88
4. The school will have enough funds to cover the cost of the books.

10.7 **Investigation:** Prepare a budget for a single event

Learner's Book page 151

Answers will differ/class discussion.

Unit 11
Cost price and selling price

Learner's Book pages 152–168

Teaching tips

- The concepts in this unit have not been taught previously in Mathematical Literacy although learners may remember them from earlier grades and work with percentage, profit and loss.
- Some learners may think cost price is what an item costs when you buy it in the shop. Remind them that shops have to buy or make the things they sell. The price they pay for an item is the cost price. Similarly, the total cost of making an item is its cost price. Shops then add on an amount to cover their expenses and make a profit before selling an item to the customers. The price an item is sold for is the selling price.
- In basic terms, selling price – cost price = profit per item. However, in real terms, this is not the total profit for the business. A shopkeeper who buys things for Rx and sells them for R10 000x does not actually make R10 000 profit. The shopkeeper still needs to pay salaries and running costs before he or she can work out what the actual net profit is. This is an important concept and learners who have entrepreneurial experience will understand this and be able to give examples to enrich the lessons.
- You may like to invite a local small-business owner to school to talk to the learners about cost prices, selling prices and profit in general terms.

Solutions

11.1 **Practise** calculating cost prices

Learner's Book page 155

1. **a.** Number of scarves made annually = 75 × 12 = 900

b. Cost price = (R980 × 12) + R3 400 = R7 850 = R23 010 p.a.

c. Cost price per scarf = $\frac{23\,010}{900}$ = R25,57

2. Monthly running and production costs = (R420 × 4) + $\left(\frac{R6\,950}{6}\right)$
= R2 833,33

Cost price of a single crate = $\frac{R2\,833,33}{40}$
= R70,96

3. Monthly costs = R500 + R340 = R840

Cost price per learner per month = $\frac{R840}{12}$
= R70

11.2 **Practise** identifying reasonable selling price

Learner's Book page 158

Answers will differ.

11.3 **Practise** calculating profit and loss with cost price and selling price

Learner's Book page 163

1. **a.** Profit = selling price – cost price
= R11,95 – R1,72 = R10,23

b. Profit = selling price – cost price = R59,00 – R7,95 = R51,05

c. Profit = selling price – cost price = R99,95 – R129,40 = –R29,45
A negative profit shows that a loss of R29,45 has been made.

d. Profit = selling price – cost price = R149,50 – R0,95 = R148,55

e. Profit = selling price – cost price = R75,50 – R285,00 = –R209,50
A negative profit shows that a loss of R209,50 has been made.

2. Cost price per single A4 copy = $\frac{\text{R150,00}}{500}$ = R0,30
= 30c
To make a profit of 50c per copy, the shop must sell each single A4 copy for 80c.

3. Cost price of one slice of pizza = $\frac{\text{R35,00}}{8}$ = R4,38
Profit = selling price – cost price = R9,50 – R4,38 = R5,12

4. a. Cost price per set of gift wrap and card = 2 × R4,50 + 2 × R1,25
= R11,50
Profit = selling price – cost price = R39,95 – R11,50 = R28,45

b. If she sells the sets for R11,50 each, she will just break even. If she sells the sets for an amount greater than R11,50, she will make a profit.

11.4 **Practise** calculating percentage profit or loss

Learner's Book page 164

1.

1. a. Percentage profit = $\frac{\text{profit}}{\text{cost price}} \times \frac{100}{1}$
$= \frac{10,23}{1,72} \times \frac{100}{1}$
= 594,77%

b. Percentage profit = $\frac{51,05}{7,95} \times \frac{100}{1}$
= 642,14%

c. Percentage loss = $\frac{\text{loss}}{\text{cost price}} \times \frac{100}{1}$
$= \frac{29,45}{129,40} \times \frac{100}{1}$
= 22,76%

d. Percentage profit = $\frac{148,55}{0,95} \times \frac{100}{1}$ = 15 636,84%

e. Percentage loss = $\frac{209,50}{285,00} \times \frac{100}{1}$ = 73,51%

2. Percentage profit = $\frac{50}{30} \times \frac{100}{1}$ = 166,67%

3. Percentage profit = $\frac{5,12}{4,38} \times \frac{100}{1}$ = 116,89%

4. Percentage profit = $\frac{28,45}{11,50} \times \frac{100}{1}$ = 247,39%

2. a.

Province	Percentage mark-up	Selling price of a pocket of potatoes in May
Limpopo	55	R6,30 + 55% of R6,30 = R9,77
Eastern Cape	35	R6,30 + 35% of R6,30 = R8,51
Northern Cape	14	R6,30 + 14% of R6,30 = R7,18
Free State	23	R6,30 + 23% of R6,30 = R7,75
KZN	26	R6,30 + 26% of R6,30 = R7,94

b. Mark-up on potatoes in Limpopo in June: 30%
Selling price = R12,95
= 100% of cost price + 30% of cost price
∴ 12,95 = 130% of cost price
12,95 = $\frac{130}{100}$ × cost price
12,95 × $\frac{100}{130}$ = cost price
Cost price: R9,96

c. Mark-up on potatoes in KZN in May = 26%
Mark-up on potatoes in Free State in July = 23,5%
Cost price of Potatoes = R6,30 in May (we are told this).
In KZN, selling price = R16,45
$= 100\%$ of cost price $\times$ 23,5% of cost price
$= \frac{123}{100} \times$ cost price
$\therefore$ R16,45 $\times \frac{100}{123,5}$ = cost price = R13,32
The cost price of the potatoes was lower in May (R6,30) and more than double in July (R13,32)

d. Answers may differ. A possible answer is that if potatoes are grown locally, they would be cheaper as there would be no transport costs involved.

11.5 **Practise** budgeting to achieve a percentage profit

Learner's Book page 166

1. a.

Item	Cost price	Selling price at 10% profit	Selling price at 18% profit	Selling price at 35% profit
Sunglasses	12,40	13,64	14,63	16,74
Sunglasses with mirror lenses	15,20	16,72	17,94	20,52
Denim handbags	21,95	24,15	25,90	29,63
Denim rucksacks	28,35	31,19	33,45	38,27
Leather handbags	45,50	50,05	53,69	61,43
Leather rucksacks	52,80	58,08	62,30	71,28
Cellphone pouches	3,95	4,35	4,66	5,33

b. Answers will differ.

2. a. Profit = income – expenditure
= R127 314,80 – R99 163,70
= R28 151,10

b. Percentage profit $= \frac{\text{profit}}{\text{total income}} \times \frac{100}{1}$
$= \frac{28\ 151,10}{127\ 314,80} \times \frac{100}{1}$
$= 22,11\%$

c. Profit = income – expenditure
$P = I - 99\ 163,70$..... (1)
Percentage profit $= \frac{\text{profit}}{\text{income}} \times \frac{100}{1}$
$\therefore \frac{P}{I} \times \frac{100}{1} = 45\%$
$\therefore \frac{P}{I} = 0,45$..... (2)
Substituting $P = I - 99\ 163,70$ into (2)
$\frac{I - 99\ 163,70}{I} = 0,45$
$\therefore I - 99\ 163,70 = 0,45I$
$\therefore I - 0,45I = 99\ 163,70$
$\therefore 0,55I = 99\ 163,70$
$\therefore I = \frac{99\ 163,70}{0,55}$
$= 180\ 297,64$
To make a profit of 45%, they would need an income of R180 297,64.

d. Expenditure for the next year: R99 163,70 + 13,5% of R99 163,70
Expenditure next year – 112 550,80
Profit = income – 112 550,80
P = I – 112 550,80.....(1)
Percentage profit = $\frac{P}{I} \times \frac{100}{1} = 45\%$

$$\therefore \frac{P}{I} = 0{,}45 \text{.....(2)}$$

Substitute equation 1 into (2).

$$\frac{I - 112\,550{,}80}{I} = 0{,}45$$

$$\therefore I - 112\,550{,}80 = 0{,}45I$$

$$\therefore I - 0{,}45I = 112\,550{,}80$$

$$\therefore 0{,}55I = 112\,550{,}80$$

$$\therefore I = \frac{112\,550{,}80}{0{,}55}$$

$$= 204\,637{,}82$$

If expenses increase by 13,5% and they want to make a profit of 45%, they would need an income of R180 297,64.

Unit 12
Break-even analysis

Learner's Book pages 168–177

Teaching tips

- Break-even points on graphs were covered in Unit 4. Remind the learners about this before starting to discuss the concepts in this unit.
- The unit starts with an example of costs and income from a business venture, then it covers using break-even analysis to make decisions and choose between two different options. Point out to learners that a graph is a much easier way to show complex data about stepped tariffs and draw your own graphs using two different tariff options from a real brochure as a further example.

Solutions

12.1 **Practise** break-even analysis using equations

Learner's Book page 176

1. Let number of dogs Bettina must walk every week in order to break-even be x.

$30x = 360$

$\therefore x = \frac{360}{30}$

$x = 12$

So, Bettina must walk 12 dogs per week if she wants to break-even.

2. Let the number of pages Ayanda translates per month be x.

$85x = 4\,500$

$\therefore x = \frac{4\,500}{85}$

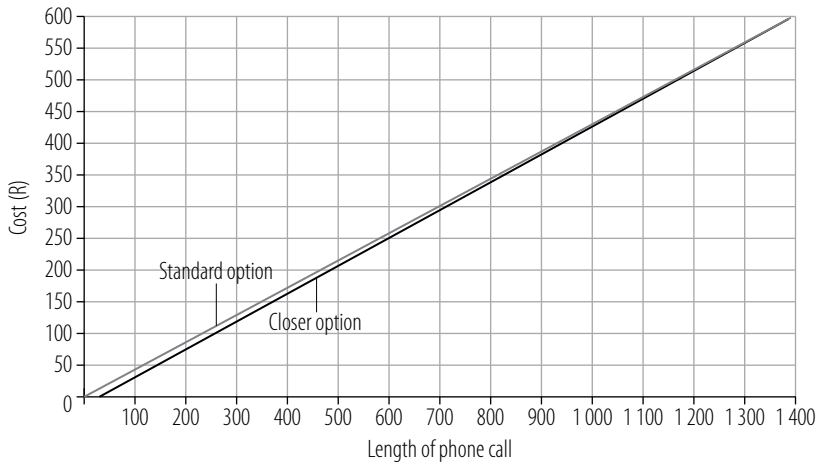
$\therefore x = 52{,}94$

Ayanda must translate 53 pages in order to break-even.

1.

Length of phone call	Standard option cost	Closer option cost
10	4,20	0
20	8,40	0
30	12,60	0
40	16,80	4,30
50	21,00	8,60
60	15,20	12,90
70	29,40	17,20
80	33,60	21,50
90	37,80	25,80
100	42,00	30,10
200	84,00	73,10
300	126,00	116,10
400	168,00	159,10
500	210,00	202,10
600	252,00	245,10
700	294,00	288,10
800	336,00	331,10
900	378,00	374,10
1 000	420,00	417,10
1 100	462,00	460,10
1 200	504,00	503,10
1 300	546,00	546,10

2. The Closer rate is cheaper for any call less that 1 290 minutes, which is 21,5 hours. So despite the higher monthly charge, this will be the better option for the majority of people. The average phone call is generally less than 30 minutes which would be free on Closer. On the Standard option, a call of 30 minutes would cost R12,60.



12.3 **Assignment:** Break-even analysis for a T-shirt business

Learner's Book page 177

1. **a.** Total costs = R800 + R7 per T-shirt

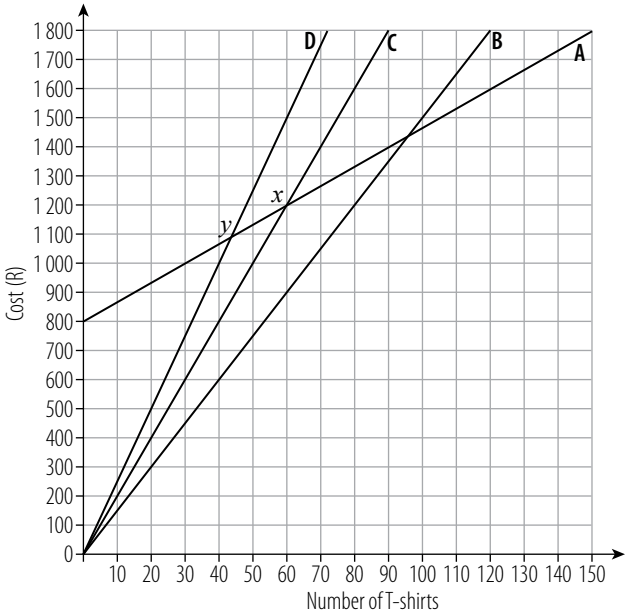
b. Let the number of T-shirts Moeketsi needs to sell in order to break-even be x.

The number of T-shirts sold = R800 + R7 for however many T-shirts he sells.

$$15x = 800 + 7x$$
$$\therefore 15x - 7x = 800$$
$$\therefore 8x = 800$$
$$\therefore x = \frac{800}{8}$$
$$= 100$$

Moeketsi must sell 100 T-shirts in order to break-even.

2.



Graph A shows increase in cost as the number of T-shirts increase.
Graph B shows increase in income as the number of T-shirts sold for R15 per T-shirt increases.

3. Graph C shows the increase in income as more T-shirts are sold for R20 per T-shirt.
The break-even point (x) is reached when 60 T-shirts are sold.
Graph D shows the increase in income as more T-shirts are sold for R25 per T-shirt.
The break-even point (y) is reached when 45 T-shirts are sold.

Revise and consolidate: Finance

Learner's Book page 179

1. Answers may differ. Discuss learners' answers with the class.

2. **a.** Ms LW Dlamini

b. 366 End Road, Newlands, 7700

c. 137702816

d. rates, water, refuse, sewerage

e. water: (1) 6,9040 litres free; (2) 5,1780 kl @ R2,9900; (3) 10,9320 kl @ R8,5100; (4) 13,9880 kl @ R12,6100: R290,05
Learners can discuss the other tariffs.

f. January 2020

g. R0,00

h. R1 205,17
i. R1 205,17
j. 14/02/2020

3. a. Elite Stores
b. Dexter Jordaan
c. ID: 820903 1223 013
Employee number: J02-D19
d. Shelf packer
e. 01/08/2019 to 31/08/2019
f. R1 185,20
g. weekly
h. R29,63 per hour
i. R1 185,20
j. R59,20 per hour
k. R177,78
l. R1 362,98
m. PAYE – R190,82
Union – R13,62
n. R1 158,54

4. a. Option 3
b. On weekdays, Option 1 charges R1,23 per call up to an hour long while there is no charge with Option 2.
At weekends, both Option 1 and 2 are the same.
c. The subscription amount for Option 3 includes the cost of calls made within the month according to the guidelines set out.
d,e. Answers will differ.

5. a.

Expenditure		**Income**	
Two days in recording studio @ R2 800/day	5 600	300 CD's @ R75/CD	22 500
Sound engineer for two 8-hour days @ R375/h	6 000		
Designer for ten hours @ R225/h	2 250		
300 CDs at R200/75	800		
Jewel cases for 300 CDs at R99/100	297		
Computer paper and so on at R3,50/CD	1 050		
Total	**R15 997**		**R22 500**

b. Mokoko makes a profit.
c. Percentage profit: $\frac{\text{R22 500} - \text{R15 997}}{\text{R15 997}} \times \frac{100}{1} = 40{,}65\%$
d. 70% of R15 997 = $\frac{70}{100} \times 15\,997 = 11\,197{,}90$
Total income = R15 997 + R11 197,90
= R27 194,90
Cost per CD: $\frac{27\,194{,}90}{300} = \text{R}90{,}65$
e. Old selling price: R75/CD
Fixed production costs: R13 850
Costs per CD: R2,67 + R0,99 + R3,50 = R7,16

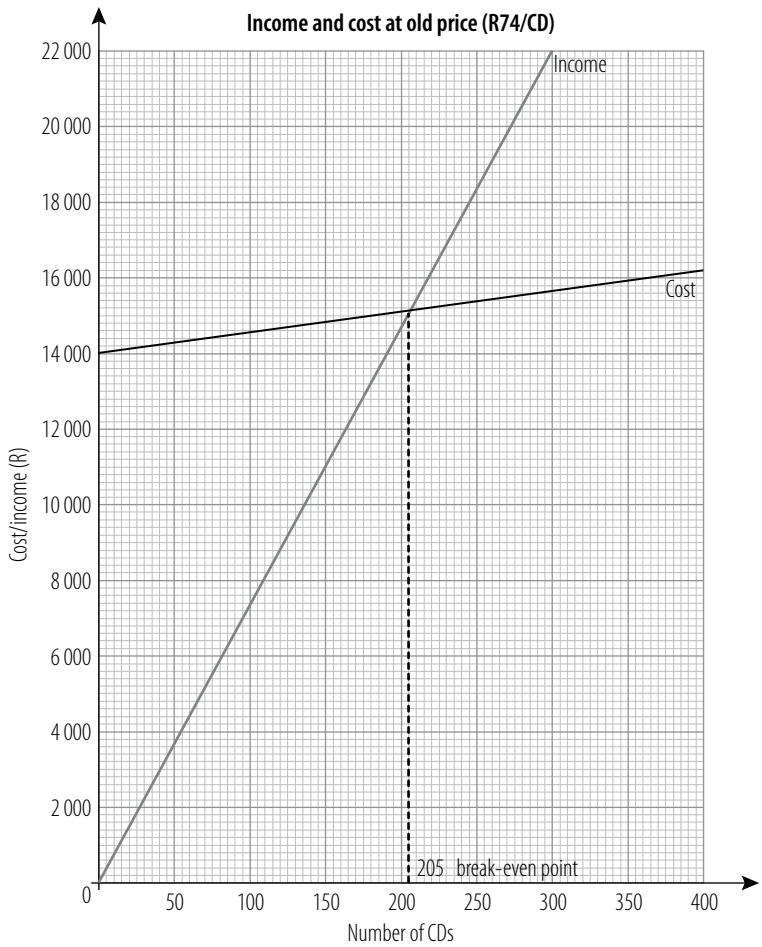
Number of CDs	1	2	10	20
Cost (R)	13 857,16	13 864,32	13 921,00	13 993,20

Number of CDs	30	50	100	150	200	250
Cost (R)	14 064,80	14 208,00	14 566,00	14 924,00	15 282,00	15 640,00

Number of CDs	300	350	400
Cost (R)	15 998	16 356	16 714

Number of CDs sold	10	20	50	100	150	200	250
Income (R)	750	1 500	3 750	7 500	11 250	15 000	18 750

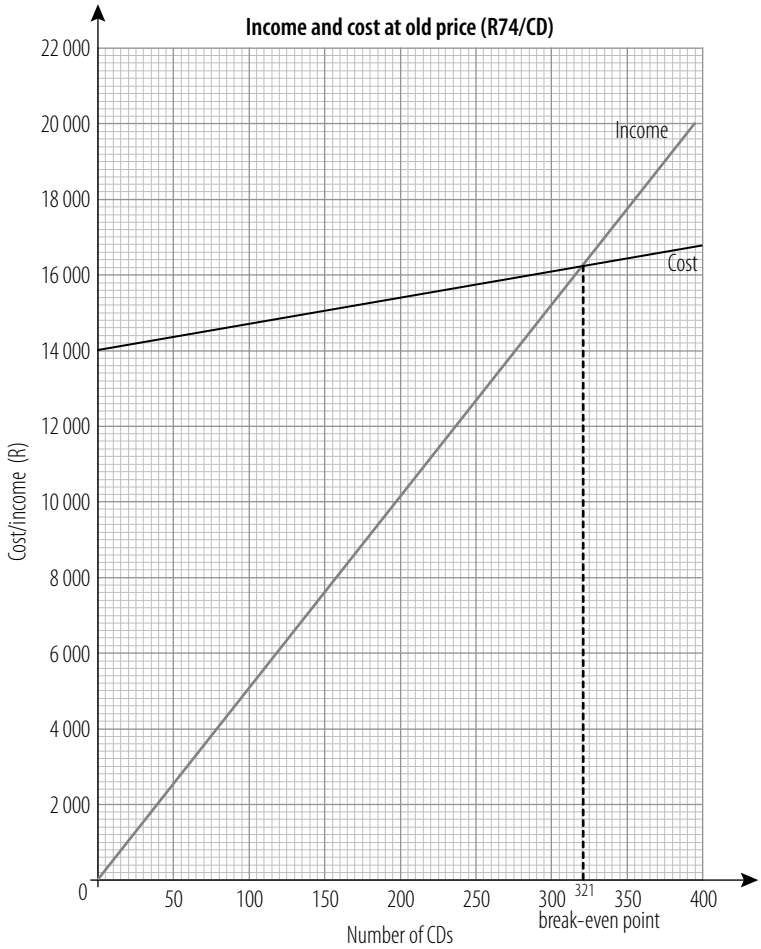
The break-even point lies somewhere between 200 and 250 CDs.
The break-even point of costs and income is at 205 CDs.



New selling price: R50 for each CD
The costs do not change so previous table applies.

Number of CDs sold	50	100	150	200	250	300	350	400
Income (R)	2 500	5 000	7 500	10 000	10 500	15 000	17 500	20 000

The break-even point lies somewhere between 300 and 350 CDs.
The break-even point of costs and income is at 321 CDs.


Income and cost at old price (R74/CD)
22 000
20 000
18 000
16 000
14 000
12 000
10 000
8 000
6 000
4 000
2 000
0
Cost/income (R)
Income
Cost
50
100
150
200
250
300
321
350
400
break-even point
Number of CDs

TERM 2

WORKED ANSWERS

Unit 1
Interest and interest rates

Learner's Book pages 186–202

Teaching tips

- Learners will need to make calculations using percentages. If necessary, revise the basic skills on pages 497 to 537 of the Learner's Book before working through this unit. Also work through the terms used to talk about interest on page 185 of the Learner's Book to revise these.
- In Grade 10 the learners worked with simple interest. In real life, most interest (on both loans and investments) is compounded. That means it is worked out at set times and added to the principal amount. So, if you have R100 and interest is compounded annually at a rate of 5%, you will have R105 after one year. The next year, the interest is worked out on R105 not on the original R100, so you earn slightly more. Obviously when you owe money, this means you pay more interest on the outstanding balance.
- Learners do not need to learn or use the formula for compound interest at this level. Rather they will do a series of period on period calculations to work out amounts and solve problems
- Comparing simple and compound interest rates is an important life skill that will help learners become critical and informed consumers. The skills that the learners developed in working with break-even values can be used to graph this type of comparison. What is important is that the learners realise that compound interest is a much better option than simple interest for savings, but that it is also a much more expensive option for loans and other debts.

Solutions

1.1 **Practise** calculating simple interest

Learner's Book page 188

1. a. i. 10% of R5 000 = R500
Simple interest over three years = 3 × R500
= R1 500

ii. Total amount = R5 000 + R1 500
= 6 500

b. i. 8% of R9 000 = R720
Simple interest over 24 months (2 years) = 2 × R720
= R1 440

ii. Total amount = R9 000 + R1 440
= R10 440

c. i. 9,5% of R12 000 = R1 140
Simple interest over two years = 2 × R1 140
= R2 280

ii. Total amount = R12 000 + R2 280
= R14 280

d. i. 11% of R23 000 = R2 530
Simple interest over five years = 5 × R2 530
= R12 650

ii. Total amount = R23 000 + R12 650
= R35 650

2. a. i. 9% of R10 000 = R900
Simple interest over three years = 3 × R900
= R2 700

ii. Total amount = R10 000 + R2 700
= R12 700
Monthly repayments = $\frac{12\,700}{36}$
= R352,78

b. i. 9% of R26 000 = R2 340
Simple interest over three years = 3 × R2 340
= R7 020

ii. Total amount = R26 000 + R7 020
= R33 020
Monthly repayments = $\frac{33\,020}{36}$
= R917,22

c. i. 9% of R4 000 = R360
Simple interest over three years = R × R360
= R1 080

ii. Total amount = R4 000 + R1 080
= R5 080
Monthly repayments = $\frac{5\,080}{36}$
= R141,11

3. a. i. Interest: R170

ii. Monthly repayments: R48,75

b. i. Interest: R357,00

ii. Monthly repayments: R48,81

c. i. Interest: R255,00

ii. Monthly repayments: R125,28

d. i. Interest: R433,50

ii. Monthly repayments: R59,26

e. i. Interest: R229,50

ii. Monthly repayments: R112,75

f. i. Interest: R187,00

ii. Monthly repayments: R53,63

1.2 **Practise** calculating compound interest

Learner's Book page 191

1. a. i. Year 1: Amount = R200 + 2% of R200
= R200 + R4
= R204
Compound interest = R4

ii. Total amount = R204

b. Year 1: Amount = R200 + 2% of R200
= R200 + R4
= R204

Year 2: Amount = R204 + 2% of R204
= R204 + R4,08
= R208,08
Year 3: Amount = R208,08 + 2% of R208,08
= R208,08 + R4,16
= R212,24
Year 4: Amount = R212,24 + 2% of R212,24
= R212,24 + R4,28
= R216,48

i. Compund interest = R216,48 – R200
= R16,48

ii. Total amount = R216,48

c. Year 1: Amount = R750 + 1,25% of R750
= R750 + R9,38
= R759,38

i. Compund interest = R9,38

ii. Total amount = R759,38

d. Year 1: Amount = R8 000 + 3,4% of R8 000
= R8 000 + R272
= R8 272
Year 2: Amount = R8 272 + 2% of R8 272
= R8 272 + R281,25
= R8 553,25

i. Compund interest = R553,25

ii. Total amount = R8 553,25

e. Year 1: Amount = R6 340 + 10% of R6 340
= R6 340 + R634
= R6 974
Year 2: Amount = R6 974 + 10% of R6 974
= R6 974 + R697,40
= R7 671,40
Year 3: Amount = R7 671,40 + 10% of R7 671,40
= R7 671,40 + R767,14
= R8 438,54
Year 4: Amount = R8 438,54 + 10% of R8 438,54
= R8 438,54 + R843,85
= R9 282,39
Year 5: Amount = R9 282,39 + 10% of R9 282,39
= R9 282,39 + R928,24
= R10 210,63
Year 6: Amount = R10 210,63 + 10% of R10 210,63
= R10 210,63 + R1 021,06
= R11 231,69
Year 7: Amount = R11 231,69 + 10% of R11 231,69
= R11 231,69 + R1 123,17
= R12 354,86

i. Compund interest = R6 014, 86

ii. Total amount = R12 354,86

f. Year 1: Amount = R25 000 + 12% of 25 000
= R25 000 + R3 000
= R28 000
Year 2: A = R28 000 + 12% of R28 000
= R28 000 + R3 360
= R31 360

i. Compund interest = R6 360
ii. Total amount = R31 360

2. Use the same method as shown in question 1.
a. Balance = R2 460
b. Balance = R2 584,54
c. Balance = R2 924,17

3. a. Bank 1
Amount = R12 630 – 12 × R12,50 (bank charges)
= R12 480 (after one year)
Bank 2
Amount = R12 612 (after one year)

b. Bank 1
Amount = R15 498,57 – 5 × (12 × R12,50) (bank charges)
= R14 748,57 (after five years)
Bank 2
Amount = R15 388,45 (after five year)
Bank 2 will give Louise a bigger credit balance after one year and after five years.

1.3 **Practise** calculating daily and monthly interest on accounts with changing balances

Learner's Book page 196

1. a. Interest for one day = 2,5% of R500 × $\frac{1}{365}$
= 0,0342… (keep this value on your calculator)
There are 30 days in June, so interest for June = 0,0342 × 30
= R1,03

b. This interest will be capitalised on 1 July so the balance in the account will be R500 + R1,03 = R501,03

c. The balance in Zodwa's account on 2 July will be R501,03 (interest is only capitalised at the end of the month).

2. a. Interest for one day = 8% of R3 000 × $\frac{1}{365}$
= 0,6575… (keep this value on your calculator)
Balance in account on 1 April = R3 000 + 16 × 0,6575
= R3 010,52
Balance in account will be R3 010,52 on 15 April

b. Interest for one day in April = 8% of R3 010,52 × $\frac{1}{365}$
= R0,65984… (keep this value on your calculator)
When he closes his account on 16 April, the closing balance will be:
R3 010,52 + 15 × 0,65984 = R3 020,42

3. a. Interest calculation
1 Jan. R1 000 + 3,5% of R1 000 × $\frac{1}{365}$ = R1 000 + 0,09589
8 Jan. R1 220 + 3,5% of R1 220 × $\frac{1}{365}$ = R1 220 + 0,11698
15 Jan. R1 580 + 3,5% of R1 580 × $\frac{1}{365}$ = R1 580 + 0,1515
22 Jan. R1 855 + 3,5% of R1 855 × $\frac{1}{365}$ = R1 855 + 0,17787
29 Jan. R2 335 + 3,5% of R2 335 × $\frac{1}{365}$ = R2 335 + 0,2239
Total interest for Jan.
= (7 × 0,09589) + (7 × 0,11698) + (7 × 0,1515) + (7 × 0,17787) + (7 × 0,2239)
= R4,47

b. If her opening balance on 1 February were R1 000, she would earn less interest than in January as February has fewer days than January.
Or
If she capitalises the interest she earned in January, giving her a greater opening balance, she might earn more interest even though there are fewer days in February.

4. a. i. Balance after 3 years: R16 035,06

ii. Balance after 3,5 years: R16 501,63

b. Balance after 4 years: R16 981,77

Balance after withdrawal of R1 500 = R16 981,77 – R1 500
= R15 481,77

Balance after four years and one month: R15 555,18.

1.4 **Practise** comparing interest rates

Learner's Book page 198

1. Compound interest of 3,75% p.a.

Years	Account balance
1	R350,00 + 3,75% of R350,00 = R363,13
2	R363,13 + 3,75% of R363,13 = R376,74

Simple interest of 4,5% p.a.

Years	Account balance
1	R350,00 + 4,5% of R350,00 = R350,00 + R15,75 = R365,75
2	365,75 + R15,75 = R381,60

Janet should take her brother's loan.

2. a. i. Interest after one year = 12% of R3 460,00
= R415,20

ii. Interest after two years = 2 × R415,20
= R830,40

b. i. Account balance after one year = R3 460,00 + R415,20 – R18,00
= R3 857,20

ii. Account balance after two years = R3 857,20 + R415,20 – R18,00
= R4 254,40

c. i. Balance after one year = R3 460,00 + 7,5% of R3 640,00
= R3 719,50

ii. Balance after two years = R3 719,50 + 7,5% of 3 719,50
= R3 998,46

d. The bank that offers 12% p.a. simple interest

e. Balance after three years = R3 998,46 + 7,5% of 3 998,46
= R4 298,35

After three years he will be able to invest in the fixed deposit account.

1.5 **Investigation:** Compare interest options at different banks

Learner's Book page 199

1. The family have R2 500 to deposit right now so they qualify to invest at bank B. We can immediately exclude bank C as it pays a lower interest rate than bank B.

Bank A	
Years	**Account balance**
1	R2 500,00 + R206,25 = R2 706,25
2	R2 912,50
3	R3 118,75
4	R3 325,00
5	R3 531,25
6	R3 737,50
7	R3 943,75
8	R4 150,00
9	R4 356,25
10	R4 562,50
11	R4 768,75
12	R4 975,00
And so on	

The investment will grow by R206,25 per year.

Bank B	
Years	**Account balance**
1	R2 500,00 + 6,15% of R2 500,00 = R2 653,75
2	R2 653,75 + 6,15% of R2 653,75 = R2 816,96
3	R2 990,20
4	R3 174,10
5	R3 369,30
6	R3 576,51
7	R3 796,47
8	R4 029,95
9	R4 277,80
10	R4 540,88
11	R4 820,14
12	R5 116,58
And so on	

Each year the account balance earns interest of 6,15%.

2. Bank A: It will take 85 years for the family's saving to reach R20 000.
Bank B: It will take 35 years for the family's saving to reach R20 000.

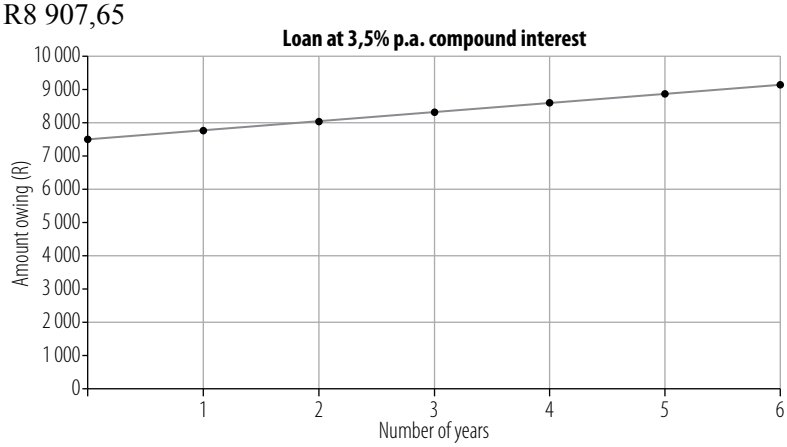
1.6 **Practise** using graphs of interest growth

Learner's Book page 202

1. **a.** **i.** After two years investment 2 is worth more.
ii. After seven years investment 2 is worth more.
b. After six years investment 1 has earned R270.
c. After two years investment 2 has earned R555.
d. Obviously, the bigger the initial investment, the bigger the interest you will earn.

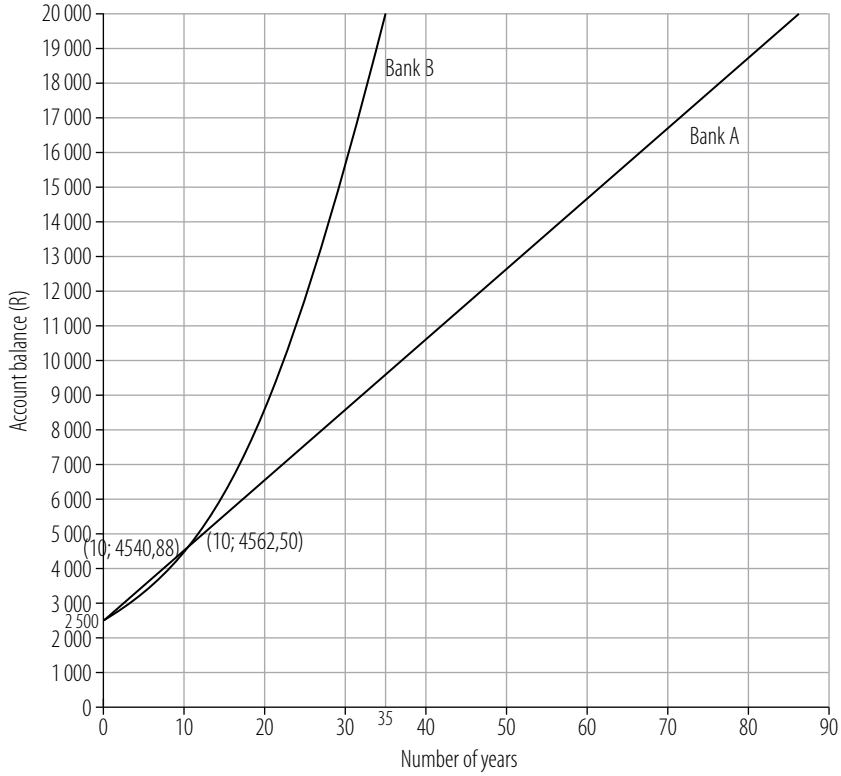
2. **a.** R8 606,42

b. R8 907,65



3. Amount owing after three years: R8 315,39 – R5 000,00 = R3 315,39
Amount owing after four years: R3 431,43
Amount owing after five years: R3 551,53
Amount owing after six years: R3 675,83

4. **a.**



b. The tables and graphs for the first 10 years show that bank A gives a higher balance. Thereafter bank B gives a higher balance. Even though bank B offers a lower interest rate than bank A, bank B's interest is compounded, so the account balance grows more rapidly. At bank A it takes 85 years to reach R20 000, while bank B takes 35 years. Investing at bank A is not a sensible idea as it gives a very poor return in the long term. In the short term bank A is a fair investment.
The graph for bank A is a straight line that indicats the same interest that is earned each month. The graph for bank B is curved indicating that the amount of interest earned increases each year.

Unit 2
Banking

Learner's Book pages 203–227

Teaching tips

- Learners may already have opened a bank account. If they have, encourage them to bring information to class about the account they opened. Discourage them from sharing account details though.
- Today, most employers insist that workers have a bank account as it is too risky to pay people cash, and cheque payments are expensive and outdated, so most companies don't use them anymore. This unit explores different accounts and provides useful guidance to help learners choose the most suitable account for their needs.
- As learners work through this unit, they will deal with real bank documents and fee structures and perform calculations and draw graphs to compare different options. Remember though that these charges change each year, so it will be useful to collect a range of real bank charges. You can get brochures from branches of different banks and access bank websites and download fee structures. You may also be able to find advertisements that include bank fees (Capitec Bank for example is upfront about their fees and prints these in advertisements in the newspapers) and articles that compare the cost of accounts for different banks. It is important that learners realise there is a cost involved in banking and that they can save considerable amounts of money by choosing the right option and/or by comparing offerings from different banks.

Solutions

2.1 **Practise** choosing a suitable bank account

Learner's Book page 206

Answers will differ.
Possible answers include the following.

1. A current account with a debit card would work well for Mr Morofe. He would not need to carry large amounts of cash with him as he could pay for his purchases with his debit card. He could easily withdraw cash if he needed to do so. He would have to watch out for bank charges, but as a pensioner he might qualify for discounted bank charges.
2. Mrs Tshwete already has a bank account, which is probably a current account. She could consider opening a savings account so she could earn interest on money she is able to save. This would help her achieve her aim of opening a hair salon.
3. The club should open a savings account or even a fixed deposit account over six months. In these ways they will be able to earn interest on money they are not currently using.
4. Darien could open a current account to cater for his daily expenses and a fixed deposit account for the balance of his inheritance. This would give him a better interest rate and help him achieve his aim of starting his own business more quickly.

2.2 **Practise** estimating and calculating fees per transaction

Learner's Book page 214

1. a. Yes, there is a monthly fee for all accounts.

b. Yes, with a few exceptions such as when you make a cheque deposit at an ABSA ATM.

c. There is no charge.

d. 2 × R1,05 = R2,10

e. **i.** R3,75 + 8 × R1,01 = R11,83

ii. R20,00 + 8 × R1,01 = R28,80

iii. R9,75 + 8 × R1,01 = R17,83

f. Yes.

g. Yes.

h. R3,15

i. R3,75 + 10 × R0,75 = R11,25

j.

Transaction		**Charge**	**Total**
Two cheques deposited at ATM		No charge	
Cash withdrawal from ATM	R200	R3,75 + 2 × R1,01	
	R500	R3,75 + 5 × R1,01	
	R450	R3,75 + 5 × R1,01	R47,03
	R1 500	R3,75 + 15 × R1,01	
	R80	R3,75 + 1 × R1,01	
Electronic payment (R864)		R3,75 + 9 × R1,01	R10,50
Prepaid top-up		No charge	
Balance request at ATM (× 2)			R2,00
Full account statement at branch			R5,50
Stop orders:	R1 400 (internal)		R3,15
	R650 (internal)		R3,15

Monthly account fee (current account): R21,00

Total monthly fee: R92,33

2. Pricing option 2 – Rebate Banking would be the best deal for the list of transactions in 1j, provided the minimum balance is maintained.
If maintaining a minimum balance is a problem, option 4 would be the next best deal.

3. Answers will differ.

2.3 **Assignment:** Compare student fee packages at different banks

Learner's Book page 218

1. Possible transactions a college or university student might need to do:

- cash withdrawals
- cash/cheque deposit
- debit card purchases
- electronic linked account payments.

Obviously, different students will have different requirements depending on a number of factors. For instance, students who live at home with their families will have different requirements from those who is in a residence or in a flat. If you do five or less transactions per month, the Student Achiever Plan is a good option.

2–4. Answers will differ.

2.4 **Practise** calculating the cost of late payment on credit cards

Learner's Book page 225

1. Minimum payment = 5% of R5 784,30
= R289,22

2. Jabu will start the month with a debit balance of R5 495,08.

3. Interest = 18,4% × $\frac{1}{12}$ × R5 495,08
= R84,26

4.

Month	Opening balance	Credit card purchases	Interest on debit balance	Monthly debit balance	Minimum payment due (5% of debit balance)	Payment made into the account
Month 1	R0,00	R1 235,00	R0,00	R1 235,00	R61,75	R61,75
Month 2	–R1 173,25	R988,40	R22,49	R2 184,14	R109,21	R109,21
Month 3	–R2 074,93	R3 560,00	R39,77	R5 674,70	R283,73	R283,73
Month 4	–R5 390,97	R2 298,35	R103,33	R7 792,65	R389,63	R389,63
Month 5	–R7 403,02	R1 049,20	R141,89	R8 594,11	R429,71	R429,71
Month 6	–R8 164,40	R817,65	R156,48	R9 138,53	R456,93	R456,93
Totals	–R8 681,60					

2.5 **Practise** calculating interest on different types of bank accounts after the same period of time and with the same starting balance

Learner's Book page 227

1.

	a. Three months	b. Six months	c. Twelve months
Current account	R24,71	R49,71	R100,17
Savings account	R21,06	R42,23	R84,91
Fixed deposit account		R59,87	R120,64
Credit card account	R24,35	R48,84	R98,28

Calculations for interest earned on a current account

Month 1: Simple interest per day = 2,5% of R4 000 × $\frac{1}{365}$
= 0,2739…
Interest per month = 30 × 0,2739
= R8,22

Month 2: Capitalise the previous month's interest
R4 000 + R8,22 = R4 008,22
Simple interest per day = 2,5% of R4 008,22 × $\frac{1}{365}$
= 0,2745…
Interest per month = 30 × 0,2745
= R8,24

Month 3: Capitalise the previous month's interest
R4 008,22 + R8,24 = R4 016,46
Simple interest per day = 2,5% of R4 016,46 × $\frac{1}{365}$
= 0,2751…
Interest per month = 30 × 0,2751
= R8,25

Capitalise the interest: account balance = R4 016,46 + R8,25
= R4 024,71

Account balance after three months = R4 024,71

Interest earned: R24,71

Using the same method, complete the table. If the answers are not exactly the same, the difference could be a result of rounding off differences.

2. The best option would be to invest in a fixed deposit account (interest of 3% p.a.) and then leave the money in the current account for the remaining two months.

3. **a.** According to the rates given, he should keep his money in his current account.

b. After he has saved R1 000, which will take him four months, he could transfer his money to a fixed deposit account that would give him a better interest rate.

Unit 3
Bank loans and investments

Learner's Book pages 228–244

Teaching tips

- This unit builds on work done on loans and savings in previous units and it investigates different aspects of loans and savings. Learners will also apply what they have learnt about interest rates to see how these affect the real costs of investing or borrowing money in different contexts.
- Remember that many South African families make use of informal financial services. The South African Labour and Development Research Unit (SALDRU) and the Centre for Social Studies Research (CSSR) carried out a year-long investigation into how families in different parts of the country conduct their finances. The findings from this study can be found online (www.financialdiaries.com). The website has many useful graphs and tables that you can use to develop this topic further in the classroom. If you do not have internet access, you can contact the SALDRU offices at 021 650 5696 and they may be able to post you some publications.
- An important skill in this unit is working out the real cost of an HP agreement. Many learners may not realise that some HP options (such as buying a car and paying it over 60 months with no deposit) may mean that they pay more than double the price of the car because they will pay so much interest over the period. It will be useful to have class discussions about this. Learners can do calculations to substantiate their arguments.

Solutions

3.1 **Practise** calculating the real costs of a loan

Learner's Book page 234

1. **a.** Real cost = loan amount + simple interest for 1 year
= R6 000 + 3,5% of R6 000 × 1
= R6 000 + R210
= R6 210

b. Real cost = loan amount + simple interest for 1,5 years
= R6 000 + 3,5% of R6 000 × 1,5
= R6 000 + R315
= R6 315

2. a.

Year	1	2	3	4
Amount of loan	R812,14	R845,60	R880,43	R916,71

The real cost of the loan: R916,71

b.

Year	1	2	3	4
Amount of loan	R812,14	R845,60 $-\frac{1}{2}$(R780) = R455,60	R474,37	R493,91

The real cost of the loan = R390 + R493,91
= R883,91

3. R2 500 at 8,7% simple interest

Year	1	2	3
Amount owed	R2 717,50	R2 935,00	R3 152,50

R2 500 at 5,2% compount interest

Year	1	2	3
Amount owed	R2 630,00	R2 766,76	R2 910,63

The loan at 8,7% simple interest would have a higher cost.

4. Total amount owed after five years: R714,81
Total amount owed after 36 months: R6 618,76
Amount saved = R7 141,81 –R6 618,76
= R523,05

3.2 **Practise** calculating the real costs of a hire purchase agreement

Learner's Book page 236

1. a. i. Real cost = 15% of R112 500 + R3 985 × 36
= R160 335

ii. Difference in price = R160 335 – R112 500
= R47 835

b. i. Real cost = 10% of R2 119 + R110 × 24
= R2 660,90

ii. Difference in price = R2 859,90 – R2 119,00
= R660,90

c. i. Real cost = 20% of R5 999 + R580 × 12
= R8 159,20

ii. Difference in price = R8 159,20 – R5 999,00
= R2 160,20

2. a. Real cost = R121,30 × 12 = R1 455,60
b. Real cost = 15% of R1 200 + R105 × 12 = R1 440,00
Option B has the lowest real cost.

3. a. Real cost = R120,80 × 6 = R724,80
b. Real cost = 25% of R700,00 + 6 × R91,00 = R721,00
Option B has the lowest real cost.

4. a. Real cost = R131,27 × 24 = R3 150,48
b. Real cost = 10% of R3 000,00 + R126,04 × 24 = R3 324,96
Option A has the lowest real cost.

3.3 **Practise** comparing investment options

Learner's Book page 244

1. Option 2 or if the business has internet banking facilities.
   Option 3 has a slightly higher interest rate over six months.
2. Overall, option 3 has the highest interest rates. The monthly savings could be invested in option 1 and once they have accumulated a lump sum they could transfer it to option 3.
3. Option 1would probably work well as you can add to your investment each month. Once the pensioner has accumulated a lump sum she could transfer the money to option 2 or option 3.
4. For the monthly savings, option 1 would work well. If the business uses option 2 they will have to open a new fixed deposit account each month. For the amount of R35 000 over five years, option 2 and option 3 offer the same interest rate so either one would be a good choice.

Unit 4
Inflation

Learner's Book pages 245–256

Teaching tips

- Inflation is often mentioned in the media, both in relation to price increases and also to inflation-linked wage increases. The concept is explained in simple terms in this unit and learners do several percentage calculations to work out how inflation affects prices and income levels.
- Collect articles and headlines that refer to inflation and display them in the classroom. Discuss what they mean in real terms.

Solutions

4.1 **Practise** calculating inflation-related price increases

Learner's Book page 249

1. Variawa family budget adjusted for 8% inflation rate

a.

Item	January	February	March
Rates	R296,48	R273,89	R296,48
Electricity	R465,15	R426,79	R514,32
Food	R1 692,31	R2 025,32	R2 229,66
School fees	R918,00	R918,00	R918,00
Taxi/bus/train fares	R466,99	R677,92	R711,02

b.

Item	April
Rates	R303,89
Electricity	R527,18
Food	R2 285,40
School fees	R918,00
Taxi/bus/train fares	R728,80

(School fees usually remain the same throughout the year.)

2. Cookie's Cookie Bakes price list (adjusted for 7,4% inflation rate)
R2,69/cookie
R32,22/kg fudge
R51,55/cheese cake
Savoury snack platters: R64,44 (small), R80,55 (medium), R96,66 (large)
Delivery charges: R26,85 per 10-km distance from the bakery.
Delivery free on orders over R268,50.

3. **a.** Their expenditure will increase by about 4,5%. If salaries and wages do not increase by a similar rate, they could end up with a debit balance.
b. Their purchasing power will be less next year. This means they will be able to purchase less for the same amount of money.
c. They would need to increase their income to keep pace with inflation.

4. If the demand for their services remains the same, their production requirements will remain the same, but their production costs and running costs will increase by 6,85%. They need to increase their income by 6,85% so they will be able to pay the increased running and production costs. To do this they will need to put their prices up by 6,85%.

4.2 **Practise** comparing rates of price increase and decrease

Learner's Book page 255

1. **a.** Price change for cheddar cheese = R37,99 – R34,99
= R3,00
Percentage increase = $\frac{3,00}{34,99} \times \frac{100}{1} = 8,57\%$
Price change for gouda cheese = R28,55 – R25,20
= R3,35
Percentage increase = $\frac{3,35}{25,50} \times \frac{100}{1} = 13,29\%$
Gouda cheese shows the greatest rate of price change.

b. Price change for dishwashing soap = R14,95 – R14,20
= R0,75
Percentage increase = $\frac{0,75}{14,20} \times \frac{100}{1} = 5,28\%$
Price change for body soap = R8,50 – R7,95
= R0,55
Percentage increase = $\frac{0,55}{7,95} \times \frac{100}{1} = 6,92\%$
Body soap shows the greatest rate of price change.

c. Price change for petrol = R8,75 – R9,10
= –R0,35
Percentage increase = $\frac{0,35}{9,10} \times \frac{100}{1} = 3,85\%$
Price change for paraffin = R5,60 – R5,75
= –R0,15
Percentage decrease = $\frac{0,15}{5,75} \times \frac{100}{1} = 2,61\%$
Petrol shows the greatest rate of price change – in this case, the rate of change in price is decreased.

2. Total cost to paint the house in 2018: R355,70
Cost at end of 2020: R389,54

4.3 **Investigation:** How does inflation affect property prices?

Learner's Book page 256

1. a.

Property	Price increase/ decrease	% increase/ decrease
One-bedroom flat, no garage, communal swimming pool in block	R45 000	5,81% increase
Two-room house, small front yard, off-street parking	R165 000	25,38% increase
Five-room house, three bathrooms, granny flat, extensive garden, double garage	– R130 000	5,31% decrease
Penthouse flat in luxury complex, four en-suite bedrooms, designer kitchen jacuzzi	– R1 850 00	25,17% decrease

A two-room house with small front yard and off-street parking shows the greatest percentage increase.

b. Answers will differ.

c. Each month the price will increase at a rate of 4,25%.

Property	Price in January	Price in February	Price in March
One-bedroom flat, no garage, communal swimming pool in block	R854 850	R891,181	R929 056
Two-room house, small front yard, off-street parking	R849 638	R885 747	R923 391
Five-room house, three bathrooms, granny flat, extensive garden, double garage	R2 418 600	R2 521 391	R2 628 550
Penthouse flat in luxury complex, four en-suite bedrooms, designer kitchen jacuzzi	R5 733 750	R5 977 434	R6 231 475

2–4. Answers will differ. Discuss the information learners collected with the class.

Revise and consolidate: Finance – Interest, banking, loans and investments, inflation

Learner's Book page 258

1.

	Interest owing	Total amount owing
a.	R1 050	R4 800
b.	R5 117,50	R14 017,50
c.	R164,24	R564,24
d.	R3 302,15	R18 302,15

2. a. R7 554,61

b. R8 206,06

3. a. R191,13

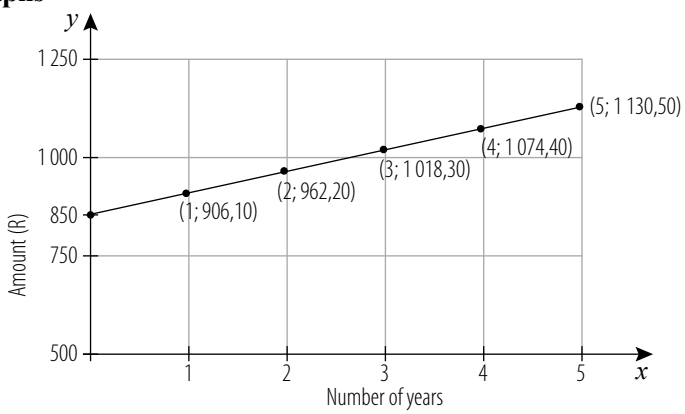
b. Balance on 1 June: R7 836,43
Interest earned:
1–3 June: $7\,836{,}43 \times \frac{0{,}025}{365} \times 3 = 1{,}61$
4–16 June: $6\,536{,}43 \times \frac{0{,}025}{365} \times 13 = 5{,}82$
17–27 June: $5\,961{,}93 \times \frac{0{,}025}{365} \times 11 = 4{,}49$
28–30 June: $5\,662{,}93 \times \frac{0{,}025}{365} \times 3 = 1{,}61$
Total interest earned in June: R13,08

4.

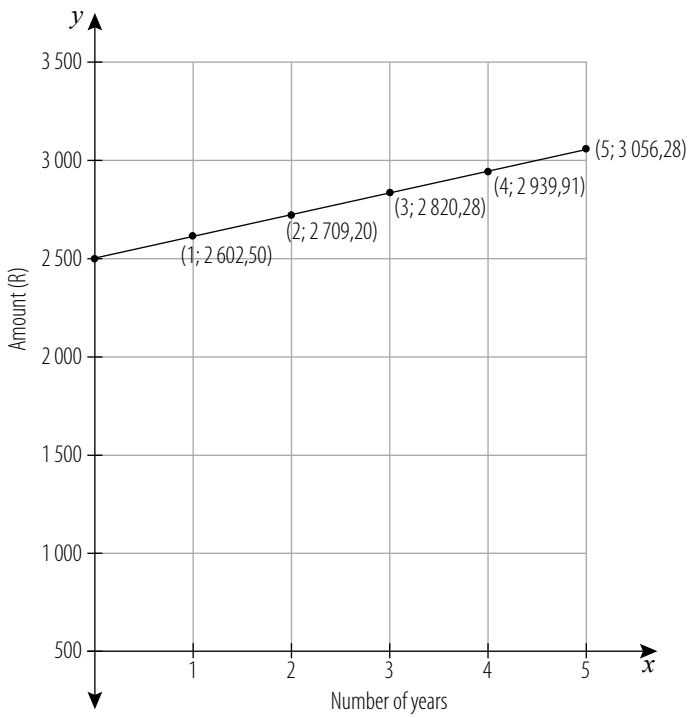
	Year	0	1	2	3	4	5
a.	Amount (R)	850	906,10	962,20	1 018,30	1 074,40	1 130,50
b.	Amount (R)	2 500	2 602,50	2 709,20	2 820,28	2 935,91	3 056,28
c.	Amount (R)	10 000	10 380	10 774,44	11 183,87	11 608,86	12 049,99
d.	Amount (R)	10 000	10 750	11 500,00	12 250,00	13 000,00	13 750,00

Graphs

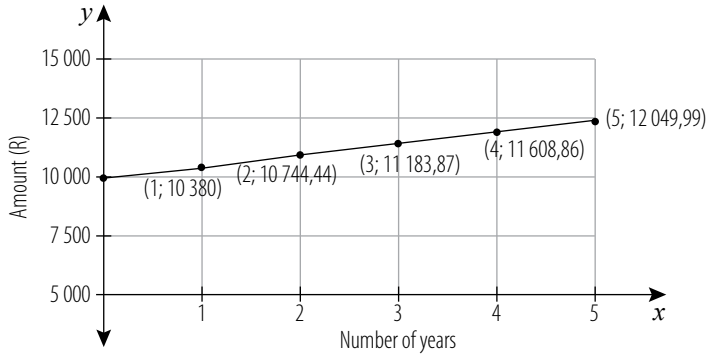
a.



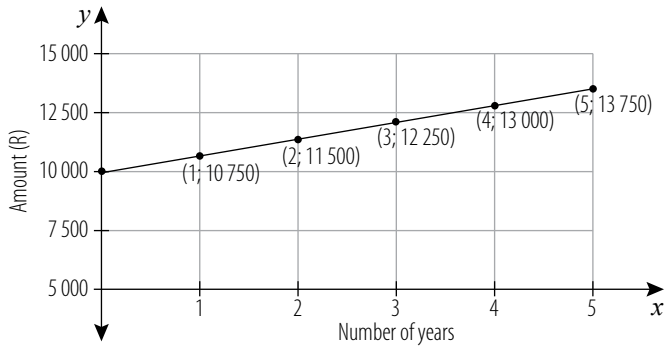
b.



c.



d.



5. **a.** 3,50 + 1,5% of R2 150,00
= R35,75
Fee will be R18,00 – maximum amount

b. R12,50

c. R12,50

d. R18,00

6. Option 1: Amount = 18 000 (1 + 0,05) = R18 900
Option 2: Amount = 18 000 $(1 + 0{,}075)^4$ = R24 038,44
Option 3: After one year:
Amount = 18 000 $(1 + 0{,}025)^{12}$
= R24 208,00
Option 1 would appear to be the best option but Joyce would need to repay the loan in one year. Option 2 is more expensive but she would have four years to repay the loan. Depending on Joyce's financial situation, option 1 or option 2 would be the better choices.

7 **a.** Real cost: R459,50 × 36 = R16 542

b. Real cost: R500 + R620 × 24 = R15 380

c. Real cost: R675 + R385,50 × 36 = R14 553

8. **a.** Total expenditure and income would increase by 7,8%.
Total expenditure for next year: R160 288,66
Total income for next year: R164 911,66

b. Income: R119 291,89
This would mean that their current expenditure would exceed their income. They would have to cut back on their spending.

9. **a.** Amount = 415 000 (1 + 0,063)(1 + 0,078)
= R475 554,31

b. Amount = 675 000 (1 + 0,078)
= R727 650

c. No.

10. D (jacket); A (jeans); C (pants); B (trainers)

Unit 5
Measuring length and distance

Learner's Book pages 261–273

Teaching tips

- Learners have estimated and measured lengths and distances since they were in Foundation Phase. This unit builds on their existing skills, but also requires them to measure with increasing levels of accuracy.
- Make sure you have a range of rulers and measuring tapes available for learners to use. Ask them to bring instruments from home to school as necessary. If anyone has access to an electronic measuring device, it would be good to show the class how it works. These instruments use laser beams (they are very accurate, but needs something for the laser to bounce off) or ultrasonic waves (they are not as accurate) to cover a distance and give an electronic reading of the exact distance. If learners are interested, encourage them to do research into how electronic measuring devices are used in different industries. Also discuss why people (especially older, experienced people) may still prefer to use traditional tape measuring devices (reasons include cost, ease of use and mistrust of change).
- Once learners have revised the basic concepts they will apply their skills to calculating the cost of products that use length as a measurement.

Solutions

5.1 **Practise** comparing measuring instruments

Learner's Book page 262

Answers will differ.

5.2 **Practise** reading odometers and trip meters

Learner's Book page 263

1. A: odometer: 100 187
B: odometer: 528 570
C: odometer: 30 516; trip meter: 26
D: trip meter: 87

2. **a.** A: odometer: 100 341
B: odometer: 528 724
C: odometer: 30 670; trip meter: 180
D: trip meter: 241

b. A: odometer: 100 108,6
B: odometer: 528 491,6
C: odometer: 30 437,6; trip meter: 0
D: trip meter: 8,6

3. **a.** Nababeep: 477,6
Garies: 596,6
Calvinia: 740,6

b. 606 km – 30 km = 576 km
She should start looking for an exit when the trip meter shows: 1 011,6

5.3 **Practise** estimating lengths and distances

Learner's Book page 266

Answers will differ.

5.4 **Practise** calculating travelling costs

Learner's Book page 269

1. a. $\frac{12\ \ell}{100\ \text{km}} = \frac{x\ \ell}{3\ 560\ \text{km}}$

$\therefore x = \frac{12\ \ell}{100\ \text{km}} \times \frac{3\ 560\ \text{km}}{1}$

$= 427{,}2\ \ell$

Cost of petrol = R8,17 × 427,2 = R3 490,22

b. Petrol costs for July = R3 490,22 – 2% of R3 490,22

= R3 420,42

c. Number of kilometres travelled = 279 801,5 – 122 458,4

= 157 343,1 km

Number of litres used:

$\frac{x\ \ell}{157\ 343{,}1\ \text{km}} = \frac{12\ \ell}{100\ \text{km}}$

$\therefore x = \frac{12\ \ell}{100\ \text{km}} \times 157\ 343{,}1$

$= 18\ 881{,}17\ \ell$

Cost of petrol for the year = 18 881,17 × R8,34

= R157 468,97

2.

Travelling speed (km/h)	Petrol consumption (km/ℓ)	Length of journey (km)	Petrol price (per litre)	Litres of petrol used for the journey	Cost of the journey
they are	11,75	56	R8,30	$\frac{56}{11{,}75} = 4{,}77$	R8,30 × 4,77 = R39,59
50	12,2	56	R8,30	$\frac{56}{12{,}2} = 4{,}59$	R33,10
60	12,8	56	R8,30	$\frac{56}{12{,}8} = 4{,}38$	R36,35
70	12,9	56	R8,30	$\frac{56}{12{,}9} = 4{,}34$	R36,02
80	12,9	56	R8,30	$\frac{56}{12{,}9} = 4{,}34$	R36,02
90	12,2	56	R8,30	$\frac{56}{12{,}2} = 4{,}59$	R33,10
100	12,0	56	R8,30	$\frac{56}{12} = \text{R}4{,}67$	R33,76

5.5 **Practise** calculating costs of materials

Learner's Book page 272

1. Bookcase requires ten lengths for shelves and two lengths for the uprights.

a. Pine

Cost = 12 × 2,4 m lengths @ R149,99/length = R1 799,88

b. Chipboard

Cost = 12 × 2 440 m length @ R260,00/length = R3 120,00

2. 105 m + 35,3 m = 140,5 m

140,5 ÷ 3,8 = 50,17

51 × R175 = R8 925

Unit 6
Measuring mass

Learner's Book pages 274–292

Teaching tips

- In this unit, learners will revise the concepts and skills they were taught last year. Remind them that mass is not the same as weight although in daily life, the terms are often used interchangeably. (Weight is the force of gravity on an object, often measured in Newton (N).) Learners are not expected to work with weight in this course.
- Learners learn about and calculate a measurement known as body mass index (BMI). This is one way of determining whether your mass is in a healthy range for your height, however, it is not an absolute and some very fit people (such as Olympic weight lifters and boxers) have a BMI that is in the very obese range because they have lots of muscle mass and muscle is heavier than fat. Sports scientists and dieticians also use a body fat percentage to help them decide whether a person is overweight. It is important that learners do not get stressed if their BMI is higher or lower than normal as many young adults have body image issues. Do not expect learners to share this information about themselves if they are not comfortable doing so.

Solutions

6.1 **Practise** estimating, calculating and measuring quantities of food

Learner's Book page 275

1. Flour for 100 scones: $\frac{100}{24} \times 450 \text{ g} = 1\,875 \text{ g}$
$= 1{,}875 \text{ kg}$

a. 2 × 1 kg bags

b. 2 × 1 kg bags

2. $(5 \times 105 \text{ g}) + (2 \times 210 \text{ g}) + (1 \times 315 \text{ g})$
$= 525 + 420 + 315$
$= 1\,260 \text{ g}$

3. Answers will differ.

6.2 **Practise** measuring the net mass of foods

Learner's Book page 278

Answers will differ.

6.3 **Practise** calculating quantities of food related to body mass

Learner's Book page 280

1. **Dry food:** A cat with a body mass of 1 kg would be given 20 g–25 g of dry food. Once we know this, we can calculate the amount of dry food a cat of any mass would receive by simply multiplying this quantity by the cat's mass in kilograms.
Wet food: A cat with a mass of 1 kg would be given 19,5 g of wet food and 8,75 g of dry food, or 39 g of wet food and 3,75 g of dry food. (You are given the feeding schedule for a cat of 4 kg so to find out how much a cat of 1 kg should be given, divide by 4.)

		i.	ii.
	Body mass	**Amount of dry food**	**Amount of dry and wet food**
a.	3 kg	40–55 g	58,5 g wet food and 26,5 g dry food or 117 g wet food and 11,25 g dry food
b.	1,8 kg	28–37 g	35,1 g wet food and 15,75 g dry food or 70,2 g wet food and 6,75 g dry food
c.	7 kg	70–105 g	136,5 g wet food and 61,25 g dry food or 273 g wet food and 26,25 g dry food
d.	800 g (0,8 kg)	16–20 g	15,6 g wet food and 7 g dry food or 31,2 g wet food and 3 g dry food

2.

Mass as an adult dog	**Dry food**	**Dry food mixed with canned food**
1 pound = 0,45 kg	1 cup = 250 ml 250 ml water has a mass of 250 g. What is the conversion for the dog food?	
Up to 4,5 kg	62,5 ml –187,5 ml	Half the amount of dry food and substitute the same amount with canned food.
4,5 kg –11,25 kg	187,5 ml –250 ml	Half the amount of dry food and substitute the same amount with canned food.
11,25 kg –22,5 kg	250 ml –500 ml	Half the amount of dry food and substitute the same amount with canned food.
22,5 kg –33,75 kg	500 ml –625 ml	Half the amount of dry food and substitute the same amount with canned food.
Over 33,75 kg	500 ml –1 000 ml	Half the amount of dry food and substitute the same amount with canned food.

3. a.

		i.	i.
Cattle	**Grain**	**Recommended grain intake (kg/month)**	**Recommended grain intake (kg/year)**
Dry beef cows (120)	Straw	(2,0 to 4,0) × 30 × 120 = 7 200 to 144 000	(2,0 to 4,0) × 365 × 120 = 87 600,0 to 175 200
Suckled beef cows (240)	Straw	(3,0 to 6,0) × 30 × 240 = 21 600 to 43 200	(3,0 to 6,0) × 365 × 240 = 262 800 to 525 600
	Good hay	(0,0 to 4,0) × 30 × 240 = 0 to 28 800	(0,0 to 4,0) × 365 × 240 = 0 to 350 400
Bulls (4)	Straw	(3,0 to 5,0) × 30 × 4 = 360 to 600	(3,0 to 5,0) × 365 × 4 = 4 380 to 7 300
	Good hay	(1,5 to 3,0) × 30 × 4 = 180 to 360	(1,5 to 3,0) × 365 × 4 = 2 190 to 438

b. Number of dry beef cows = 120 + 34% of 120 = 161
Number of suckled beef cows = 240 + 27% of 240 = 305
Number of bulls = 4 + 100% of 4 = 8

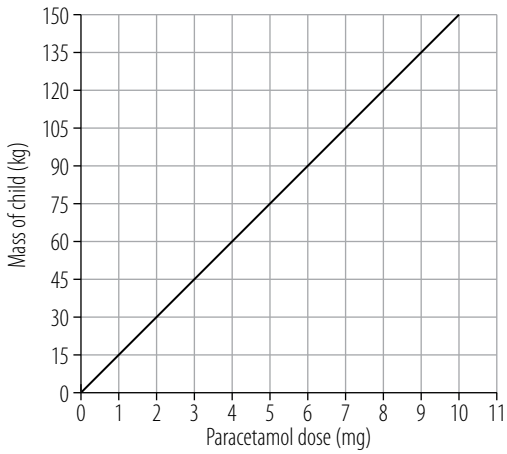
		i.	**i.**
Cattle	**Grain**	**Recommended grain intake (kg/month)**	**Recommended grain intake (kg/year)**
Dry beef cows (161)	Straw	(2,0 to 4,0) × 30 × 161 = 9 660 to 19 320	(2,0 to 4,0) × 365 × 161 = 117 530 to 235 060
Suckled beef cows (305)	Straw	(3,0 to 6,0) × 30 × 305 = 27 450 to 54 900	(3,0 to 6,0) × 365 × 305 = 333 975 to 667 950
	Good hay	(0,0 to 4,0) × 30 × 305 = 0 to 36 600	(0,0 to 4,0) × 365 × 305 = 0 to 445 300
Bulls (8)	Straw	(3,0 to 5,0) × 30 × 8 = 720 to 1 200	(3,0 to 5,0) × 365 × 8 = 8 760 to 14 600
	Good hay	(1,5 to 3,0) × 30 × 8 = 360 to 720	(1,5 to 3,0) × 365 × 8 = 4 380 to 8 760

6.4 **Practise** calculating correct medicine dosages

Learner's Book page 284

1.

Mass of child (kg)	1	1,5	2	2,5	3	3,5	4	4,5
Paracetamol dose (mg)	15	22,5	30	37,5	45,5	52,5	60	67,5
Mass (kg)	5	5,5	6	6,5	7	7,5	8	8,5
Paracetamol dose (mg)	75	82,5	90	97,5	105	112,5	120	127,5



2. **a.** Chest measurement of 143 cm: mass of 246 kg
150 kg – 350 kg: 6 ml – 10 ml
246 kg – 150 kg = 96 kg and 350 kg – 150 kg = 200 kg
Dose = 6 ml + $\frac{96}{200}$ × 4 ml = 7,92 ml

b. Chest measurement of 156 cm: mass of 306 kg
306 kg – 150 kg = 156 kg
Dose = 6 ml + $\frac{156}{200}$ × 4 ml = 9,12 ml

c. Chest measurement of 169 cm: mass of 390 kg
Dose: about 11 ml
Chest measurement of 150 cm: mass of 272 kg
272 kg – 150 kg = 122 kg
Dose = 6 ml + $\frac{122}{200}$ × 4 ml = 8,44 ml

Chest measurement of 129 cm: mass of 186 kg
186 kg – 150 kg = 36 kg
Dose = 6 ml + $\frac{36}{200}$ × 4 ml = 6,72 ml
Chest measurement of 119 cm: mass of 146 kg
146 kg – 150 kg = 96 kg
Dose = 6 ml + $\frac{96}{200}$ × 4 ml = 5,84 ml

Total amount of medicine

(2 animals @ 390 kg): 11 × 2 × 2 × 30	1 320 ml
1 animal @ 272 kg: 8,49 × 2 × 30	506,4 ml
1 animal @ 186 kg: 6,72 × 2 × 30	403,2 ml
2 animals @ 146 kg: 5,84 × 2 × 2 × 30	700,8 ml
Total medicine	2 930,4 ml

6.5 **Investigation:** Collect body mass data and determine BMI weight status

Learner's Book page 288

1, 2. Answers will differ.

6.6 **Practise** calculations with cost and mass

Learner's Book page 292

Answers will differ.

Unit 7
Measuring volume

Learner's Book pages 293–309

Teaching tips

- Learners often find converting between units of volume and capacity difficult, especially the solid-to-liquid conversions they will use in this unit. Revise the work on conversions from Term 1 Unit 5 as necessary, and remind the learners to use the conversion factor tables on page 29 of the Learner's Book to help them do these conversions.
- Learners should be aware of the difference between volume and capacity as they have worked with these concepts since Grade 4. Reiterate this by reading through page 293 with the class but bear in mind that the terms volume and capacity are often used to mean the same thing in daily life.
- The new concept in this unit involves using formulae to calculate volumes. Learners will work with and solve problems related to petrol consumption rates, alcohol content and water run-off rates. It may be useful to find a few car test articles from motoring magazines or the motoring section of the newspaper to compare the given petrol consumption rates for different cars. You will also find the alcohol content of various drinks on the labels and it may be useful to compare these. If you do not wish to use alcohol content as a context you could use fruit drinks and compare the fruit juice content per volume of various brands. This information will be given on the labels.

Solutions

7.1 **Practise** calculating volumes for practical projects

Learner's Book page 297

1. a. i. 14 m^2 of wall surface for two coats

ii. One 1-ℓ tin will be needed; $\frac{14}{15} = 0{,}93$ ℓ

iii. Amount of paint left over: 1 ℓ – 0,93 ℓ = 0,07 ℓ

b. i. 46 m^2 of wall surface for two coats

ii. Number of litres of paint needed: $\frac{46}{15} = 3{,}07$ ℓ

Four 1-ℓ tins will be needed.

iii. Amount of paint left over: 4 ℓ – 3,07 ℓ = 0,93 ℓ

c. i. 95 m^2 of wall surface for two coats

ii. Number of litres of paint = $\frac{95}{15} = 6{,}33$ ℓ

Two 1-ℓ tins plus 1 × 5 ℓ tin will be needed.

iii. Amount of paint left over: 7 ℓ – 6,33 ℓ = 0,67 ℓ

d. i. 436 m^2 of wall surface for two coats

ii. Number of litres of paint = $\frac{436}{15} = 29{,}07$ ℓ

Three 10-ℓ tins plus one 5-ℓ tin will be needed.

iii. Amount of paint left over: 30 ℓ – 29,07 ℓ = 0,93 ℓ

2. a. The capacity of the bucket would be about 15 ℓ and a cup is 250 ml.

Dilute fertiliser: 125 ml fertiliser to 15 ℓ of water

b. 3 buckets = 3 × 15 ℓ = 45 ℓ

c. 7 × 6 drops = 42 drops per week

Using the value given in the example on the previous page of 25 drops = 10 ml: 42 drops = $\frac{42}{25} \times 10$ ml

= 16,8 ml.

If we make enough fertiliser for three months we will need 3 × 4 × 16,8 ml of diluted fertiliser. This means that we will need half the amount of concentrated fertiliser. So, we will need: $\frac{201{,}6 \text{ ml}}{2} = 100{,}8$ ml of concentrated fertiliser.

3. a. 500 ml = 0,5 ℓ

This means that 50 bottles of 500 ml each would give us a total of 25 ℓ.

b. i. Diluted fertiliser mixture: 0,5 ℓ fertiliser to 10 ℓ water

This will make up a total of 10,5 ℓ of diluted fertiliser.

To make 120 ℓ of diluted fertiliser:

0,5 : 10,5 ℓ = x : 120 l

$\frac{0{,}5}{10{,}5} \times 120 = x$

$\therefore x = 5{,}71$ ℓ

To make 120 ℓ of diluted poultry fertiliser: 5,71 ℓ of the concentrated fertiliser.

ii. Seaweed fertiliser

Diluted seaweed mixture: $\frac{1}{2}$ cup to a bucket of water

= 125 ml to 15 ℓ

This will make up a total of 15,125 ℓ of diluted fertiliser.

To make 120 ℓ of diluted fertiliser:

125 ml : 15 ℓ = x : 120 ℓ

$\frac{125 \text{ ml}}{15 \text{ ℓ}} \times 120 \text{ ℓ} = x$

$\therefore x$ = 1 000 ml of contrated fertiliser.

iii. Comfrey fertiliser

Dilute comfrey fertiliser: 50/50 mix

To make 120 ℓ of diluted fertiliser: $\frac{1}{2} \times 120$ ℓ = 60 ℓ of concentrated comfrey fertiliser.

4. Answers will differ.

7.2 **Practise** monitoring your water footprint

Learner's Book page 300

1. 1 gallon = 8 pints = (8 × 0,57 ℓ) = 4,56 ℓ

Rise and shine

Toilet: 6 gallons/flush = 27,36 ℓ/flush
Low-flow toilet: 1,3 g/flush = 5,93 ℓ/flush
Shower: 3,8 g/minute = 17,33 ℓ/min.
Low-flow shower: 2,3 g/min. = 10,49 ℓ/min.
Faucet: 5 g/min. = 22,8 ℓ/min.
Low-flow faucet: 1,5 g/min. = 6,84 ℓ/min.
Total: 49 gallons = 223,44 ℓ
Total: 25,8 gallons = 117,65 ℓ
Amount saved: 23,2 gallons = 105,79 ℓ

Breakfast

Coffee: 37 gallons = 168,72 ℓ
Tea: 9 gallons = 41,04 ℓ
Egg (two): 36 gallons/egg = 164,16 ℓ/egg
Cereal with milk: 22 gallons = 100,32 ℓ
Apple: 18 gallons = 82,08 ℓ
Orange: 13 gallons = 59,28 ℓ
Total: 127 gallons = 579,12 ℓ
44 gallons = 200,64 ℓ
Amount saved: 83 gallons = 378,48 ℓ

Lunch

Soda: 33 gallons = 150,48 ℓ
Water: 0,125 gallons = 0,57 ℓ
Hamburger: 634 gallons = 2 891,04 ℓ
Salad (lettuce, tomato and carrot): 31 gallons = 141,36 ℓ
Total: 667 gallons = 3041,52 ℓ
31,125 gallons = 141,93 ℓ
Amount saved: 635,875 gallons = 2 899,59 ℓ

Dinner

Beef: 1 500 gallons = 6 840 ℓ
Chicken: 287 gallons = 1 308,72 ℓ
Wine: 31 gallons = 141,36 ℓ
Beer: 20 gallons = 91,20 ℓ
Bread (2 slices): 11 gallons/slice = 50,16 ℓ/slice
Baked potato: 7 gallons = 31,92 ℓ
Dish washing in sink 20 gallons = 91,2 ℓ
Dish washing in machine 4 gallons = 18,24 ℓ
Total: 1 573 gallons = 7 172,88 ℓ
318 gallons = 1 450,08 ℓ
Amount saved: 1 255 gallons = 5 722,8 ℓ

Cleaning up

Washing machine: 40 gallons = 182,4 ℓ
Second washing machine: 22 gallons = 100,32 ℓ
Toilet: 69 g/flush = 27,36 ℓ
Low-flow toilet: 1,3 g/flush = 5,93 ℓ/flush
Bath: 35 gallons = 159,6 ℓ
No bath
Faucet (tap): 5 g/min. = 22,8 ℓ/min.
Low-flow faucet: 1,5 g/min. = 6,84 ℓ/min.
Total: 46 gallons = 209,76 ℓ
2,8 gallons = 12,77 ℓ
Amount saved: 43,2 gallons = 196,99 ℓ

Energy

Nuclear: 255 g/day = 1 162,8 ℓ/day
Solar: 24,5 g/day = 111,72 ℓ/day
Amount saved: 230,5 gallons = 1 051,08 ℓ

2–5. Answers will differ.

7.3 **Assignment:** Calculate your household's basic water needs

Learner's Book page 301

Answers will differ.

7.4 **Practise** calculating petrol consumption

Learner's Book page 305

1. a. Petrol consumption (ℓ/km) $= \frac{80\ \ell}{830\ \text{km}} = 0{,}09638\ \ell/\text{km}$

Consumption in ℓ/100 km $= 0{,}09638 \times 100$

$= 9{,}638\ \ell/100\ \text{km}$

$= 9{,}64\ \ell/100\ \text{km}$

b. Petrol consumption (ℓ/100 km) $= \frac{42\ \ell}{465\ \text{km}} \times 100 = 9{,}03\ \ell/100\ \text{km}$

c. Petrol consumption (ℓ/100 km) $= \frac{65\ \ell}{710\ \text{km}} \times 100 = 9{,}15\ \ell/100\ \text{km}$

2. a. Petrol consumption (ℓ/100 km) $= \frac{10\ \ell}{120\ \text{km}} \times 100 = 8{,}33\ \ell/100\ \text{km}$

b. $8{,}33\ \ell : 100\ \text{km} = 55\ \ell : x\ \text{km}$

$$\frac{8{,}33\ \ell}{100\ \text{km}} = \frac{55\ \ell}{x\ \text{km}}$$

$$x = 55 \times \frac{100}{8{,}33}$$

$$= 660{,}20\ \text{km}$$

3. a. $7\ \ell : 100\ \text{km} = x\ \ell : 1\ 200\ \text{km}$

$$x = \frac{7}{100} \times 1\ 200$$

$$x = 84\ \text{l}$$

b. $6\ \ell : 100\ \text{km} = x : 3\ 458\ \text{km}$

$$\frac{6}{100} = \frac{x}{3\ 458}$$

$$x = \frac{6}{100} \times 3\ 458$$

$$x = 207{,}48\ \ell$$

c. Total number of litres of petrol: $84 + 207{,}48 = 291{,}48\ \ell$
To calculate the monthly petrol cost, multiply 291,48 ℓ by the current price of petrol per litre.

d. They could use their June travel expenses for the whole year, but it would be far from accurate as petrol prices are subject to frequent change.

e. Answers will differ.

5. We can see that the optimum (best) petrol consumption occurs at speeds between 75 km/h and 100 km/h. Petrol consumption increases at speeds above 100 km/h. The owner will instruct the drivers to maintain speeds of between 75 km/h and 100 km/h and avoid travelling at speeds over 100 km/h unless there is a special need.

6. Overall, the smart car shows the lowest rate of petrol consumption followed by the Hyundia Elantra. Obviously when choosing a car, a number of factors such as one's requirements and financial situation need to be considered. As petrol is quite expensive, petrol consumption rates would be an important factor to consider.

7.5 **Practise** calculating alcohol content

Learner's Book page 307

1. Alcohol content

A One beer (300 ml): 4,4% of 300 ml = 13,2 ml
B One glass red wine (175 ml): 13,7% of 175 ml = 23,98 ml
C One brandy (30 ml): 40% of 30 ml = 12 ml
D One glass sparkling wine (200 ml): 11% of 200 ml = 22 ml
E One chocolate liqueur (50 ml): 35% of 50 ml = 17,5 ml

Drinks ranked in order from least to most alcohol content:

C One brandy (30 ml)
A One beer (300 ml)
E One chocolate liqueur (50 ml)
D One glass sparkling wine (200 ml)
B One glass red wine (175 ml)

2. Alcohol content

a. 1 ℓ (1 000 ml) wine: 14,2% of 1 000 ml = 142 ml
b. 5 ℓ (5 000 ml) wine: 10,7% of 5 000 ml = 535 ml
c. bottle of whisky (750 ml): 25,4% of 750 ml = 190,5 ml
d. six beers (1 800 ml): 5,7% of 1 800 ml = 102,6 ml

3. Alcohol content

four beers: 4 × 13,2 ml = 52,80 ml
two glasses of red wine: 2 × 23,98 ml = 47,96 ml
one glass of sparkling wine: 1 × 22 ml = 22,00 ml
one liqueur: 1 × 17,5 ml = 17,50 ml
Total amount of pure alcohol consumed: 140,26 ml

4. half a bottle of wine: 375 ml
Amount of alcohol per half bottle of wine: 12,2% × 375 ml = 45,75 ml
Amount of alcohol consumed in one year = 365 × 45,75 ml
= 16 698,75 ml
= 16,70 ℓ

7.6 **Practise** calculating water run-off

Learner's Book page 309

1. **a.** Run-off = R × A
= 564 mm × 38 m^2
= 21 432 ℓ
= 21,432 kl

b. If the household is going to store the water, they should install a water tank with a capacity of 25 000 ℓ (25 kl). If they used the water regularly they could manage with a tank of 15 kl or 20 kl.

2.

Month	Durban	Cape Town
January	130	20
February	115	22
March	122	23
April	75	40
May	65	60
June	30	90
July	35	80
August	60	76
September	75	40
October	100	28
November	110	20
December	100	20
Total	**1 017**	**519**

a. Annual run-off for Cape Town = R × A
= 519 mm × 338 m^2
= 175 422 ℓ
= 175,422 kl

The total annual run-off is 175,422 kl. As Cape Town has a dry summer, it would probably be necessary to store as much water as possible during the wet months so there would be enough water during summer. For this reason a storage tank of 150 kl would be the best option.

b. Annual run-off for Durban = R × A
= 1 017 mm × 415 m^2
= 422 055 ℓ
= 422,055 kl

The total annual run-off for Durban is 422,055 kl. A storage tak with a capacity of 300 kl or 350 kl woud most likely be sufficient to store the water as the rainfall in Durban is fairly steady with the lowest monthly rainfall being 30 ml in June.

7.7 **Assignment:** Calculate total water run-off in a settlement

Learner's Book page 309

1. Run-off = R × A
= 980 mm × 40 m^2
= 39 200 ℓ
= 39,2 kl

2. Total run-off = 240 × 39,2 kl
= 9 408 kl

3, 4. Answers will differ.

Unit 8
Measuring temperature

Learner's Book pages 310–316

Teaching tips

- Learners have already done some basic temperature conversions. This unit builds on what they already know and allows them to apply their skills in different contexts.
- Remind learners to read the labels on the axes of line graphs before they work with the conversion graphs in this unit.

Solutions

8.1 **Practise** reading and converting temperature information

Learner's Book page 313

1. 8 °C = (1,8 × 8 °C) + 32° = 46 °F
–5 °C = (1,8 × –5 °C) + 32 = 23 °F
0 °C = 32 °F
We must look for places where the temperature range is between 23 °F and 46 °F. The minimum temperature must be 32 °F or less if they are hoping for snow. Cities that satisfy their requirements are: Amsterdam, Zurich and Tokyo.

2. Answers will differ.

3. For accurate conversions, a calculation would be the best option. For estimated temperatures that do not need to be exact, a conversion graph would be the quickest and easiest way to make conversions.

4. **a.** 2002 and 2003

b. Temperature in °C: (58 – 32) ÷ 1,8 = 14 °C

5. **a.** 1998

Temperature in 1998: 58,1 °F

Temperature in °C = (58,1 – 32) ÷ 1,8 = 14,5 °C

6. Temperature in 2004: 59 °F = 14,4 °C

Temperature in 1880: 56,7 °F = 13,7 °C

Global average annual temperature rise:

temperature 2004 – temperature 1880 = 14,4 °C – 13,7 °C

= 0,7 °C

7. Answers will differ.

8.2 **Practise** compiling planting calendars based on temperature information

Learner's Book page 315

1. **a,b.** Group C: avocados, bananas, citrus, figs, litchis, mangoes, pawpaws

c. In the south-west in January temperatures range from 10–15 °C.
This temperature range would be suitable for apples, cherries, pears, quinces and raspberries (group B)
and also apples, apricots, berries, citrus, figs, grapes, guavas, peaches, nectarines, pears, plums, quinces, strawberries (group A).

d. Fruit from group A.

e. Fruit from group C.

f. Fruit from both groups A and C

2.

Vegetable	Planting times					
	Polokwane	Bloemfontein	East London	Cape Town	Johannesburg	Durban
beans	Feb.–Aug.	Aug.–Dec.	Oct.–Dec.	Sep.–Jan.	Aug.–Jan.	Feb.–Aug.
cabbage	Feb.–Jun.	Nov.–Feb.	Aug.–Apr.	Nov.–Apr.	Feb.–Apr. Aug.–Sep.	Feb.–Jun.
carrots	Feb.–Aug.	Aug.–Oct. Jan.–Mar.	Jul.–Apr.	Aug.–Nov. Jan.–Apr.	Aug.–Oct. Jan.–Mar.	Feb.–Aug.
cucumbers	Feb.–Sep.	Sep.–Dec.	Jul.–Feb.	Sep.–Nov.	Aug.–Jan.	Feb.–Sep.
peas	Mar.–Jun.	Jul.–Aug.	May–Jul.	Apr.–Aug.	Mar., Jul.–Sep.	Mar.–Jun.
peppers	Jan.–Apr.	Aug.–Oct.	Aug.–Oct.	Aug.–Oct.	Aug.–Oct.	Jan.–Apr.
potatoes	Jan.–Aug.	Dec.–Jan. Aug.–Nov.	Oct.–Dec. Jul.–Oct.	Nov.–Oct. (All year round)	Dec.–Feb. Jul.–Nov.	Aug.–Feb. May.–Aug.
spinach	Feb.–Jun.	Aug.–Apr.	Aug.–Sep.	Mar.–May	Aug.–Apr.	Feb.–Jun.
sweetcorn	Jul.–Nov.	Aug.–Nov.	Sep.–Dec.	Aug.–Dec.	Aug.–Dec.	Jul.–Nov.
tomatoes	Jan.–Jul.	Aug.–Nov.	Aug.–Oct.	Jul.–Sep.	Jul.–Dec.	Jan.–Jul.

1. Answers will differ.

2.

	Number of litres of petrol	Cost
a.	26,60	R293,88
b.	6,50	R71,87
c.	174,81	R1 931,59

3. **a.** 23 m
b. R205,85
c. If he buys 13 of the 1,8 m strips @ R14,40 it will cost R187,20.

4. Answers will differ.

5. **a.** 125 bottles of mixed spice
b. 156 bottles of ginger
c. 104 bottles of pepper

6. **a.** R0,17 + 1,15 = R1,32
b. R1,39
c. R1,45

7. **a.** 190 ml
b. 1 330 ml
c. 1 440 ml

8. $\text{BMI} = \frac{\text{body mass in kg}}{(\text{height in m})^2}$

Child	Mass (kg)	Height (m)	BMI
Gabeba	35,2	0,9	43,46
Jeremy	42,8	1,3	25,33
Seithlamo	44,3	1,2	30,76
Ingrid	38,4	1,3	22,72
Lebo	45,1	1,5	20,04
Vonani	43,6	1,6	17,03
Mzi	36,9	0,7	75,31
Nolwazi	35,7	0,8	55,78

9. **a.** R15,75
b. R20,43
c. R0,16
d. R3,36

10. **a.** 0,3 ℓ bleach (300 ml bleach)
b. A 750 ml bottle of bleach will be enough for two washes.
c. Amount of bleach = $\frac{1}{4} \times 5{,}5\ \ell$
$= 1{,}38\ \ell$

11. Highland: none
River valley: plum tree, walnut tree
Coastal plain: sweet potatoes, sweet basil

Unit 9
Scale

Learner's Book pages 322–326

Teaching tips

- This unit helps to revise and apply the concepts that learners developed in Grade 10 and practised in Term 1 Unit 5.
- Make sure the learners are able to measure distances on maps and convert them to real distances before you ask them to work with real distances and draw their own scaled diagrams.
- In order to make it easy to manage this unit, some real lengths are given. However, it will be more interesting and engaging if you let the learners measure real distances at school and use these measurements to develop scaled diagrams of your actual buildings. They can work in groups and they will need a long measuring tape (the industrial kind).

Solutions

9.1 **Practise** working out distances using a map scale

Learner's Book page 323

1. a. 6 cm : 10 km

$\therefore$ 1 cm : x km

$\frac{6\text{ cm}}{10\text{ km}} = \frac{1\text{ cm}}{x}$

$x = 1\text{ cm} \times \frac{10\text{ km}}{6\text{ cm}}$

$x = 1{,}67\text{ km}$

So, 1 cm represents 1,67 km.

b. 4 cm : 96 km

$\frac{1\text{ cm}}{x} = \frac{4\text{ cm}}{96\text{ km}}$

$x = 1\text{ cm} \times \frac{96\text{ km}}{4\text{ cm}}$

$x = 24\text{ km}$

So, 1 cm represents 24 km.

c. 4 cm : 100 km

$\frac{1\text{ cm}}{x} = \frac{4\text{ cm}}{100\text{ km}}$

$x = 1\text{ cm} \times \frac{100\text{ km}}{4\text{ cm}}$

$x = 25\text{ km}$

So, 1 cm represents 25 km.

d. 4 cm : 400 feet

$\therefore$ 1 cm = 100 feet

2. a. 1 : 120 = 40 mm : x

$\frac{1}{120} = \frac{40\text{ mm}}{x}$

$\therefore x = 40\text{ mm} \times 120$

$= 4\,800\text{ mm}$

$= 4{,}8\text{ km}$

b. $\frac{1}{1\,200} = \frac{40\text{ mm}}{x}$

$\therefore x = 40\text{ mm} \times 1\,200$

$= 48\,000\text{ mm}$

$= 48\text{ km}$

c. $\frac{1}{12\,000} = \frac{40\text{ mm}}{x}$

$\therefore x = 40\text{ mm} \times 12\,000$

$= 480\,000\text{ mm}$

$= 480\text{ km}$

d. 4 800 km

e. 48 000 km

f. 480 000 km

g. 4 800 000 km

3. a. $1 : 18\,000 = 3 \text{ cm} : x$

$$\therefore \frac{1}{18\,000} = \frac{3 \text{ cm}}{x}$$

$$\therefore x = 3 \text{ cm} \times 18\,000$$

$$= 54\,000 \text{ cm}$$

$$= 540 \text{ km}$$

b. Distance on ground = map distance × scale

$$= 7{,}2 \text{ cm} \times 18\,000$$

$$= 129\,600 \text{ cm}$$

$$= 1\,296 \text{ km}$$

c. Distance on ground = map distance × scale

$$= 14 \text{ mm} \times 18\,000$$

$$= 252\,000 \text{ mm}$$

$$= 252 \text{ km}$$

d. Distance on ground = map distance × scale

$$= 2{,}45 \text{ cm} \times 18\,000$$

$$= 44\,100 \text{ cm}$$

$$= 44{,}1 \text{ km}$$

9.2 **Practise** measuring map distances and working with scale

Learner's Book page 323

1. a. 33 mm or 3,3 cm

b. 17 mm or 1,7 cm

c. 5,3 cm or 53 mm

scale: 2 cm : 300 km

$\therefore$ 2 cm : 300 km = 5,3 cm : x

$$\frac{2 \text{ cm}}{300 \text{ km}} = \frac{5{,}3 \text{ cm}}{x}$$

$$\therefore x = 5{,}3 \text{ cm} \times \frac{300 \text{ km}}{2 \text{ cm}}$$

$$= 795 \text{ km}$$

d. 3,4 cm

2 cm : 300 km = 3,4 cm : x

$$\frac{2 \text{ cm}}{300 \text{ km}} = \frac{3{,}4 \text{ cm}}{x}$$

$$\therefore x = 3{,}4 \text{ cm} \times \frac{300 \text{ km}}{2 \text{ cm}}$$

$$= 510 \text{ km}$$

2, 3.

From Pretoria to …	Map distance (mm)	Real distance (km)
Johannesburg	4	60
Polokwane	17	226
Mafikeng	8	120
Mbombela	19	285
Kimberley	32	480
Bloemfontein	29	435
Ulundi	30	450
Bhisho	55	825
Cape Town	92	1 380

1. a. 1 : 50 = 1 cm : 50 m
= 100 cm : 50 m
= 80 cm : 40 m
= 40 cm : 20 m
Scale diagram : 80 cm × 40 cm

b. 1 m : 500 m = 1 000 cm : 500 m

$\frac{x}{20\text{ cm}} = \frac{100\text{ cm}}{500\text{ m}}$ $\quad$ $\frac{x}{40\text{ m}} = \frac{100\text{ cm}}{500\text{ m}}$

$\therefore x = \frac{100\text{ cm}}{500\text{ m}} \times 20\text{ m}$ $\quad$ $\therefore x = \frac{100\text{ cm}}{500\text{ cm}} \times 40\text{ m}$

$= 4\text{ cm}$ $\quad$ $= 8\text{ cm}$

Scale diagram: 8 cm × 4 cm

c. 1 m : 1 000 m = 100 cm : 1 000 m

$\frac{x}{20\text{ cm}} = \frac{100\text{ cm}}{1\,000\text{ m}}$ $\quad$ $\frac{x}{40\text{ m}} = \frac{100\text{ cm}}{1\,000\text{ m}}$

$\therefore x = \frac{100\text{ cm}}{1\,000\text{ m}} \times 20\text{ m}$ $\quad$ $\therefore x = \frac{100\text{ cm}}{1\,000\text{ m}} \times 40\text{ m}$

$= 2\text{ cm}$ $\quad$ $= 4\text{ cm}$

Scale diagram: 4 cm × 2 cm

2. Answers will differ.

3. First, we must decide what scale we need to use. The width of the page is about 20 cm and we need to represent the width of the classroom block which is 25 m on the page.
20 cm : 25 m
20 cm : 2 500 cm or 20 : 2 500 (divide by 20)
Scale: 1 : 125
25 m = 20 cm on plan
Scale the other dimensions

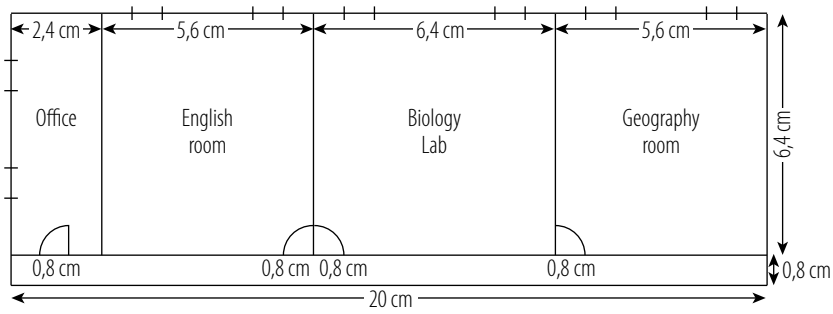
8 m or 800 cm $\quad x : 800 = 1 : 125$
$\therefore x = \frac{1}{125} \times 800$
$x = 6{,}4\text{ cm}$

7 m or 700 cm $\quad x : 700 = 1 : 125$
$\therefore x = \frac{1}{125} \times 700$
$x = 5{,}6\text{ cm}$

3 m or 300 cm $\quad x : 300 = 1 : 125$
$\therefore x = \frac{1}{125} \times 300$
$x = 2{,}4\text{ cm}$

1,8 m or 180 cm $\quad x : 180 = 1 : 125$
$\therefore x = \frac{1}{125} \times 180$
$x = 1{,}44\text{ cm}$

1 m or 100 cm $\quad x : 100 = 1 : 125$
$\therefore x = \frac{1}{125} \times 100$
$x = 0{,}8\text{ cm}$



Unit 10
Maps

Learner's Book pages 327–345

Teaching tips

- Learners have worked with floor plans and simple maps before. In this unit, they will work with the same kinds of map in different contexts. They will also learn how to read and interpret street maps with an index and grid system, maps that show larger areas (maps of South Africa) and elevation maps (also called cross sections).
- It will be useful to have floor plans of local shopping centres available. You will find these at the information kiosks in the centres. Use these to revise the basic skills of locating places on a map. Working with maps of places that are familiar to the learners can help them formalise their spatial and mapping abilities.
- Street map books of cities and towns in your province are also a useful classroom resource as they have maps of small areas and also contain a detailed index to place names that you can refer to as you work through the unit. Learners can make up activities for each other to complete using local area maps.
- You should have an atlas available in class for the learners to refer to as necessary.
- The most common use of road maps is probably to find your way while driving. Make sure the learners understand how to read the distance indicators given on these maps. They may be presented in different ways by different publishers.
- If anyone has access to a GPS system, use it to show the class how maps and routes appear on this. The distances given by the GPS are exact, and it could be a fun activity to compare these to the ones marked on a map. (Use the map on page 335 for this, or a map of your local area).
- Point out to learners that a profile or elevation map is like a line graph that shows distance (in km) on the horizontal axis and height (in metres usually) on the vertical axis. The height (or altitude) is often given on both sides of the graph to make it easier to read the values.

Solutions

10.1 **Practise** describing the position of objects on a map

Learner's Book page 329

1. **a.** Edgars is the the right of entrance 1 or entrance 1 is just to the left of Edgars.
b. The toilets are to the left of entance 3.
c. The ATM is left around the first corner after entrance 4.
d. If you enter the mall at entrance 1, walk past the phones and the escalator, the CNA is on your left.
e. Walk to the left as you enter the mall (at entrance 5), walk between Woolworths on your left and shops 34, 32 and 30 on your right, the ATM is outside shop 26.
f. Walk past Clicks and shops 3, 5 and 7 and the AMT on your left. Go into Edgars, the lift is in front of you.

2. **a.** an escalator
b. a public phone, public toilets, a baby room and a disabled facitily
c. an escalator and entrance 1

d. a customer services counter

3. a. Edgars, Woolworths and Checkers

b. Edgars: entrance 1 is nearest
Woolworths: entrance 5 is nearest
Checkers: entrance 3 is nearest

10.2 **Practise** using the index to locate streets

Learner's Book page 332

1. a. p. 72 **b.** p. 39 **c.** p. 91 **d.** p. 28

2. a. p. 36 DA 118 **b.** p. 41 DE 114
c. p. 72 DR 139 **d.** p. 35 DC 118

3. a. p. 36 **b.** p. 53 **c.** p. 28 **d.** p. 39

10.3 **Practise** following and giving directions using a street map

Learner's Book page 334

1. a. Mandela House

b. Regina Mundi Church

2. As you exit the Chris Hani Baragwanath Hospital in the direction of Orlando, turn left. Continue on this road. You will pass the Regina Mundi Church on your left. Continue following the road. When you reach the intersection with the N12, do not get onto it, but proceed across the N12 and Lenasia will be directly ahead of you.

3. a. Walk through the parking area, the main arena is straight ahead.

b. The parking for gates 4/5 is just to the right of the technical workshop.

c. The monorail makes a short circuit through the centre of the exhibition centre going past the main exhibition halls as far as terrace 2 and then completes its circuit past the other main halls (5, 6, 7 and 8) and returns to the terminal.

d. After entering through turnstile 4/5, she should turn left and continue walking and pass the 4 × 4 Track, turn right and take the escalator to the next floor. Terrace 2 is on the left.

10.4 **Practise** working with a street map

Learner's Book page 335

1. a. B3 **b.** A1 **c.** A1 **d.** B1

2. A1: Nelson Mandela Drive
A3: Rugby Street

3. Mafikeng Museum

4. Directions from Warren's Fort to the Mafikeng Game Reserve:
Leaving Warren's Fort turn left. At Vryburg Road, turn right. Continue on Vryburg Road, crossing the railway line, where after it becomes Main Street. Continue down Main Street until you come to a T-junction at Mandela Drive. Turn right into Mandela Drive. Turn first left after crossing the railway line. When the road forks, take the right fork and that will take you to the reserve.

10.5 **Practise** working out routes and distances using a map

Learner's Book page 338

1. a. 42 km

b. 33 km + 30 km = 63 km

c. 35 km + 34 km = 96 km

d. 35 km + 22 km + 62 km + 6 km = 125 km

2. a. Distance from Bethlehem to Senekal: 35 km + 22 km = 57 km
Distance from Senekal to Ventersburg: 55 km
(There appears to be a road off the R70 – this could be an entrance, but its distance is not given.)
Distance covered: 109 km

b. Time = $\frac{\text{distance}}{\text{speed}} = \frac{109}{75}$ = 1,45 hours.
Break at Senekal: 45 minutes = 0,75 hours
Jeff will take 1,45 + 0,75 = 2,2 hours or 2 hours 12 minutes.

3. a. Sinidi's journey
Maseru to Teyateyaneng: 45 km
Teyateyaneng to Peka: 20 km
From the turnoff to Ficksburg: 5 km
Total distance: 45 km + 20 km + 19 km + 5 km = 89 km

b. Travel time = $\frac{\text{distance}}{\text{speed}} = \frac{89}{70}$ = 1,27 hours = 1 hour 16 min.
Time Sindi takes to cross the border = 30 min.
Total travel time = 1 h 16 min. + 30 min. = 1 h 46 min.
Sindi will arrive at Ficksburg at about 5:00 + 1:46 = 6:46 a.m.

c. Mpho's journey
Maseru to Ladybrand: 15 km
Ladybrand to Ficksburg: 35 km + 34 km = 69 km
Total distance: 15 km + 69 km = 84 km

d. Travelling time = $\frac{\text{distance}}{\text{speed}} = \frac{18 \text{ km}}{90 \text{ km/h}}$ = 0,93 h = 56 min.
Total time = 56 min. + 35 min. = 91 min. ≈ 1,5 h
Mpho will arrive in Ficksburg at 6:30 a.m.

10.6 **Practise** working out distance, time and speed using a strip map

Learner's Book page 339

1. a. Distance between Pretoria and the Villiers turn-off:
(39 + 20 + 8 + 6 + 30 + 11) km = 114 km

b. Distance between Pretoria and Vredefort:
(39 + 20 + 8 + 6 + 30 + 11 + 28 + 19 + 13) km = 174 km

c. Distance between Bloemfontein and Odendaalsrus:
(4 + 18 + 80 + 9 + 43) km = 154 km

d. Distance between Parys and the Krugersdorp turn-off:
(19 + 28 + 11 + 30 + 6) km = 94 km

2. a. Distance between Pretoria and Sasolburg:
(39 + 20 + 8 + 6 + 30 + 11 + 28) km = 142 km
Time = $\frac{d}{s} = \frac{142 \text{ km}}{100 \text{ km/h}}$ = 1,42 h

b. Distance between Pretoria and Kroonstad:
(39 + 20 + 8 + 6 + 30 + 11 + 28 + 19 + 13 + 75 + 9) km = 258 km
Time = $\frac{d}{s} = \frac{258 \text{ km}}{100 \text{ km/h}}$ = 2,58 h

c. Distance between Pretoria and Bloemfontein:
(39 + 20 + 8 + 6 + 30 + 11 + 28 + 19 + 13 + 75 + 9 + 50 + 43 + 9 + 80 + 18 + 4) km = 462 km
Time = $\frac{d}{s} = \frac{462 \text{ km}}{100 \text{ km/h}}$ = 4,62 h

3. Answers will differ. Answers may include: the quality of the road surface, whether it is a straight road or windy road, the volume of the traffic on the road – you could also get stuck behind a large truck, weather – motorists generally travel at lower speeds when the roads are wet or it is raining heavily. Sometimes there is fog or mist on the road which will cause motorists to drive with extreme caution.

4. a. Speed = $\frac{\text{distance}}{\text{time}} = \frac{59\text{ km}}{1{,}5\text{ h}} = 39{,}33$ km/h

b. At 5 p.m. the volume of traffice on the roads would be very high resulting in motorists travelling at low average speeds.

5. a. Time = $\frac{\text{distance}}{\text{speed}} = \frac{60\text{ km}}{160\text{ km/h}} = 0{,}375$ h or 0,375 h × 60 = 22,5 min.

b. Distance from Pretoria to Johannesburg: 59 km

Time with no stops = $\frac{\text{distance}}{\text{speed}} = \frac{59\text{ km}}{160\text{ km/h}} = 0{,}369$ h

or 0,369 × 60 = 22,13 min. ≈ 22 min.

Time spent at stations: 40 – 22 = 18 min.

c. Possible answers include the train can maintain a constant speed of 160 km/h, it is not delayed by traffic jams.

10.7 **Practise** working with national road and rail maps

Learner's Book page 341

1. map scale: 3,5 cm : 400 km

a. Distance from Polokwane to Cape Town: about 15 cm on the map

15 cm : x = 3,5 cm : 400 km

$$\frac{15}{x} = \frac{3{,}5}{400}$$

$$\therefore x = 15 \times \frac{400}{3{,}5}$$

$$= 1\,714{,}29\text{ km}$$

$$= 1\,175\text{ km}$$

b. Time = $\frac{\text{distance}}{\text{speed}} = \frac{1\,715}{100} = 17{,}5$ h

c. Time = $\frac{\text{distance}}{\text{speed}} = \frac{1\,715}{80} = 21{,}44$ h

d. It is recommended that the driver takes a break of 15 minutes every two hours or so. Work out which towns would allow you to stop for a break every two hours and fill up with petrol as necessary.

2. a. Distance from Polokwane to Cape Town: roughly 1 715 km

The number of litres of petrol: $\frac{1\,715}{10} = 171{,}5\ \ell$

b. Number of tanks of petrol needed for the trip: $\frac{171{,}5}{55} = 3{,}12$ tanks

You would need about four tanks of petrol.

c. Using this information (one tank of petrol allows you to travel 550 km), you would plan your next break to coincide with refilling your petrol tank.

d. Answers will differ.

3. Durban – Pietermaritzburg – Harrismith – Bloemfontein

Distance on map: about 7 cm

Actual distance: $\frac{7\text{ cm}}{x\text{ km}} = \frac{3{,}5\text{ cm}}{400\text{ km}}$

$$7\text{ cm} \times \frac{400\text{ km}}{3{,}5\text{ cm}} = 800\text{ km}$$

Distance from Durban to Bloemfontein by rail: about 800 km

4. Distance on the map from Port Elizabeth to East London is ± 13 cm.

Actual distance: $\frac{3{,}5}{400} = \frac{13}{x}$

$$\therefore x = 13 \times \frac{400}{3{,}5}$$

$$= 1\,485{,}71\text{ km}$$

5. a. Distance on rail map from Mthatha to Cape Town : about 16 cm

Actual distance: $\frac{3{,}5}{400} = \frac{16}{x}$

$$\therefore x = 16 \times \frac{400}{3{,}5}$$

$$= 1\,829\text{ km}$$

b. Cost for family: 4 × R256 = R1 024,00

c. Distance on road map from Mthatha to Cape Town: about 11 cm

Actual distance: $\frac{3,5}{400} = \frac{11}{x}$

$\therefore x = 11 \times \frac{400}{3,5}$

$= 1\ 257$ km

Cost: $1\ 257 \times 0,82 = R1\ 031$ (Adapt to the current petrol prices.)

The cost for driving is virtually the same as travelling by train. Your decision would, therefore, be based on factors such as the length of time for the trip; wear and tear on the car.

10.8 **Practise** interpreting information on elevation maps

Learner's Book page 344

1. a. From Hout Bay the run up a very steep hill up to the highest point in the marathon which is 215 m at Constantia Nek. Runners then run down a short slope and then up another small hill and arrive at Kirstenbosch.

b. The first 30 km of the route looks the easiest because there are only small hills. There are no steep hills until after 30 km of the route.

2. a. 87 km

b. 150 km (at Durban)

c. Umlaas Road (± 850 m)

d. From Pinetown to Botha's Hill

e. Runners have covered 40 km of the marathon.

f. From Tumble Inn to Umlaas Road

g. Runners have covered 17 km of the marathon.

h. From Durban to Pietermaritzburg seems most difficult because of the uphills.

i. Time for the up run would probably be longer than for the down run, because runners can run faster down hills than they can run up hills.

3. a. Time difference = 5 h 24 min. 49 s

$$\underline{-\ 5\text{ h }20\text{ min. }49\text{ s}}$$

$$4\text{ min.}$$

b. Yes.

c. The up route is more difficult than the down route for the reason given in **2i**.

Revise and consolidate: Scale and map

Learner's Book page 347

1. a. 85 mm **b.** 20 mm **c.** 35 mm
d. 70 mm **e.** 55 mm

2. a. **A** 212,5 km **B** 50 km **C** 87,5 km
D 175 km **E** 137,5 km

b. **A** 212,5 km **B** 50 km **C** 87,5 km
D 175 km **E** 137,5 km

c. **A** 1 062 500 mm **B** 250 000 mm
C 437 500 mm **D** 875 000 mm
E 687 500 mm

d. **A** 27 200 000 mm **B** 6 400 000 mm
C 11 200 000 mm **D** 22 400 000 mm
E 17 600 000 mm

3. Scale of map 35 mm : 150 km

a. i. 20 mm : 85,71 km

ii. 25 mm : 107,14 km

b. By road, Thabazimbi to Lephale is closer.
As the crow flies, Vaalwater to Mokopane is closer.

4. a. Using the scale 35 mm : 150 km
Distance: 58 mm : 248,57 km

b. Speed $= \frac{248{,}57 \text{ km}}{1\frac{5}{6} \text{ h}}$
$= 135{,}58$ km/h

c. 31,07 ℓ

d. R365,71

5. a. Running cost = 6,62 × 11,77 + 17,18 + 8,98
= 104 c/km (cents/kilometre)

b. R1,04/km

c. R1,17/km

d. 40 mm on map = 171,43 km
Charge = 171,43 × R1,17
= R200,57

6. a. An elevation map

b. Height above sea-level

c. Distance from west coast in kilometres

d. The Pacific Ocean

e. 2 000 m (Although the unit is not given on the vertical axis, it makes sense for it to be metres.)

f. Answers will differ.

TERM 3

WORKED ANSWERS

Unit 1
Perimeter, area and volume

Learner's Book pages 350–375

Teaching tips

- When working with perimeter, area and volume, the learners need to be very confident with measuring length and converting units. Remind them that they worked on these skills in earlier units and pay particular attention to converting between units of area and volume as learners sometimes find these confusing.
- Use real examples as far as possible to demonstrate concepts. We have included some practical direct measuring activities in this unit because physically measuring familiar items helps learners when they have to work with more abstract concepts. The activities are best carried out in groups so that learners can compare and check results.
- It may be useful to make a large poster with the formulae for perimeter, area and volume of different shapes and objects for display in the classroom. It is important that learners can see how these formulae work and that they can use them, changing the subject of the formula if they need to, but they do NOT need to memorise them because the CAPS document specifies that these formulae must be given in assessment tasks and exams.
- Once learners have worked through some basic activities involving the concepts, they will work though more involved investigation in different contexts to calculate real quantities. As prices change from area to area and from time to time, we would encourage the learners to do their own research and to find the cost of locally sold items (such as paint and wood) if at all possible to compare those with the costs given in this book (correct in 2011).

Solutions

1.1 **Practise** direct measurement methods to find perimeter, area and volume

Learner's Book page 351

Answers will differ.

1.2 **Practise** calculating perimeter and area with given formulae

Learner's Book page 353

1. **a.** $P = 2l + 2b$
$= 2(12{,}05\text{ cm}) + 2(2{,}1\text{ cm})$
$= 28{,}3\text{ cm}$

b. $A = l \times b$
$= 12{,}05\text{ cm} \times 2{,}1\text{ cm}$
$= 25{,}31\text{ cm}^2$

2. a. $P = 2\pi r$
$= 2 \times 3{,}142 \times 23{,}4$ cm
$= 147{,}67$ cm

b. $A = \pi r^2$
$= 3{,}412 \times (23{,}5 \text{ cm})^2$
$= 1\,735{,}17 \text{ cm}^2$

3. a. $P = (14 \text{ mm} + 9 \text{ mm} + 32 \text{ mm})$
$= 55$ mm

b. $A = \frac{1}{2}bh$
$= 0{,}8 \text{ cm}^2$

4. a. $P = 4s$
$= 4 \times 0{,}75$ m
$= 3$ m

b. $A = s^2$
$= (0{,}75 \text{ m})^2$
$= 0{,}56 \text{ m}^2$

5. a. $P = \frac{1}{4}(2\pi r)$
$= \frac{1}{2}(2 \times 3{,}142 \times 21{,}52 \text{ cm})$
$= 67{,}62$ cm

b. $A = \frac{1}{2}\pi r^2$
$= \frac{1}{2} \times 3{,}142 \times (21{,}52 \text{ cm})^2$
$= 727{,}55 \text{ cm}^2$

6. a. $P = 0{,}074 \text{ m} + 0{,}08 \text{ m} + 0{,}107 \text{ m}$
$= 0{,}261$ m
$= 261$ mm

b. $A = \frac{1}{2}bh$
$= 2\,942{,}5 \text{ mm}^2$

7. a. $P = \frac{3}{4}(2 \times 3{,}412 \times 84{,}5 \text{ mm})$
$= 398{,}25$ mm

b. $A = \frac{3}{4}(3{,}412 \times 84{,}5 \text{ mm})^2$
$= 16\,825{,}00 \text{ mm}^2$

8. a. $P = 2(l \times b)$
$= 2(1{,}5 \text{ m} \times 0{,}95 \text{ m})$
$= 4{,}9$ m

b. $A = lb$
$= (1{,}5 \text{ m})(0{,}95)$
$= 1{,}43 \text{ m}^2$

9. a. $P = \frac{1}{2}(2 \times 3{,}412 \times 33{,}5 \text{ mm})$
$= 105{,}26$ mm

b. $A = P = \frac{1}{2}(3{,}412 \times 33{,}5 \text{ mm})^2$
$= 1\,763{,}01 \text{ mm}^2$

10. a. $P = \pi d$
$= 3{,}142 \times 1{,}08$ m
$= 3{,}39$ m

b. $A = \pi r^2$ $\left(r = \frac{1{,}08}{2} = 0{,}54\right)$
$= 3{,}142 \times (0{,}54 \text{ m})^2$
$= 0{,}92 \text{ m}^2$

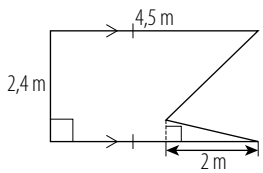
1.3 **Practise** using formulae to calculate the perimeter and area of composite shapes

Learner's Book page 357

1. a. A = area of square + area of semi-circle
$= s^2 + \frac{1}{2}\pi r^2$ $\left(r = \frac{4{,}4}{2} = 2{,}2\right)$
$= (4{,}4 \text{ cm})^2 + \frac{1}{2} \times 3{,}412 \times (2{,}2 \text{ cm})^2$
$= 26{,}96 \text{ cm}^2$

b. A = area of square + area of triangle
$= s^2 + \frac{1}{2}bh$
$= (25 \text{ mm})^2 + \frac{1}{2}(25 \text{ mm})(25 \text{ mm})$
$= 625 \text{ mm}^2 + 312{,}5 \text{ mm}^2$
$= 937{,}5 \text{ mm}^2$

c. A = area of rectangle – area of triangle
$= lb - \frac{1}{2}bh$
$= 2{,}4 \text{ m} \times 4{,}5 \text{ m} - \frac{1}{2} \times 2{,}4 \times 2 \text{ m}$
$= 10{,}8 \text{ m}^2 - 2{,}4 \text{ m}^2$
$= 8{,}4 \text{ m}^2$



2. a. Divide quadrilaterals into two triangles.

A = area $\triangle_1$ + area of $\triangle_2$ (let the base of both $\triangle$s = 17 cm)

$= \frac{1}{2}bh + \frac{1}{2}bh$

$= \frac{1}{2} \times 17 \text{ cm} \times 8 \text{ cm} + \frac{1}{2} \times 17 \text{ cm} \times 5 \text{ cm}$

$= 110{,}5 \text{ cm}^2$

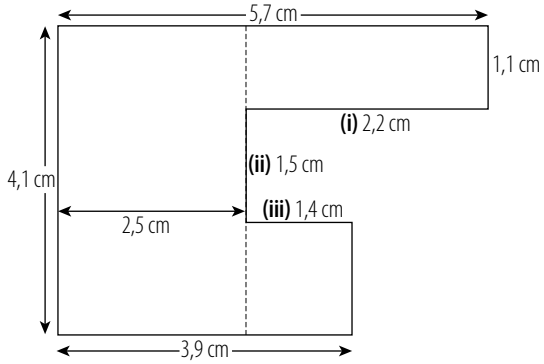
b. Let the base of both $\triangle$s = 18 cm.

$A = \frac{1}{2} \times 18 \text{ cm} \times 9 \text{ cm} + \frac{1}{2} \times 18 \text{ cm} \times 4 \text{ cm}$

$= 81 \text{ cm}^2 + 36 \text{ cm}^2$

$= 117 \text{ m}^2$

3. a. Find the length of the missing sides.



i 5,7 cm – 2,5 cm = 3,2 cm

ii 4,1 cm – 1,1 cm – 1,5 cm = 1,5 cm

iii 3,9 cm – 2,5 cm = 1,4 cm

P = 3,9 cm + 4,1 cm + 5,7 cm + 1,1 cm + 3,2 cm + 1,5 cm + 1,4 cm + 1,5 cm

= 22,4 cm

A = (3,2 × 1,1) + (2,5 × 4,1) + (1,4 × 1,5)

= 16,77 cm²

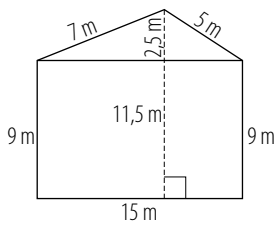
b. P = 2,9 m + 1,9 m + 1,5 m + 1,35 m + 6,1 m + 1,35 m + 1,7 m + 1,9 m

= 18,7 m

A = (6,1 × 1,35 m) + (1,9 m × 2,9 m)

= 13,75 m²

c. P = 7 + 5 + 9 + 3,9 = 24,9 m



Height of triangle = 11,5 m – 9 m = 2,5 m

A = area of rectangle + area of triangle

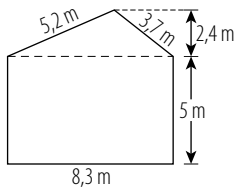
$= l \times b + \frac{1}{2}bh$

$= (9 \text{ m} \times 15 \text{ m}) + (\frac{1}{2} \times 15 \text{ m} \times 2{,}5 \text{ m})$

$= 144 \text{ m}^2 + 18{,}7 \text{ m}^2$

$= 162{,}75 \text{ m}^2$

d. P = 5,2 + 3,7 + 5 + 8,3 + 5 = 27,2 m



A = area of rectangle + area of triangle

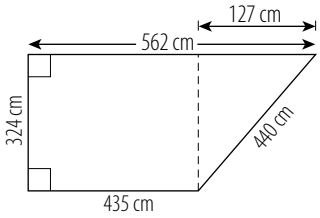
$= l \times b + \frac{1}{2}bh$

$= (8{,}3 \text{ m} \times 5 \text{ m}) + (\frac{1}{2} \times 8{,}3 \times 2{,}4 \text{ m})$

$= 41{,}5 \text{ m}^2 + 9{,}96 \text{ m}^2$

$= 51{,}46 \text{ m}^2$

e. P = 324 + 562 + 435 + 440 = 1 751 cm

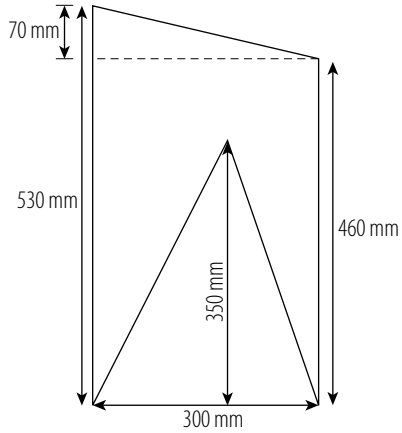


A = area of rectangle + area of triangle

= (435 cm × 324 cm) + ($\frac{1}{2}$ × 324 m × 127 cm)

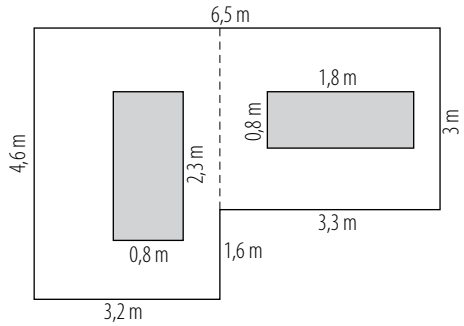
= 161 514 cm²

f. A = area of rectangle + area of △ – area of △ cut out of rectangle
$= (460\,\text{mm} \times 300\,\text{mm}) + \frac{1}{2}(300\,\text{mm} \times 70\,\text{mm}) - \frac{1}{2}(300\,\text{mm} \times 350\,\text{mm})$
$= 96\,000\ \text{mm}^2$



4. a. P = 270 cm + 660 cm + 375 cm + 480 cm + 105 cm + 20 cm + 16 cm + 6 cm + 14 cm + 10 cm + 6 cm = 1 962 cm
= 19,62 m
Area of shaded part:
area of total area – [(0,06 m × 0,16 m) + (0,14 m × 0,1 m)]
$= 22{,}84\ \text{m}^2$

b.



P of unshaded area
= 4,6 m + 6,5 m + 3 m + 3,3 m + 1,6 m + 3,2 m + 2(0,8 m + 2,3 m) + 2(1,8 m + 0,8 m)
= 33,6 m
A of unshaded area
= area of unshaded area – area of shaded area
= (4,6 m × 3,2 m) + (3 m × 3,3 m) – (0,8 m × 2,3 m) – (0,8 m × 1,8 m)
$= 21{,}34\ \text{m}^2$

5. a. P = 54 cm + 60 cm + 60 cm + $\frac{1}{2}$ × circumference of circle with diameter of 54 cm
$= 54\ \text{cm} + 60\ \text{cm} + 60\ \text{cm} + \frac{1}{2}\pi d$
$= 174\ \text{cm} + \frac{1}{2} \times 3{,}412 \times 54\ \text{cm}$
$= 258{,}83\ \text{cm}$
A = area of rectangle – area of semi-circle
$= lb - \frac{1}{2}\pi r^2$
$= 60\ \text{m} \times 54\ \text{m} - \frac{1}{2} \times 3{,}142 \times (27\ \text{cm})^2$
$= 2\,094{,}74\ \text{cm}^2$

$r = \frac{1}{2}d$
$= \frac{1}{2} \times 54\ \text{cm}$
$= 27\ \text{cm}$

b. P of quarter circle $= \frac{1}{4}(2\pi r)$
$= \frac{1}{4}(2 \times 3{,}142 \times 2{,}8)$
$= 4{,}40\ \text{cm}$

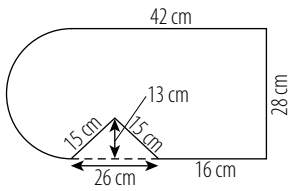
A of quarter circle = $\frac{1}{4}(\pi r^2)$
$= \frac{1}{4} \times 3{,}142 \times (2{,}8)^2$
$= 6{,}16\ cm^2$
P of shape = 2,8 m + 5,6 cm + 5,6 cm + 2,8 cm + 4,4 cm
= 21,2 cm
A of shape = area of square – area of $\frac{1}{4}$ circle
$= (5{,}6)^2 - 6{,}16\ cm^2$
$= 25{,}2\ cm^2$

c. P of semi-circle = $\frac{1}{2}\pi d$
$= \frac{1}{2} \times 3{,}142 \times 620\ mm$
$= 974{,}02\ mm$
A of semi-circle = $\frac{1}{2}\pi r^2$
$= \frac{1}{2} \times 3{,}142 \times (310\ mm)^2$
$= 150\ 973{,}1\ mm^2$
P of shape = 3 × 620 mm + 974,02 mm
= 2 834,02 mm
A of shape = area of square + area of semi-circle
$= (620\ mm)^2 + 150\ 973{,}1\ mm^2$
$= 535\ 373{,}1\ mm^2$

d. Circumference of semi-circle = $\frac{1}{2}\pi d$
$= \frac{1}{2} \times 3{,}142 \times 2{,}3\ m$
$= 3{,}61\ m$
A of semi-circle = $\frac{1}{2}\pi r^2$
$= \frac{1}{2} \times 3{,}142 \times (1{,}15\ m)^2$
$= 2{,}08\ m^2$
A of triangle = $\frac{1}{2}bh$
$= \frac{1}{2} \times 1{,}3\ m \times 1\ m$
$= 0{,}65\ m^2$
P = 2,3 m + 1,3 m + 3,61 m + length of slant sides of triangle
A = area of rectangle + area of semi-circle + area of triangle
$= (1{,}3\ m \times 2{,}3\ m) + 2{,}08\ m^2 + 0{,}65\ m^2$
$= 5{,}72\ m^2$

e. Circumference of semicircle = π × r
= π × 1,4
= 4,398 cm (to three desimal places)
P of two shapes on the sides of the triangle (height as 1,4 cm (radius))
$= \sqrt{1{,}4^2 + 1{,}4^2}$
$= \sqrt{3{,}92} = 1{,}98$ cm
= slanted sides (bases of the shapes on the sides)
P of composite form = 4,398 + 1,98 + 1,98 = 8,358 cm
A of triangle = $\frac{1}{2} \times 2{,}8 \times 1{,}4 = 1{,}96\ cm^2$
A of semicircle = $\frac{1}{2} \times \pi \times r^2 = \frac{1}{2} \times \pi \times 1{,}4^2$
$= 3{,}079\ cm^2$ (to three decimal places)
Therefore, area of composite form = $3{,}079 - 1{,}96 = 1{,}119\ cm^2$

f. P = circumference of semi-circle + 42 cm + 28 cm + 16 cm + slanted sides of triangle
= $\frac{1}{2} \times 3{,}142 \times 28$ cm + 42 cm + 28 cm + 16 cm + sides of triangle
= 43,99 cm + 42 cm + 28 cm + 16 cm + 15 cm + 15 cm
= 159,99 cm



A = area of semi-circle + area of rectangle – area of triangle
$= [\frac{1}{2} \times 3{,}142 \times (14 \text{ cm})^2] + (42 \text{ cm} \times 28 \text{ cm}) - (\frac{1}{2} \times 26 \text{ cm} \times 13 \text{ cm})$
$= 307{,}92 \text{ cm}^2 + 1\ 176 \text{ cm}^2 - 169 \text{ cm}^2$
$= 1\ 314{,}92 \text{ cm}^2$

6. a. i. $A = l \times b$
$= 5 \text{ km} \times 2{,}7 \text{ km}$
$= 13{,}5 \text{ km}^2$

ii. 100 ha = 1 km^2
$13{,}5 \text{ km}^2 \times 100 = 13\ 500$ ha

b. i. $A = l \times b$
$= 0{,}95 \text{ km} \times 8{,}76 \text{ km}$
$= 8{,}32 \text{ km}^2$

ii. $8{,}32 \text{ km}^2 \times 100 = 823$ ha

c. i. $A = l \times b$
$= 5 \text{ km} \times 0{,}1 \text{ km}$
$= 0{,}5 \text{ km}^2$

ii. $0{,}5 \text{ km}^2 \times 100 = 50$ ha

d. i. A = area of rectangle × area of triangle
$= (5{,}54 \text{ km} \times 3{,}76 \text{ km}) + \frac{1}{2}(3{,}76 \text{ km} \times 3{,}09 \text{ km})$
$= 20{,}83 \text{ km}^2 + 5{,}81 \text{ km}^2$
$= 26{,}64 \text{ km}^2$

ii. $26{,}64 \text{ km}^2 \times 100 = 2\ 664$ ha

1.4 **Practise** using formulae to calculate surface area and volume

Learner's Book page 363

1. a. $SA = 2(32 \text{ cm} \times 32 \text{ cm}) + 4(32 \text{ cm}) \times 32 \text{ cm}$
$= 6\ 144 \text{ cm}^2$
$V = 32 \text{ cm} \times 32 \text{ cm} \times 32 \text{ cm}$
$= 32\ 768 \text{ cm}^3$

b. $SA = 2(5{,}7 \text{ cm} \times 2{,}5 \text{ cm}) + 2(5{,}7 \text{ cm} \times 2{,}5 \text{ cm}) \times 8{,}9 \text{ cm}$
$= 174{,}46 \text{ cm}^2$
$V = 5{,}7 \text{ cm} \times 2{,}5 \text{ cm} \times 8{,}9 \text{ cm}$
$= 126{,}83 \text{ cm}^3$

c. $SA = 2(900 \text{ mm} \times 1\ 200 \text{ mm}) + 2(900 \text{ mm} \times 1\ 200 \text{ mm}) \times 600 \text{ mm}$
$= 4\ 680\ 000 \text{ mm}^2$
$V = 900 \text{ mm} \times 1\ 200 \text{ mm} \times 600 \text{ mm}$
$= 648\ 000\ 000 \text{ mm}^3$

2. a. $SA = 2\pi r^2 + 2\pi r \times h$
$= 2 \times 3{,}412 \times (10 \text{ mm})^2 + 2 \times 3{,}142 \times 10 \text{ mm} \times 12 \text{ mm}$
$= 1\ 382{,}48 \text{ mm}^2$
$V = \pi r^2 h$
$= 3{,}142 \times (10 \text{ mm})^2 \times 12 \text{ mm}$
$= 3\ 770{,}4 \text{ mm}^3$

b. $SA = 2\pi r^2 + 2\pi rh$
$= 2 \times 3{,}412 \times (3 \text{ cm})^2 + 2 \times 3{,}142 \times 2 \text{ cm} \times 45 \text{ cm}$
$= 590{,}70 \text{ cm}^2$
$V = \pi r^2 h$
$= 3{,}142 \times (2 \text{ cm})^2 \times 45 \text{ cm}$
$= 565{,}56 \text{ cm}^3$

c. $SA = 2\pi r^2 + 2\pi rh$
$= 2 \times 3{,}412 \times (0{,}65 \text{ m})^2 + 2 \times 3{,}142 \times 0{,}65 \text{ m} \times 10{,}4 \text{ m}$
$= 45{,}13 \text{ m}^2$

$V = \pi r^2 h$
$= 3{,}142 \times (0{,}65 \text{ m})^2 \times 10{,}4 \text{ m}$
$= 13{,}81 \text{ m}^3$

3. a. $SA = 2 \times (26 \text{ cm} \times 19 \text{ cm}) + 2(26 \text{ cm} \times 19 \text{ cm}) \times 31 \text{ cm}$
$= 3\,778 \text{ cm}^2$
$V = 26 \text{ cm} \times 19 \text{ cm} \times 31 \text{ cm}$
$= 15\,314 \text{ m}^3$

b. $SA = 2 \times (43 \text{ cm} \times 59 \text{ cm}) + 2(43 \text{ cm} \times 59 \text{ cm}) \times 9 \text{ cm}$
$= 6\,910 \text{ cm}^2$
$V = 43 \text{ cm} \times 59 \text{ cm} \times 9 \text{ cm}$
$= 22\,833 \text{ m}^3$

c. $SA = 2 \times (5{,}7 \text{ m} \times 2{,}5 \text{ m}) + 2(5{,}7 \text{ m} \times 2{,}5 \text{ m}) \times 8{,}9 \text{ cm}$
$= 174{,}46 \text{ cm}^2$
$V = 5{,}7 \text{ m} \times 2{,}5 \text{ m} \times 8{,}9 \text{ cm}$
$= 126{,}83 \text{ m}^3$

d. $SA = 2\pi r^2 + 2\pi rh$
$= 2 \times 3{,}412 \times (9{,}25 \text{ mm})^2 + 2 \times 3{,}142 \times 9{,}25 \text{ mm} \times 13 \text{ mm}$
$= 1\,293{,}33 \text{ mm}^2$
$V = \pi r^2 h$
$= 3{,}142 \times (9{,}25 \text{ mm})^2 \times 13 \text{ mm}$
$= 3\,494{,}89 \text{ mm}^3$

e. $SA = 2\pi r^2 + 2\pi rh$
$= 2 \times 3{,}412 \times (0{,}45 \text{ m})^2 + 2 \times 3{,}412 \times 0{,}45 \text{ m} \times 8{,}05 \text{ m}$
$= 24{,}04 \text{ m}^2$
$V = \pi r^2 h$
$= 3{,}142 \times (0{,}45 \text{ m})^2 \times 8{,}05 \text{ m}$
$= 5{,}12 \text{ m}^3$

f. $SA = 2\pi r^2 + 2\pi rh$
$= 2 \times 3{,}412 \times (2 \text{ cm})^2 + 2 \times 3{,}142 \times 2 \text{ cm} \times 48{,}3 \text{ cm}$
$= 632{,}17 \text{ cm}^2$
$V = \pi r^2 h$
$= 3{,}142 \times (2 \text{ cm})^2 \times 48{,}3 \text{ cm}$
$= 607{,}03 \text{ cm}^3$

4. $SA = 1\,433{,}98 \text{ cm}^2$
$V = 3\,179{,}8 \text{ cm}^3$

Assignment 1 A nursery with an office shed

Learner's Book page 364

1. Scale drawings may differ.

2. a. Perimeter: $2(18 \text{ m} + 15 \text{ m}) = 66 \text{ m}$

d. You will need $(66 \text{ m} - 1{,}5 \text{ m})$ of fencing: 64,5 m

e. Number of poles $= \frac{64}{2} + 1$
$= 32 + 1$
$= 33$ poles
You might need another two poles to support the gate at either end.

3. a. Area of ground $= 18 \text{ m} \times 15 \text{ m} = 270 \text{ m}^2$
Volume of topsoil $= 270 \text{ m}^2 \times 0{,}75 \text{ m}$
$= 202{,}5 \text{ m}^3$

b. Topsoil : compost $= 3 : 1 = 202{,}5 \text{ m}^3 : x$
$\frac{3}{1} = \frac{202{,}5}{x}$
$\therefore x = 202{,}5 \times \frac{1}{3}$
$= 67{,}5 \text{ m}^3$

Total amount of topsoil + compost = 202,5 + 67,5 = 270 m^3

c. **Topsoil:** R55,00 per m^3 or R199,00 for 5 m^3

$$= \frac{R199,00}{5}$$

$$= R39,80/m^3$$

Buying 5 m^3 at a time is the best option.

Compost: R80,00 per m^3 or R350 for 5 m^3

$$= \frac{R350}{5}$$

$$= R70/m^3$$

Buying 5 m^3 at a time is the best option.

Topsoil: $\frac{202,5\ m^3}{5}$ = 40 (× 5 m^3) + 2,5 m^3

40 × 5 m^3 = 40 × R199,00 = R7 960,00

2,8 m^3 × R55 = R137,5

Most economical: 40 × 5 m^3 + 2,5 1 m^3

Compost: $\frac{67,5}{5}$ = 13 (× 5 m^3) + 2,5 m^3

More economical: 13 × 5 m^3 + 2,5 1 m^3

4. Learners to work from their own plans.

5. Materials for pergola:

8 poles × 3 m = 32 m

+ 4 poles × 1 m = 4 m

= 36 m in length

Calculate the surface area of the pole that needs to be varnished – you need to measure the diameter of the poles you are using.

6. Learners to work from their own plans.

7. Answers will differ.

8. **a.** Volume of cement = 3 m × 2,4 m × 1,1 m

= 7,92 m^3

b–e. Answers will differ.

9–10. Answers will differ.

Assignment 2 Choose fittings and finishes for a new house

Learner's Book page 371

1. Answers will differ.

2. Using a scale of 1 : 100

a. Measurement on map: 3,5 cm × 3 cm: 10,5 cm^2

1,6 cm × 0,9 cm: 1,44 cm^2

1,7 cm × 0,9 cm: 1,53 cm^2

Total area on map: 13,47 cm^2

Scale of 1 : 100 or 1 cm : 100 cm or 1 cm : 1 m

Area of bedroom 1 plus the en-suite bathroom: 13,47 m^2

b. Measurement on map: 1,7 cm × 2 cm = 3,4 cm^2

Area of main bathroom = 3,4 m^2

c. Measurement on map: 1,5 cm × 1 cm = 1,5 cm^2

Area of stoep outside kitchen: 1,5 m^2

4. **a.** Class discussion – would depend on personal preference and what one could afford.

b. 1 cm^2 on the map is 1 m^2 of area of the house.

c. • Bedroom 1 (excluding en-suite): 10,5 m^2

Cost of carpets: 10,5 m^2 × R135 = R1 417,50

Cost of tiles for bedroom 1: 12 boxes required

Cost: 12 × R89,95 = R1 079,40

- En-suite: 2,97 m^2
  4 boxes of tiles required: Cost: 4 × R89,95 = R359,80
- Main bathroom: 3,4 m^2
  4 boxes of tiles required: Cost: 4 × R89,95 = R359,80
- Stoep outside kitchen: 1,5 m^2
  2 boxes of tiles required: Cost: 2 × R89,95 = R179,90

d. Answers will differ.

5. a. Seven doors and one sliding door

b. Learners' own research.

6. a–c. Answers will differ.

d. Learners' own research.

e. **Main bedroom**

Floor area: 3,4 m^2

Area of tiles: 20 cm × 20 cm = 0,2 m × 0,2 m = 0,04 m^2

Number of floor tiles: $\frac{3{,}4\ m^2}{0{,}04\ m^2/tile}$ = 85 tiles

Area of tiles: 30 cm × 30 cm = 0,3 m × 0,3 m = 0,09 m^2

Number of floor tiles: $\frac{3{,}4\ m^2}{0{,}09\ m^2/tile}$ = 38 tiles

Perimeter = 2(1,7 m + 2 m) = 7,4 m

Calculate wall area to be tiled:

Perimeter of bathroom – width of door = 7,4 m – 0,9 m = 6,5 m

Wall area to be tiled = 6,5 m × 1,2 m = 7,8 m^2

Number of wall tiles required:

20 cm × 20 cm: $\frac{7{,}8\ m^2}{0{,}04\ m^2/tile}$ = 195 tiles

30 cm × 30 cm: $\frac{7{,}8\ m^2}{0{,}09\ m^2/tile}$ = 87 tiles

Both floor and wall tiles can only be bought in multiples of 25.

f. **Cost of floor tiles**

20 cm × 20 cm floor tile: 85 tiles required means four boxes must be purchased.
Cost = 4 × R98,00 = R392,00

30 cm × 30 cm floor tile: 38 tiles required means two boxes must be purchased.
Cost = 2 × R124,50 = R249,00

Cost of wall tiles:

20 cm × 20 cm wall tile: 195 tiles required means eight boxes must be purchased.
Cost = 8 × R74,00 = R592,00

30 cm × 30 cm wall tile: 87 tiles required means four boxes must be purchased.
Cost = 4 × R109,00 = R436,00

g. From the results of question 6f we can see the 30 cm × 30 cm tiles is the most economical.

Note: According to the plan the area of the erf is 200 m^2. If we assume that the width of 12,4 m is correct, the length would be 16,13 m (the length on plan should be 16,13 cm and the width 12,4 cm).

7. a. Perimeter = 2(16,13 + 12,4) cm ≈ 57 cm

Width of driveway = 3 m

54 m of fencing is required

b–d. Learners' own research and conclusion.

8, 9. Answers will differ.

1. a. i. 120 m **ii.** 675 m^2
b. i. 109 mm **ii.** 306 mm^2
c. i. 121,8 m **ii.** 927,20 m^2
d. i. 80,38 m **ii.** 514,46 m^2
e. i. 87,28 m **ii.** 398,00 m^2
f. i. 514 cm **ii.** 15 700 cm^2

2. a. i. 18,84 m + 55 = 73,84 m **ii.** 314,52 m^2
b. i. 258 cm **ii.** 2 144 cm^2
c. i. 436,9 cm **ii.** 1 553,38 cm^2
d. i. 418 mm **ii.** 7 248 mm^2

3. a. i. 82,93 mm^2 **ii.** 43,07 m^3
b. i. 16 000 + 10 080 – 3 600 = 22 480 cm^2
ii. 96 000 cm^3
c. i. 0,38 mm^2 **ii.** 0,02 m^3
d. i. 7 937,2 cm^2 **ii.** 28 935 cm^2

4. a. 23,51 m^2
b. R899,90
c. 109 × R12 = R1 308
d. 51,6 m
e. Volume of living room: 96,77 m^3
Volume of main bedroom: 30,24 m^3
f. Wall area of study: 22,96 m^2
He would need to buy three rolls @ R124.
Cost of wallpaper: R372

Unit 2
Plans (instructions and assembly diagrams)

Learner's Book pages 379–384

Teaching tips

- This unit revises the basic concepts and skills that learners worked with in Grade 10 to read and make sense of instructions and assembly diagrams.
- Written instructions are often misread or misinterpreted because people don't read them properly or because they don't follow them properly. It is useful to have some instruction manuals in class and to ask learners to follow the instructions. Calculator manuals, cellphone instruction booklets and appliance operating instructions are all easy to find. Have learners work in pairs, one to carry out the actions, the other to check whether they are doing it correctly. You can develop and carry out similar activities using diagrams and pictorial instructions.
- Learners should be able to identify instructions that are not clear. This is often the case for items made in countries where people don't use much English (particularly China and Korea) or where countries don't have the same safety standards as other countries. It will be interesting to have a class discussion about international safety standards and the role of organisations such as the South African Bureau of Standards (www.sabs.co.za) in enforcing those standards. It is also interesting to look at how and why legal requirements lead to some seemingly silly instructions. Product instructions from the European Union are often over-specified

in terms of instructions and safety information so that the manufacturers cannot be sued by consumers. You can find lots of examples of ridiculous instructions on products if you do an internet search and learners will find these funny. Local examples include:

- On an iron: Do not iron clothes on body.
- On a baby's pram: Remove infant before folding for storage.
- On a superman costume: Wearing of this garment does not enable you to fly.
- On a hairdryer: Do not use in shower.

Solutions

2.1 **Practise** reading and writing instructions

Learner's Book page 380

1. **a.** Turn the camera on.
b. [camera icon]
c. See page 71.
d. Video clips folder
e. Press the OK/***i*** button
f. Press the C button

2. Answers will differ.

2.2 **Practise** writing clear instructions

Learner's Book page 381

1, 2. Answers will differ. Discuss learners' answers in class.

2.3 **Practise** reading and making sense of instruction diagrams

Learner's Book page 382

1. **a.** Open the flat covering the slot.
b. The arrows show you where to insert the memory card.
c. This will ensure that the memory card does not fall out of the slot.
d. Remove it in exactly the same way that you inserted the memory card but in reverse.
e. Discuss learners' suggestions.

2. **A** Keep away from liquids.
B Store in a safe and secure place.
C Don't write on the object or touch it with a sharp object.
D Avoid eye contact with the laser beam.
E Do not touch the power socket.
F Keep away from drafts and extreme temperatures.
G Do not touch the prongs of the charger with metal objects.
H Treat with care. Rough handling could damage the equipment.
I Do not wrap electrical cables around the equipment.
J Use in a safe place, away from other objects.

2.4 **Practise** reading and making sense of instructions with words and diagrams

Learner's Book page 383

1. Matching the colours, connect the component/progressive scan video jacks on the recorder to the corresponding input jacks on the TV using cable C.

2. There are three jacks on either end of the cable.

3. The input jacks are colour matched to the sockets on the TV.
4. Connects the S-Video out jack on the recorder to the S-video in jack on the TV using the S-video cable (the cable labelled S on the diagram).

2.5 **Practise** making sense of assembly diagrams

Learner's Book page 384

Answers will differ. Discuss learners' answers with the class.

Unit 3
Floor and elevation plans

Learner's Book pages 385–393

Teaching tips

- Learners worked with a range of simple floor plans in Grade 10. They also worked with real objects to model and solve problems related to containers and packaging. This year they will extend this work to include the floor plans of more complex structures. They will also learn to use elevation plans (views of the structure from the back, front and sides). Once learners can read and interpret plans, they will need to apply their skills in Unit 4 to build scaled 3-D models and then solve spatial problems by modelling and by calculation.
- Make sure the learners can work with line scales and ratio scales as these will be used throughout this unit. If necessary revise the conversions in Term 1 Unit 5 and Term 2 Unit 9 before proceeding.

Solutions

3.1 **Practise** describing items shown on a plan

Learner's Book page 385

1. **a.** rectangular
   b. $18 \times 25 = 450$ square units
   c. three
   d. inwards
   e. four chairs, work station, round table, bookshelf and waste-paper bin
   f.

Waste-paper bin	4 square units
Work station	97 square units
4 chairs: $4 \times 9 =$	36 square units
Table	21 square units
Bookshelf	12 square units
Total	170 square units

2. **a.** one
   b. outwards
   c. four
   d. eight cubicles
   e. There are eight windows, four in the front of the office and the other four on the back wall of the office.
   f. In the staff kitchen
   g. There are two toilets – they are at the back of the office.

3.2 **Practise** finding the size of items shown on a plan

Learner's Book page 386

1. a. 210 cm or 2,1 m

b. i. 240 cm × 50 cm

ii. Area = 2,4 m × 0,5 m = 1,2 m^2

c. Area = 2,2 m × 1,7 m = 3,74 m^2

d. The entrance doors are each 80 cm wide.

e. Area of meeting room: 2,5 m × 3,1 m = 7,75 m^2

Area of manager's office: 2,5 m × 3,1 m = 7,75 m^2

2. a. Total area of office: 9 m × 10 m = 90 m^2

Total monthly rental: 90 × R145,99 = R13 139,10

b. New monthly rental: R13 139,10 + 8% of R13 139,10

= R14 190,23 per month

3.3 **Practise** making sense of elevation plans

Learner's Book page 387

1. a. rectangular

b. The roof will slope down from front to back.

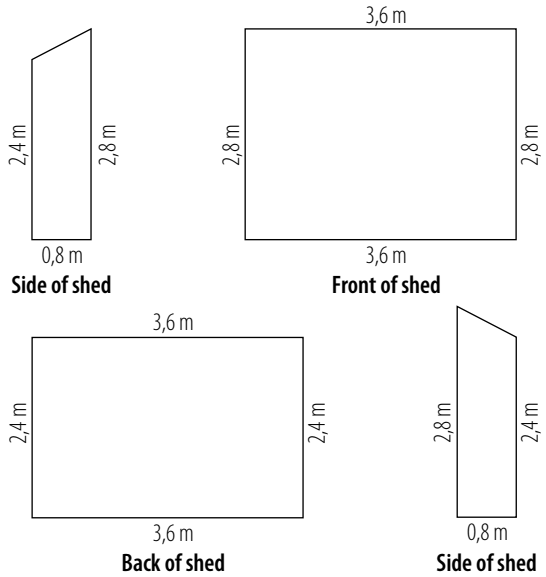
c. trapezium

d. No.

e. It has a standard width front door.

f. rectangular

2. a.



b. SA of side = area of rect + area of triangle

= 0,8 m × 2,4 m + $\frac{1}{2}$(0,8 × 0,4 m)

= 2,08 m^2

SA of front = 3,6 m × 2,8 m = 10,08 m^2

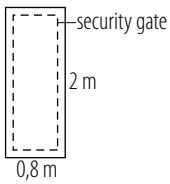
SA of back = 3,6 m × 2,4 m = 8,64 m^2

3. Door frame: 0,8 m × 2 m

(80 mm = 0,08 m 0,08 m × 2 = 0,16 m)

Security gate: (0,8m – 0,16 m) × (2,0 m – 0,16 m)

= 0,64 m × 1,84 m



4. a. length: 9 blocks

width: 4 blocks

sides of each block: 2,5 mm

length of floor: 9 × 2,5 = 22,5 mm

width of floor: 4 × 2,5 = 10 mm

Using a scale factor of 1 : 80:
length: 22,5 mm × 80 = 1 800 mm = 1,8 m
width: 10 mm × 80 = 800 mm = 0,8 m

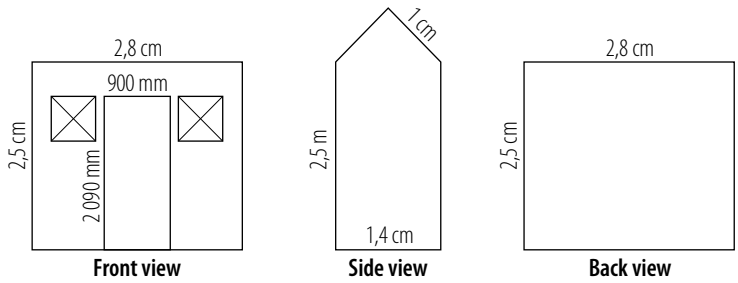
b. A = 1,8 m × 0,8 m = 1,44 m^2

c. cost: 1,44 × 258,80 = R372,67

3.4 **Practise** drawing scaled floor and elevation plans

Learner's Book page 389

1.



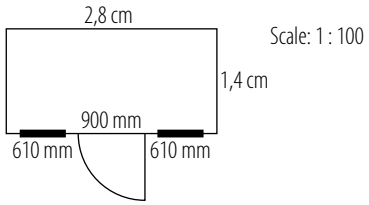
2. **a.** 900 mm

b. Outwards – allows more space for storage inside (if the door opens inwards, there needs to be room for the door to open).

d. WW610, WW730 will fit comfortably.
WW850 will just fit.

e. WW610

3. Shed floor: 2,8 m × 1,4 m



4. **a.** floor area for book shelf: 40 cm × 80 cm = 3 200 cm^2 = 0,32 m^2
floor area for bin: 2 × 3,412 × 25 cm^2 = 4 265 cm^2 = 0,43 m^2
floor area for lawnmower: 60 cm × 70 cm = 4 200 cm^2 = 0,42 m^2
floor area for wheelbarrow: 90 cm × 50 cm = 4 500 cm^2 = 0,45 m^2

b. Answers will differ.

3.5 **Practise** answering questions about compass directions in construction

Learner's Book page 392

1. The room receives full sun in mid-winter at angle *a*.

2. The angle increases from winter to spring. From spring to summer it continues to increase. From summer to autumn the angle will start to decrease.

3. The angle between the roof and the sun's light is so large that the sunlight misses the window.

4. It is cool in summer; easy to keep clean and hard-wearing.

5. South-facing rooms get almost no sunlight in winter as the sun shines from the north.

6. **a.** The best place to place a solar panel would be on the north-facing section of the roof.

b. They will receive the maximum exposure to sunlight.

3.6 **Practise** working with design drawings

Learner's Book page 393

1. 120 cm × 30 cm = 3 600 cm^2
Or: 1,2 m × 0,3 m = 0,36 m^2

2. 700 mm or 70 cm

3. V = 1,2 m × 0,3 m × 0,03 m = 0,0108 m^3
V = 120 cm × 30 cm × 3 cm = 10 800 cm^3

4. **a.** Cost of the yellow wood: 0,0108 m^3
= 0,0108 m^3 × R19 000
= R205,20

b. Cost with 15% mark up: R205,20 + 15% of R205,20 = R235,98

5. Learners discuss answers.

Unit 4
Using models to investigate shape and space

Learner's Book pages 394–399

Teaching tips

- Mathematical modelling is a very useful life skill. At a basic level, people may draw diagrams of a room and use scaled versions of furniture to see how to arrange it (learners did this last year and also in Unit 3). People may also make a model or prototype of an item (scaled or life size) to see how it will work and what it will look like. For example, architects often build scaled models of housing and/or office developments to show prospective buyers what they will get. Engineering firms often make one version of an item and then use that as a template to manufacture lots more. Jewellers make single items or carve models out of wax to use to make or cast many more identical items.
- Learners will need to construct models in this unit. Make sure you have a supply of cardboard (old packaging containers or file covers are useful), scissors and/or craft knives, adhesive tape and/or glue for learners to use.

Solutions

4.1 **Practise** describing and sketching shapes

Learner's Book page 395

1. Learners will choose different containers. Examples are given below.

a,b. dog food and pencil holder on the right: cylinder
tissues (A): cube
Tomtom container, headache liquid capsules, box with transparent lid, box of chocolates: rectangular prism
pencil case (left front): triangular prism

c. Learners describe cylinders, cubes, rectangular prisms and triangular prisms and then sketch each one.

4.2 **Assignment:** Make a cylindrical package

Learner's Book page 395

Answers will differ.

4.3 **Practise** working out how much wood you need

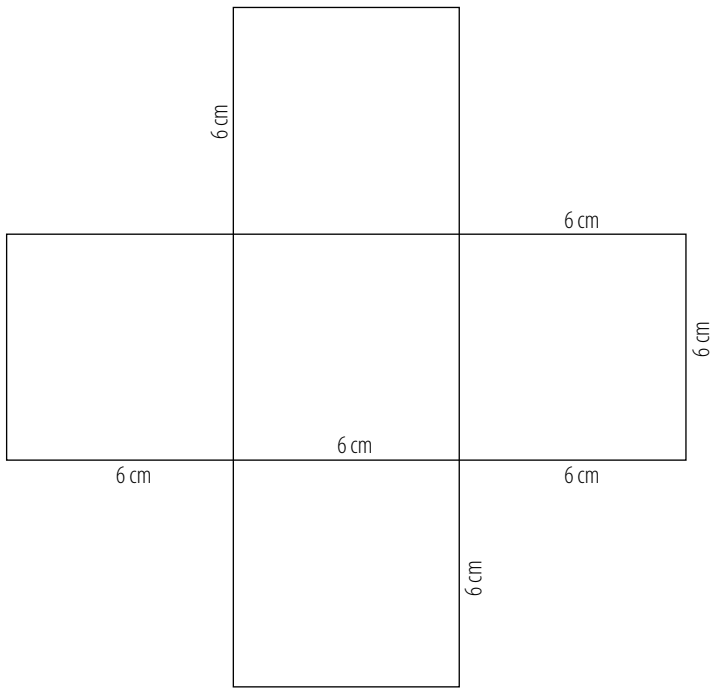
Learner's Book page 397

1. V = *lbh* = 40 cm × 20 cm × 80 cm = 64 000 cm^3
2. V = *lbh* = 120 cm × 50 cm × 75 cm = 450 000 cm^3
3. V = *lbh* = 1,3 m × 0,7 m × 1 m = 0,91 m^3
4. V = *lbh* = 880 mm × 500 mm × 920 mm
= 404 800 000 mm^3

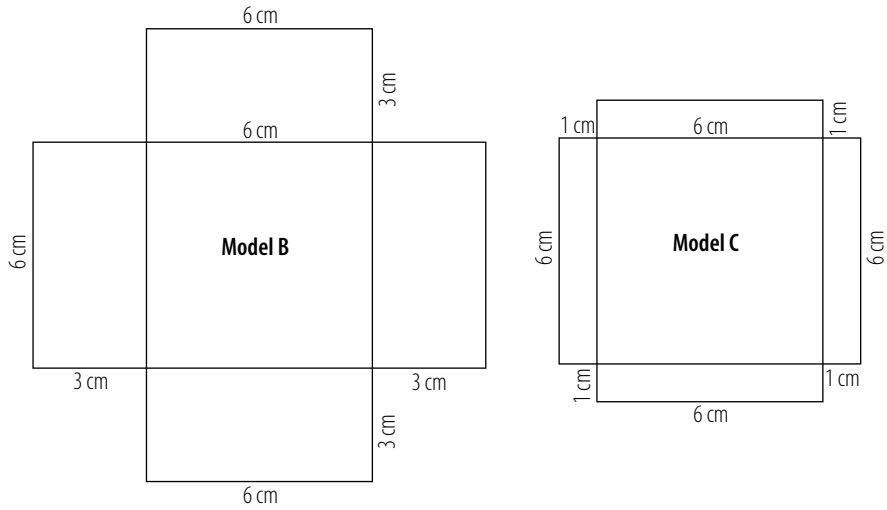
4.4 **Investigation:** Boxes and how much they hold

Learner's Book page 397

1. a. Each learner must draw the scaled nets for each box using the template provided. A scale of 1:10 is given.
Model A would have the following measurements.



All sides of the cube are 60 cm, so using a scale of 1 : 10 gives a length for each side in the scale drawing of 6 cm.
Model B and model C are drawn in the same way.



b. Model A: $5 \times 6\text{ cm} \times 6\text{ cm} = 180\text{ cm}^2$
Model B: $(6\text{ cm} \times 6\text{ cm}) + 4\ (6\text{ cm} \times 3\text{ cm}) = 108\text{ cm}^2$
Model C: $(6\text{ cm} \times 6\text{ cm}) + 4(6\text{ cm} + 1\text{ cm}) = 60\text{ cm}^2$

c. Scale of length: 1 : 10
Scale of area: 1 : 100
Model A: $180\text{ cm}^2 \times 100 = 18\,000\text{ cm}^2$
$= 1{,}8\text{ m}^2$
Model B: $108\text{ cm}^2 \times 100 = 10\,800\text{ cm}^2$
$= 1{,}08\text{ m}^2$
Model C: $60\text{ cm}^2 \times 100 = 6000\text{ cm}^2$
$= 0{,}6\text{ m}^2$

c. Volume model A = lbh
$= 60\text{ cm} \times 60\text{ cm}\ 60\text{ cm}$
$= 216\,000\text{ cm}^3$
$= 0{,}216\text{ m}^3$
Volume model B = lbh
$= 60\text{ cm} \times 60\text{ cm} \times 30\text{ cm}$
$= 108\,000\text{ cm}^3$
$= 0{,}108\text{ m}^3$
Volume model C = lbh
$= 60\text{ cm} \times 60\text{ cm} \times 10\text{ cm}$
$= 36\,000\text{ cm}^3$
$= 0{,}036\text{ m}^3$

4.5 **Practise** making and using a model of a building

Learner's Book page 398

1–3. Accurate scale plans
4. Elevation plans are glued to the model.

4.6 **Practise** using a model to decide on the placement of furniture

Learner's Book page 399

Answers will differ.

Revise and consolidate: Models and plans

Learner's Book page 401

1. a. two
b. six
c. It is a sliding door.
d. A toilet and a washing basin
e. The study and guest toilet are on your left.
On the right you look into the open-plan living area.
After the study and guest toilet the kitchen is on the left.
The front door is directly in line with entrances to bedrooms 1 and 2.

2. a. Jabu must set the system in programming status.
b. 5 1 * 1209 #
c. He will hear a double beep.
d. No he cannot. The password must be four digits.

3. Answers will differ.
4. $23{,}51\text{ m}^2$
5. R899,90
6. $109\text{ m}^2 \times \frac{\text{R}12}{\text{m}^2} = \text{R}1\,308$
7. Learners discuss their answers. They need to use all available information.
8. Answers will differ.

Unit 5
Taxation

Learner's Book pages 404–413

Teaching tips

- Learners need to be very confident about doing percentage calculations in this unit. They will have had some practice in earlier units, but if you feel they still struggle in this area revise the basic skills sections in the Learner's Book before proceeding.
- VAT was dealt with in Grade 10. Remind the learners that VAT is mostly already added to the price of goods we buy. However, businesses and tourists can claim back VAT (or offset against the VAT they have charged in the case of businesses) that they pay on items they buy. In the case of a tourist, this can result in a massive saving. Use the example of buying a camera for R5 000 (including VAT). When the tourist leaves the country, they can be refunded the VAT on their purchase. Also remind learners that some basic foodstuffs are zero-rated for VAT. The aim of this is to help the poor. There is a movement in South Africa to lobby government to make educational books zero-rated. You could discuss in class what the benefits of this would be for learners and other consumers.
- The VAT rate in South Africa has changed from 14% to 15%. If learners are using older editions of the Learner Book, you will need to guide them to use the new VAT rate in their calculations, instead of the old rate given in the Learner Book.
- UIF is a compulsory tax levied on all formal employees. Employees are taxed 1% of their earnings (up to a maximum set by SARS) and their employers pay an additional 1%. This allows people who lose their jobs and women on maternity leave to claim unemployment money from the UIF. The terms and conditions of UIF are outlined in the Learner's Book. You can find out more about UIF from your local SARS office if necessary, they have publications (printed and online) that you can take to class for reference.

Solutions

5.1 **Practise** VAT calculations

Learner's Book page 406

1. **a.** Price excluding: R144,50
VAT = R144,50 × $\frac{15}{100}$ = R21,68
Price inclusive = R166,18

b. Price excluding = R750,00 × $\frac{100}{115}$ = R652,17
VAT = R750,00 × $\frac{15}{115}$ = R97,83
Price inclusive = R750,00

c. Price excluding = R98,30
VAT = R98,30 × $\frac{15}{100}$ = R14,75
Price inclusive = R113,05

d. Price excluding = R23,40 × $\frac{100}{15}$ = R156,00
VAT = R23,40
Price inclusive = R179,40

2.

Income (total for the year)		Expenditure (total for the year)	
Salary J Robinson (net)	136 032,00	Bond repayments on house	47 718,00
Wages M Robinson (net)	62 890,00	Rates, water, refuse service + VAT	9 240,48
Inherited from Gran	10 000,00	Telephone + VAT	6 483,93
Interest on bank savings	1 803,20	Electricity + VAT	5 913,52
		Food and groceries + VAT	40 286,13
		Medical Aid	20 370,00
		Household and car insurance + VAT	10 782,98
		Monthly payments on new car + VAT	17 926,20
		Petrol, car services + VAT	19 126,80
		School and college fees	39 270,00
Total income	**R210 725,20**	**Total expenditure**	**R217 118,04**

3. **a.** VAT can be claimed back on the following items in year 1:

Electricity and phone: VAT = 10 500,00 × $\frac{15}{115}$	1 369,57
Office administration: VAT = 7 200,00 × $\frac{15}{115}$	939,13
Printer rentals: VAT = 27 600 × $\frac{15}{115}$	3 600,00
Paper: VAT = 18 000,00 × $\frac{15}{115}$	2 347,87
Ink: VAT = 9 450,00 × $\frac{15}{115}$	1 232,61
Total amount that can be claimed for year 1	**9 489,18**

VAT can be claimed back on the following items in year 2:

Electricity and phone: VAT = 11 025 × $\frac{15}{115}$	1 438,04
Office administration: VAT = 7 560,00 × $\frac{15}{115}$	986,09
Printer rentals: VAT = 27 600 × $\frac{15}{115}$	3 600,00
Paper: VAT = 21 000,00 × $\frac{15}{115}$	2 739,13
Ink: VAT = 11 376,00 × $\frac{15}{115}$	1 483,83
Total amount which can be claimed for year 2	**10 247,09**

b. VAT must be paid back to the government for the following items in year 1:

Photocopies: VAT = 81 200,00 × $\frac{15}{115}$	10 591,30
Printing A1 plans: VAT = 35 800,00 × $\frac{15}{115}$	4 669,57
Printing fancy stationery: VAT = 27 860,00 × $\frac{15}{115}$	3 633,91
Total amount to be paid	**18 894,78**

VAT must be paid back to the government for the following items in year 2:

Photocopies: VAT = 80 740,00 × $\frac{15}{115}$	10 531,30
Printing A1 plans: VAT = 27 935,00 × $\frac{15}{115}$	3 643,70
Printing fancy stationary: VAT 32 537,00 × $\frac{15}{115}$	4 243,96
Total amount to be paid	**18 418,96**

5.2 **Practise** calculating UIF contributions

Learner's Book page 412

1. **a.** **i.** He contributed 1% of R1 850 = R18,50 per week.

ii. His contribution per year = R18,50 × 52 = R962,00

2. a. Contributions to UIF from supermarket job
= 1% of R1 250
= R12,50 per week
Contributions to UIF from restaurant kitchen job
= 1% of (R90 × 5)
= 1% of R450
= R4,50

b. Increased wages at supermarket = R1 250 + 5% of R1 250
= R1 312,50
UIF contribution: R13,13
weekly contributions will be increased by R13,13 – R12,50 = R0,63

c. She sells goods on a commission basis and does not pay UIF.
Her UIF contribution will be R13,13 per week from her supermarket job. (She lost her job at the restaurant.)

» 5.3 **Assignment:** An employer's budget for UIF contributions

Learner's Book page 413

1.

	Total Salary paid for the year	UIF
Ayanda	R51 900	R519,00
Coco	R14 670	R146,70
Fezile	R51 345	R513,45
Hendrik	R27 300	R273,00
James	R51 900	R519,00
Total annual UIF contributions:		**R1 971,15**

2. UIF contribution will also increase by 3,5%.
Annual UIF contribution = R1 971,15 + 3,5% of R1 971,15
= R2 040,14

» **Revise and consolidate:** Finance – Taxation

Learner's Book page 415

1. a. R3,90 **b.** R16 867,50
c. R24,65 **d.** R1,69
2. a. R13,43 **b.** R251,30
c. R439,13 **d.** R30,43
3. a. R287,50 **b.** R3 910
c. R252 994,25 **d.** R1 953,85
4. a. i. R8,55 **ii.** R8,55
b. i. R174,30 **ii.** R174,30
c. i. R890 **ii.** R890
5. a. R214,50 **b.** R227,80
6. Maximum amount that can be paid is 58% of what was earned per day.
a. R448 per week **b.** R696 per week

Unit 6
Probability

Learner's Book pages 416–434

Teaching tips

- In this unit, learners will continue to work with games that make use of coins and dice and weather predictions to revise and consolidate the concepts and terminology that were introduced last year. They will also continue to use two-way tables and tree diagrams to represent the sample space and outcomes of different events. Remember though that they do not need to calculate probability from tree diagrams; they only use them to represent all the possible outcomes of one or more events.
- This year we also introduce a range of contexts where there is a chance of getting an incorrect result. Learners should be familiar with advertisements that make statistical claims – for example, 80% of teenagers who use this face wash reported fewer pimples. Encourage learners to make a collection of this type of claim from print media and discuss the claims in class.
- Other tests where there is a chance of a wrong result are also included. We deal specifically with pregnancy tests (locally available ones claim to be 99% or more accurate) and random drug tests (which learners may have heard about in connection with sports events). Remind learners that 1% seems like a small margin of error, but that the actual numbers of wrong results will be greater, the more people who do the test. Show them how this works using an example like the one below.

How many people get wrong results if a test is 99% accurate?							
Number of people taking the test	10	100	1 000	10 000	100 000	1 000 000	10 000 000
Correct results	9	99	990	9 900	99 000	990 000	9 900 000
Incorrect results	<1	1	10	100	1 000	10 000	100 000

- The example of an online pregnancy test discussed in this unit is a real one – such tests exist. It is important that you point out to learners that they should not rely on results from tests like this one and encourage them to be really critical of such tests. The example of a boy using it and getting a higher than 50% probability of being pregnant may seem silly, but it makes the point that the test is fundamentally flawed (it does not ask if you are female and it doesn't ask if you have had sex).

Solutions

6.1 **Practise** expressing probability in everyday terms

Learner's Book page 416

1. **a.** Likely **b.** Unlikely (unless this year is a leap year)
c. Unlikely **d.** Impossible **e.** Unlikely

2. Answers will differ but possible answers include the following.
a. Summer follows spring.
b. If I toss a coin, I have a 50–50 chance of getting heads.
c. If today is Monday, tomorrow will be Sunday.

3. Answers will differ. Discuss answers in class.

6.2 **Practise** expressing probability in percentages and numbers

Learner's Book page 417

1. **a.** Nadira has a 78% chance of falling pregnant.
   b. Nadira has a 5% chance of being infertile.
   c. Probability that she will not get pregnant: 100% – 78% = 22%
   d. Probability that she will be fertile: 100% – 5% = 95%
2. At about 33
3. **a.** An impossible outcome has a probability of 0.
   b. A certain outcome has a probability of 1.
   c. Answers will differ. Reasons must be given.
4. Answers will differ.
5. The probability of a woman who is 15 years to 19 years being infertile is less than 3%.

6.3 **Practise** doing a trial and recording the outcomes

Learner's Book page 420

Answers will differ.

6.4 **Investigation:** How often you throw a double?

Learner's Book page 420

Answers will differ.

6.5 **Practise** calculating experimental probability

Learner's Book page 422

1. Experimental probability: $\frac{35}{60} = \frac{7}{12}$
2. Experimental probability/relative frequency: $\frac{175}{200} = \frac{7}{8}$
3. Experimental probability: $\frac{58}{290} = \frac{1}{5}$
4. **a.** Relative frequency: $\frac{11}{80}$
   b. Relative frequency: $\frac{27}{80}$
5. No. A sample of size 80 is too small to be representative of most customers in South Africa.
6. **a.** Generic: Need to know now: 1 : 3
   x : 381 = 1 : 3
   Number of customers who choose the generic test:
   $x = \frac{1}{3} \times 381$
   = 127

   b.

Brand	Number sold	Relative frequency
Need to know now?	381	$\frac{381}{508} = \frac{3}{4} = 75\%$
Generic	127	$\frac{127}{508} = \frac{1}{4} = 25\%$
Total	508	100%

   c. **i.** P(Need to know now?) = 75%
   ii. P(generic) = 25%

6.6 **Practise** calculating theoretical probability

Learner's Book page 423

1. **a.** P(5) = $\frac{1}{6}$ = 16,67%
   b. P(even) = $\frac{3}{6} = \frac{1}{2}$ = 50%
   c. P(prime) = $\frac{3}{6} = \frac{1}{2}$ = 50%
   d. P(number > 3) = $\frac{3}{6} = \frac{1}{2}$ = 50%

2. **a.** P(apple flower) = $\frac{5}{9}$ = 55,56%
   b. P(blackberry flavour) = $\frac{4}{9}$ = 44,44%
   c. P(neither apple or blackberry flavour) = 0
   d. P(apple or blackberry flavour) = 1 = 100%
3. A B C D E F G H I J K
   a. P(vowel) = $\frac{3}{11}$
   b. P(consonant) = $\frac{8}{11}$
   c. P(D) = $\frac{1}{11}$
   d. P(M) = 0
4. **a.** P(M) = $\frac{2}{11}$ = 18,18%
   b. P(vowel) = $\frac{4}{11}$ = 36,36%
   c. P(consonant) = $\frac{7}{11}$ = 63,64%
   d. P(Y) = 0
   e. P(C or S) = $\frac{2}{11}$ = 18,18%
5.

Coin 1	Coin 2	Coin 3
H	H	H
H	H	T
H	T	H
H	T	T
T	T	T
T	H	T
T	T	H
T	H	H

   a. P(3 heads) = $\frac{1}{8}$ = 12,5%
   P(3 heads) = $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$
   b. P(at least one head) = 1 – P(all tails)
   = 1 – $\frac{1}{8} = \frac{7}{8}$ = 87,5%
   c. P(two tails) = $\frac{3}{8}$ = 37,5%
6. The results of the exams are not random but depend on the learners' performance, so the probability of a pass or fail is not 50%.

6.7 **Practise** understanding predictions

Learner's Book page 425

1. **a.** 11 days
   b. This year there could be less rain so there could consequently more sunny days.
2. **a.** Yes. The relative frequency of rainy days would be $\frac{2}{28}$ = 7,14%. The relative frequency of rainy days for the previous year was $\frac{8}{28}$ = 28,6%.
   b. Weather patterns are not certain.
3. Weather forecasts are only an estimate based on present conditions. There is a good chance that the weather forecast could be fairly accurate but the forecasts are never 100% certain.
4. **a.** Relative frequency of rain: $\frac{13}{30}$ = 43,33%

   b.

Weather	Wins	Relative frequency (%)
Sunny and dry	$\frac{4}{7}$	$\frac{4}{7} \times 100$ = 57,14%
Cloudy and humid	$\frac{3}{7}$	$\frac{3}{7} \times 100$ = 42,86%
Rainy	$\frac{3}{13}$	$\frac{3}{13} \times 100$ = 23,08%

   From the values it would appear that they have a better chance of winning if it is sunny.

c. From the above results, Grey College has a greater chance of losing the tournament when it is rainy. This means that Luhlaza would have a greater chance of winning when it is rainy.

d. Out of 30 tournaments, Grey College drew six matches.
P(draw) = $\frac{6}{30} = \frac{1}{5} = 20\%$

6.8 **Investigation:** Work with weather predictions

Learner's Book page 426

1. a. Probability that weather forecast is correct
$= \frac{7}{10}$
$= 70\%$

b. Probability that weather forecast is wrong
$= \frac{3}{10}$
$= 30\%$

c. Learners to discuss.

2. a. Wyoming, Colorado and Utah

b. Wyoming and Colorado have a 70% chance, whereas Utah has an about 10% chance.

c. It is most likely to snow on the border between Colorado and Wyoming, and in northern Wyoming.

d. It would depend on which part of Colorado they lived in. If Sarah lives in the southern part of Colorado, according to the forecast there will be no snow.

6.9 **Practise** considering results that may be inaccurate

Learner's Book page 429

1. a. Provided the instructions are correctly, including waiting the time specified, 97 out of 100 tests are accurate.

b. Not following instructions properly or not waiting the specified time would make the test less accurate.

c. 3%

d. 97%

2. a. Only women can become pregnant.

b. The symptoms mentioned in the test are very general – there could be other reasons why someone would present some of these symptoms.

c. Class discussion

3. a.

Status	Test positive (fail drug test)	Test negative (pass drug test)	Total
Athletes who are using illegal substances	9	1	10
Athletes who are not using illegal substances	99	891	990
Total	108	892	1 000

b. $\frac{99}{990} = 10\%$

c. No. The test has been shown to be only 90% accurate.

4. a. $\frac{1}{2}$ of $1\% = \frac{1}{2} \times \frac{1}{100} = \frac{1}{200} = 0{,}005$

b. Class discussion.
(The school could agree to re-test anyone who tests positive in the test.)

c. Number of learners who could be incorrectly accused of being drug-users:
$\frac{1}{200} \times 3\ 831\ 937$
= 19 160 learners

5. a. The table shows the findings of extensive drug testing research.

b. **Non-users**
Total number of non-users: 9 025 + 475 = 9 500
Percentage of non-users who tested negative for drugs:
$\frac{9\ 025}{9\ 500} \times \frac{100}{1}$
= 95%
Users
Total number of users: 475 + 25 = 500
Percentage of users who tested positive for drugs: $\frac{475}{500} \times \frac{100}{1} = 95\%$
So,overall, the drug tests were 95% accurate.

c. Chance that non-users would test positive for drugs: $\frac{475}{9\ 500} \times \frac{100}{1} = 5\%$

d. The accuracy of this test among actual drug users was 95%.

e. The accuracy of the drug test was the same for users and non-users.

6.10 **Practise** interpreting predictions used in the media

Learner's Book page 431

1. a. Class discussion

b. The reductions in wrinkles would probably be measured by observing the appearance of the women involved in the test.

c. Yes. The sample of women used in the clinical test was very small.

d. Class discussion

2. a. Yes.

b. Ten dentists could have been asked for their preference and given the toothpaste brand involved in the survey. If they had included more dentists in the study, the results may have been different.

3. a. *Recommended by pharmacists* implies that pharmacists recommend this product over similar products.

b. It means that if you were to ask a pharmacist to recommend a vitamin, this product would be one of many products they might recommend.

c. For advertising purposes, it would be possible to make this claim.

6.11 **Practise** representing sample spaces for compound events

Learner's Book page 433

1. a. MM MF FM FF

b. HHH HHT HTH HTT THH TTH THT TTT

c. CHAT HCAT AHCT TCHA
CHTA HCTA AHTC TCAH
CAHT HACT ATHC THCA
CTHA HTCA ACHT TACH
CATH HTAC ATCH TAHC
CTAH HACT ACTH THAC 24 Possible outcomes

d. AMR ARM MRA MAR RAM RMA

2. a.

	1	2	3	4	5	6
Heads	H1	H2	H3	H4	H5	H6
Tails	T1	T2	T3	T4	T5	T6

b.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

c.

	R1	R5
R1	R1 R1	R1 R5
R5	R5 R1	R5 R5

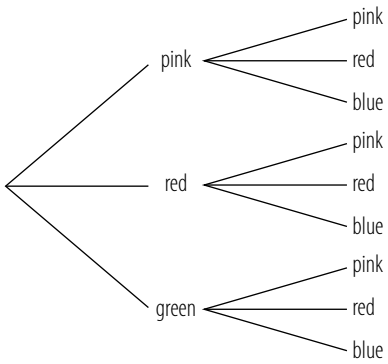
d.

	A	B	C	D	E
1	1A	1B	1C	1D	1E
2	2A	2B	2C	2D	2E
3	3A	3B	3C	3D	3E
4	4A	4B	4C	4D	4E
5	5A	5B	5C	4D	4E
6	6A	6B	6C	6D	6E

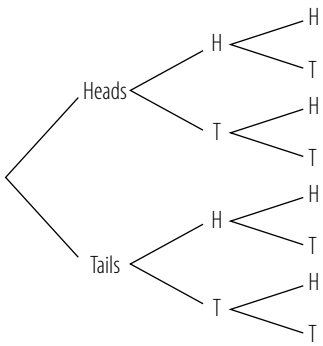
e.

	Brown eyes	Green eyes	Blue eyes
Black hair	Black hair/brown eyes	Black hair/green eyes	Black hair/blue eyes
Brown hair	Brown hair/brown eyes	Brown hair/green eyes	Brown hair/blue eyes
Red hair	Red hair/brown eyes	Red hair/green eyes	Red hair/blue eyes
Blond hair	Blond hair/brown eyes	Blond hair/green eyes	Blond hair/blue eyes

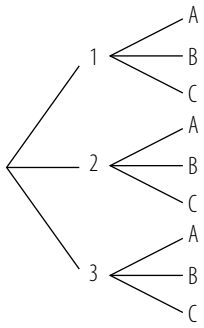
3. a.



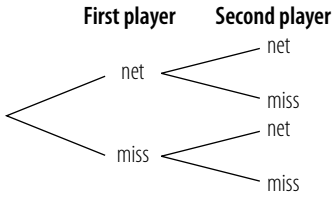
b.



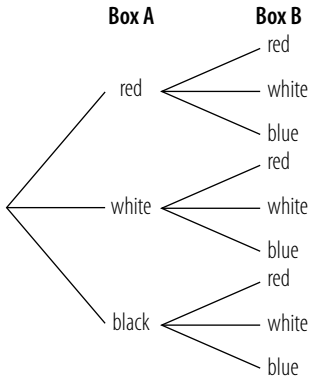
c.



d.



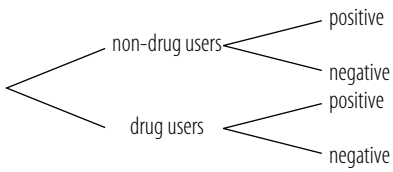
e.



4. Cold and raining
Cold and not raining
Not cold and raining
Not cold and not raining

5. **a.** Yes. **b.** No.
c. Yes. **d.** You could choose from 12 meals.

6. **a.**



b. Yes, that is possible. As we show earlier; drug tests are only 95% accurate.

» Revise and consolidate: Probability

Learner's Book page 436

1. **a.** The chance of an event happening is called the probability.
b. If it is impossible, an event never happen.
c. An event is when something happens, for example, when you toss a coin and it lands head up.
d. A trial when something is tried out and the results are recorded, for example, tossing a coin or rolling dice.
e. An outcome is the result of an event.
f. Outcomes are equally likely when the probability of the outcome of an event are the same. For example, when we toss a coin, a head or a tail is equally likely.

2. **a.** $\frac{1}{2}$ **b.** $\frac{1}{6}$

c. $\frac{1}{9}$ **d.** $\frac{1}{2}$

3. Multiples of 2: 6; 24; 18; 12
Multiples of 3: 6; 24; 9; 15; 18; 12

a. It is not a fair game as there are more multiples of 3 than of 2.

b. $\frac{6}{8} = \frac{3}{4}$

4. **a.**
H H
H T
T H
T T

b.

Set of coins	Number of tosses	Number of times we got two heads	Running total of two heads	Percentage of two heads (running total)
two 10c coins	25	6	6	$\frac{6}{25} \times 100 = 24$
two 50c coins	25	8	14	$\frac{14}{50} \times 100 = 28$
two R1 coins	25	5	19	$\frac{19}{75} \times 100 = 25{,}3$
two R2 coins	25	7	26	$\frac{26}{100} = 26$
two R5 coins	25	9	35	$\frac{35}{125} \times 100 = 28$

c. The probability of getting two heads when tossing two coins at the same time

d. 28%

e. No. If they carried out another set of trials, it is possible they could get a different result. This result does not agree with either prediction.

5. **a.** The graph shows the average number of times of getting two heads in 100 throws.

b. The yellow line on the graph is at a probability of 25%.

c. The probability changes after each trial; and so the percentage changes.

d. As the number of tosses increases, the probability of getting two heads gets closer to 25%.

e. The probability of getting two heads tends to 25% as the number of tosses increases.

6. **a.** **i.** 80%
ii. 10%
iii. It is certain that it will rain.

b. The probability of rain is 10% so there is a slight chance of rain. A sensible option would be for Kgomotso to take a rain jacket in case it rains.

c. It is highly unlikely that it rained in Johannesburg in this period. (Weather forecasts do however sometimes get it wrong.)

7. Answers will differ.

TERM 4

WORKED ANSWERS

Unit 1
Exchange rates

Learner's Book pages 440–452

Teaching tips

- Although the concept of exchange rates is new to the learners, they have already worked with rates (comparing one unit to another).
- The focus on this unit is on understanding what exchange rates mean and the influence they have on the buying power of a consumer who is travelling or for a business that imports and/or exports goods. The focus is therefore on estimated values rather than formal mathematical calculations.
- Collect up-to-date exchange rate tables from national newspapers to use in the classroom. (The newspapers print exchange rates in the business section.) Also encourage any learners who may have samples of foreign currencies take this money to class to show the others. If you have internet access, you can normally download pictures of different currencies.
- The internet also offers many on-line currency calculators that will perform calculations using the most recent values of currencies. These sites normally offer graphs that show how the values of different major currencies go up and down over time. One of the sites we recommend (www.xe.com) also offers free applications for smartphones and iPads. Learners can download these and use their cellphones to find updated currency conversion factors. XE also offers currency education that includes an online encyclopaedia that gives lots of current and historical data for different countries, including South Africa. This is well worth using if you have access to the internet.

Solutions

1.1 **Practise** estimating currency conversion values

Learner's Book page 444

1. **a.** R227,02
b. INR15,39
c. €1 000 = R100,20
£1 000 = R83,35
d. ¥18 135
e. HKD150 = R153,69
INR35 = R207,30
NZ$900 = R142,74
The New Zealand price is the cheapest.
f. ¥354 700 (rounded off to nearest 100)

2–4. Learners own research.

1.2 **Practise** identifying the stronger and weaker currency

Learner's Book page 448

1. **a.** Rand strengthened
b. Rand weakened
c. Rand strengthened
d. Rand weakened

2. **a.** The rand weakened in relation to the pound.
b. Good. When the dollars are converted into rand, the mines will get more value in the rand for each dollar.

3. **a.** **i.** End of April
ii. Beginning of August
b. A
c. When the rand was at its strongest
d. When the rand was at its weakest

1.3 **Practise** comparing buying power

Learner's Book page 451

1. **a.** **C** Lima
A Helsinki
B Copenhagen
b. **A** Johannesburg
C Rio de Janeiro
B Berlin
c. **B** New York
A Nairobi
C Istanbul

2. Convert all values to rand.
€7,59 = 10,14 × 7, 59 = R76,96
P105 = 1,06 × 105 = R111,30
France's money has the greatest buying power.

3. **a.** Ranked from highest to lowest

i.	**ii.**
Kuala Lumpur	Kuala Lumpur
Nairobi	Nairobi
Beijing	Beijing
Dubai	Dubai
Amsterdam	Chicago
London	London
Chicago	Amsterdam
Tokyo	Tokyo

b. **i.** Cost of women's clothing in Tokyo: 1 050 × 9,40 = R9 870,00
Cost of men's clothing in Tokyo: 1 320 × 9,40 = R12 408,00
ii. Cost of women's clothing in Kuala Lumpur:
170 × 9,40 = R1 598,00
Cost of men's clothing in Kuala Lumpur: 250 × 9,40 = R2 350,00
c. Learners' research.
d. Answers will differ.

Revise and consolidate: Finance – Exchange rates

Learner's Book page 453

1. **a.** R79
b. 500
c. Australian dollar
d. R350
e. Six nights in Rio de Janeiro and 11 nights in Buenos Aires

2. US price: $12,85 × 7,8579 = R100,97
   UK price: £7,99 × 12,459 = R99,55
   The British website offers a slightly better deal.
3. **a.** The rand was getting stronger.
   16 December: $0,119392 = R1
   17 January: $0,12346 = R1
   The value of the rand against the US dollar increased.
   b. Just before 15 February, the rand weakened strongly and dropped to a low on that date (15 February). Thereafter, the rand strengthened.
4. The rand became stronger.
   17 November: about 6,2 rupees = R1
   15 March: about 6,6 rupees = R1
5. **a.** Delhi
   b. Geneva
   c. 16,21%
   d. 10%
   e. Hong Kong: It cost 3,32% of his salary to purchase the basket of goods.
   Bangkok: It cost 2,89% of his salary to purchase the basket of goods.
   He should choose to go to Bangkok.

Unit 2
Data handling

Learner's Book pages 456–493

Teaching tips

- This unit revises the steps in a statistical investigation. Refer learners to the flow diagram on page 456 in the Learner's Book and discuss how the steps fit together – they should remember this from earlier grades. Make sure learners understand that the process is cyclical: in reality, the investigation does not stop after the results have been interpreted and analysed because the conclusions often lead to new questions.
- A key skill in statistics is the ability to pose the right questions. Learners need practice in being very specific in the way they frame a research question. You could give them imaginary research questions and ask them to explain how the questions might be unclear or inappropriate.
- The tools that learners choose to use to collect data should fit the type of data they are collecting and the question they are asking. Surveys and questionnaires need to be planned carefully and designed if they are to be useful. Spend as much time as necessary looking at examples of questionnaires (printed ones and those designed by learners), critically discuss these to determine which elements are clear and useful and which are not.
- Learners need to be able to organise the data they collect in order to make it easy to use. Use the national census carried out in 2011 as an example to illustrate how an investigation might result in masses of data. (For example, the census collected the ages of more than 50 million South Africans). Organising the data into frequency tables and representing it on graphs helps researchers make sense of and analyse the data.
- Summary statistics should be very familiar to the learners by now. Make sure they are able to calculate these for grouped data as most of the examples they work with from now on are likely to involve grouped data.

- Learners should be comfortable working with pie charts, bar graphs and line graphs. If they are not, revise the basic skills covered in Term 1 before proceeding.
- This year learners began to work with two sets of data at the same time so they need to use graphs that can show two sets of data. Learners have already worked with double line graphs. Now they will work with double bar graphs and composite bar graphs to show two sets of data for comparison.
- Scatter plot graphs are used to show bivariate data (two sets of data collected in pairs at the same time; for example, the height and foot size of learners). The purpose of a scatter diagram is to show whether there is a relationship between the sets of data. Learners need to recognise the three main relationships – positive, negative and no relationship based on the patterns of dots.
- Use the summary table on pages 488 and 489 to highlight the advantages and disadvantages of different kinds of graph and encourage learners to use this to help them decide which type of graph is best suited for different sets of data that they collect and/or work with.
- Learners need to interpret and analyse data that they collect, but they also need to be able to interpret data that is presented by other people critically. One of the aims of the work in this unit is to help learners realise that data can be manipulated to give a misleading impression.
- Learners need to become critical consumers and informed citizens and one element of this is being critical of statistics. Businesses often use statistics for marketing purposes when trying to sell their products and they try to present their products in ways that will convince as many customers as possible to buy them. This is not to say organisations are dishonest, it is just to point out that the way you present something can affect how people see it. You may want to refer to some of the claims used in the probability section to illustrate this, but here is another example:

  A mattress company advertisement published in local newspapers made the following claims:
  - The world's fastest growing bedding brand
  - Clinical study proves you'll sleep better:
    - 29% improved sleep quality
    - 34% reduced back pain
    - 96% reduced back stiffness
  - Research results were documented in two separate scientific studies conducted by the Director of the Exercise Physiology and Human Performance Laboratory at XYZ University
  - The only mattress to be endorsed by the ABC chiropractors association

  Point out to learners that the claims are interesting because they sound very mathematical and scientific. However, what do they actually mean? How do you measure, for example, that you are the fastest growing bedding brand "in the world"? Also, what does that mean – if your competitors increased their sales by 1% to earn one million dollars and you increased your sales by 100% to earn $20 000 which is the faster growth? Also, ask questions such as, why is it the only mattress to be endorsed? Did the mattress company pay for the endorsement? Did they sponsor the research? Incidentally, an internet search shows the research was carried out in 1993 (many years ago) and that it investigated spinal zone technology and not specific mattresses. These are all important

pieces of information that can help you avoid being sucked into meaningless statistical claims.

- The investigations that learners choose can be kept fairly simple, but they must produce data that can be organised, graphed and analysed. You can either suggest that the whole class investigate the same question (to get a larger picture) or that different groups take different questions and then feed back to the class on their findings.

Solutions

2.1 **Practise** interpreting and organising data

Learner's Book page 459

1. **a.** 67; 69; 70
b. 54; 74; 97
c. Boys' league – Altem; Bona; Fidelitas; Meadowlands
Girls' league – Altem; Bona; Fidelitas; Meadowlands
d. Altem and Meadowlands
Meadowlands won by 9 points.
e. Bona and Fidelitas
Fidelitas won by 16 points.
f. Not really. The high value of 97 scored by the girls' school Meadowlands was exceptionally high and does not follow a general trend. It could be a once-off high score rather than the norm.

2.

Points scored	Girls' teams	Boys' teams
0–10		
11–20		
21–30	𝍸	||
31–40	𝍸 |	𝍸 ||||
41–50	𝍸 𝍸 ||	𝍸 𝍸 |
51–60	||||	|||
61–70	|	𝍸 |
71–80	|	
81–90		
91–100	|	

2.2 **Practise** identifying representative samples

Learner's Book page 460

1. **a.** Biased sample; it should survey households in a range of suburbs.
b. Biased sample; Amira is focusing on how well the boys do at rugby after school. They could have achieved in other areas.
c–e. Representative samples.
2. Answers will differ/class discussion.
3. **A** Agree. In terms of the number of soccer supporter nationally, the number of SMSes is very small.
B Agree
C Agree
D Agree
E Agree

2.3 **Practise** planning an investigation and selecting a sample

Learner's Book page 462

1–2. Answers will differ.

3. a. Reef 93

b. Mean price of petrol in 1990 $= \frac{\text{sum of petrol price for 1990}}{12}$

$= \frac{1\,648}{12}$

$= 137{,}33\text{c}/\ell$

$= \text{R}1{,}37/\ell$

c. Learners need to research the current petrol price.

d. Percentage increase in the petrol price since 1990: (Unleaded 93)
(percentage increase)
$\frac{10{,}43}{1{,}37} = 761\%$
Use this answer as original petrol price was given for 93.
So, while the petrol price has increased quite substantially since 1990, the increase is far less than 2 000%.

2.4 **Practise** designing and using a questionnaire

Learner's Book page 463

Answers will differ.

2.5 **Practise** using a questionnaire to collect data

Learner's Book page 464

Answers will differ.

2.6 **Practise** working with frequency tables

Learner's Book page 467

1. a. Once, a girls' team scored 97.

b. 41–50 points

c. 41–50 points

d. 0–10 and 11–20 for both boys' and girls' teams.

e. Not very well, it could help you to make a prediction but this would only be an estimate.

2.

Points Scored	Boys' and girls' teams combined
0–10	0
11–20	0
21–30	7
31–40	14
41–50	23
51–60	7
61–70	7
71–80	1
81–90	0
91–100	1
Total	**60**

3. a.

Number of siblings	Tally	Frequency
0–1	𝍸	5
2–3	𝍸 𝍸 ||||	14
4–5	𝍸 𝍸 𝍸 |||	18
6–7	|||	3
Total		**40**

b. 4–5
c. 6–7 (7 siblings)
d. **i.** 6 siblings
ii. 5 siblings
iii. 6–7 siblings
iv. more than 7 siblings

2.7 **Practise** calculating summary statistics

Learner's Book page 472

1. a. 2; 3; 4; 4; 5; 5; 6; 6; 7; 7; 8; 9; 9; 12
mean: $\frac{\text{total}}{\text{number of scores}} = \frac{87}{14} = 6{,}21$
median: 6
modes: 4; 5; 6; 7; 9 There are five modes.
range: 12 – 2 = 10

b. 21; 22; 25; 28; 29; 32; 36; 37; 47; 54; 65; 65; 67; 69; 78; 83; 94; 95
mean: $\frac{\text{total}}{\text{number of scores}} = \frac{947}{18} = 52{,}61$
median: $\frac{47 + 54}{2} = 50{,}5$
mode: 65
range: 95 – 21 = 74

c. 1; 1; 2; 2; 3; 4; 4; 4; 5; 5; 5; 5; 6; 7; 7; 7; 8; 8; 8; 9; 9
mean: $\frac{\text{total}}{\text{number of scores}} = \frac{110}{21} = 5{,}24$
median: 5
mode: 5
range: 9 – 1 = 8

d. 8; 13; 15; 16; 17; 18; 20; 21; 21; 22; 24; 26; 26; 26; 26
mean: $\frac{\text{total}}{\text{number of scores}} = \frac{299}{15} = 19{,}93$
median: 21
mode: 26
range: 26 – 8 = 18

e. R15; R16; R16; R16; R17; R17; R18; R19; R20; R21
mean: $\frac{\text{total}}{\text{number of scores}} = \frac{175}{10} = \text{R}17{,}50$
median: R17
mode: R16
range: R21 – R15 = R6

f. 3,4; 4,3; 4,8; 5,5; 6,5; 6,5; 7,6; 7,9; 8,6; 9,8
mean: $\frac{\text{total}}{\text{number of scores}} = \frac{64{,}9}{10} = 6{,}49$
median: 6,5
mode: 6,5
range: 9,8 – 3,4 = 6,4

g. 4,8; 4,9; 5,2; 5,8; 5,9; 6,7; 6,9; 7,2; 7,3; 7,7; 7,7; 7,8; 8,1; 8,1; 8,2; 9,1; 9,3; 9,6
mean: $\frac{\text{total}}{\text{number of scores}} = \frac{130{,}3}{18} = 7{,}24$

median: 7,7
mode: 7,7 and 8,1
range: 9,6 – 4,8 = 4,8

h. R11,40; R12,60; R12,80; R12,80; R13,50; R14,20; R15,60; R16,80; R17,20; R18,50
mean: $\frac{\text{total}}{\text{number of scores}} = \frac{\text{R145,40}}{10} = \text{R14,54}$
median: $\frac{\text{R13,50} + \text{R14,20}}{2} = \frac{\text{R27,70}}{2} = \text{R13,35}$
mode: R12,80
range: R18,50 – R11,40 = R7,10

i. 15 kg; 15 kg; 15 kg; 19 kg; 23 kg; 24 kg; 25 kg; 26 kg; 27 kg; 27 kg; 27 kg; 28 kg; 35 kg; 35 kg
mean: $\frac{\text{total}}{\text{number of scores}} = \frac{341}{14} = 24{,}36 \text{ kg}$
median: 25,5 kg
mode: 15 kg
range: 35 kg – 15 kg = 20 kg

j. 161 cm; 162 cm; 165 cm; 166 cm; 172 cm; 175 cm; 176 cm; 176 cm; 180 cm
mean: $\frac{\text{total}}{\text{number of scores}} = \frac{1\,533}{9} = 170{,}33 \text{ kg}$
median: 172 cm
mode: 176 cm
range: 180 cm – 161 cm = 19 cm

2. a. 3 and 5

b. 12 × 1 = 12
14 × 2 = 28
15 × 3 = 45
12 × 4 = 48
15 × 5 = 75
12 × 6 = 60
total frequency: 80 268
mean = $\frac{268}{80}$
= 3,35

c. Median score lies between 40th and 41st value.
median: 3

3. Let age of fifth learner be x.
Total age of the five learners = 19 × 5 = 95
$\therefore$ 14 + 17 + 18 + 20 + x = 95
$\therefore$ x = 95 – 14 – 17 – 18 – 20
x = 26

4. Total number of points for the ten games: 29 × 10 = 290 points
missing score: 290 – 37 – 29 – 11 – 42 – 38 – 33 – 36 – 38 – 20 = 6

5. a. mean: $\frac{904}{6}$ = 150,67 tea bags

b. modal number of tea bags: 152

c. more or less

d. the mean

e. No. The lable says that the average is 150 bags per pack and Mrs Kunene's packet is one tea bag below average.

6. a. 5 cm^3
2 cm^3 × 4 = 8
3 cm^3 × 7 = 21
4 cm^3 × 9 = 36
5 cm^3 × 12 = 60
6 cm^3 × 10 = 60
7 cm^3 × 8 = 56
Total: 241 cm^3
Total frequency of measurements> 50

b. mean: $\frac{241}{50} = 4{,}82\ \text{cm}^3$

c. The median lies between the 25th and the 26th measurement.
median: $5\ \text{cm}^2$

d. range: $7\ \text{cm}^3 - 2\ \text{cm}^3 = 5\ \text{cm}^3$

2.8 **Practise** interpreting and analysing averages

Learner's Book page 475

1. a. mode: 25

b. range: $41 - 1 = 40$

c. If we arrange the data in order:
0; 1; 10; 12; 12; 19; 19; 20; 24; 25; 25; 25; 25; 27; 30; 36; 39; 41
The spread of the data is fairly consistent.
Consider the values 0 and 1 as outliers and ignored them; the range: $41 - 10 = 31$.

d. The range is fairly large, so the mean would not be that typical of this data set.

e. The median value is 24,5, which is more typical of the data.

2. a. To determine which learner's performance has improved the most, look at by how much the number of sit-ups for each learner has increased after training.
Karen's performance improved the most. Her performance improved by 39 sit-ups per minute.

b. i. range before training: $42 - 19 = 23$

ii. range after training: $73 - 45 = 28$

c. i. mean (before training): $\frac{328}{10} = 32{,}8$ sit-ups per minute

ii. mean (after training): $\frac{615}{10} = 61{,}5$ sit-ups per minute

d. If you find the difference between the two means, you can find the average improvement, which equals 28,7 sit-ups per minute.

e. Yes.

f. Yes.

g. The mode shows the most common data, but this could be far from the mean value.

3. a.

Aasvoëls goals	Frequency		Arende goals	Frequency	
0 ×	2	0	0 ×	1	0
1 ×	0	0	1 ×	4	4
2 ×	3	6	2 ×	5	15
3 ×	5	15	3 ×	5	15
4 ×	4	16	4 ×	2	8
5 ×	2	10	5 ×	6	30
Total		**47 goals**	**Total**		**63 goals**

$$\text{Mean} = \frac{\text{total goals}}{\text{sum of frequency}} = \frac{47}{16} = 2{,}94 \text{ goals per match}$$

$$\text{Mean} = \frac{\text{total goals}}{\text{sum of frequency}} = \frac{63}{21} = 3 \text{ goals per match}$$

b. Aasvoëls
The median number of goals per match will be between the 8th and the 9th score.
median: 3 goals per match

Arende
The median number of goals per match will be the 11th score.
median: 3 goals per match

c. Aasvoëls
modal number of goals: 3 goals per match
Arende
Modal number of goals: 5 goals per match

4. a. The Arende did better.
b. The Arende did better.
c. Both teams did the same.

5. If you used the modal score for the Arende, you could give the impression that they scored five goals per match, whereas the mean of three goals per match is more representative of the real situation.

6. a. Sparky
b. Powersurge would be the best choice because while it does not have the highest mean, it has the lowest range. This means that you would be more likely to get close to 41 hours from the battery. Sparky with a mean of 45 hours has a range of 10 hours, so you could get batteries that last many hours fewer than 45 hours.

7. a.

Number of slices	Frequency	fx
10	2	20
11	9	99
12	8	96
13	5	65
14	5	70
15	5	75
Total	**34**	**425**

b. range: 15 – 10 = 5 slices per pack
c. mean: $\frac{425}{34}$ = 12,5 slices per pack
d. 11 slices per pack
e. Median in 213th postion
median: 12 slices per pack
f. They will use the modal number of slices per pack.

8. a. mode **b.** mode **c.** mean
d. mean **e.** mean **f.** mode
g. mean **h.** mean

2.9 **Practise** revising basic graphs

Learner's Book page 477

1. a. Sixties: $\frac{15}{150} \times 360° = 36°$

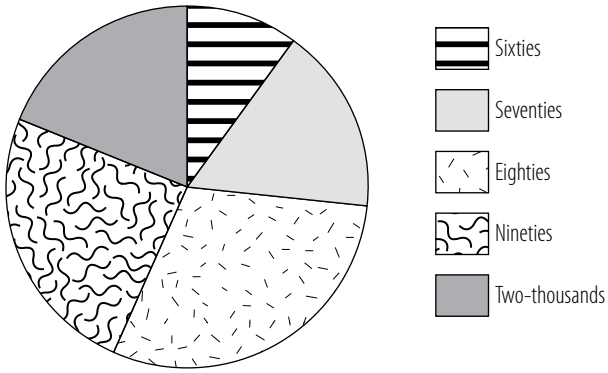
Seventies: $\frac{25}{150} \times 360° = 60°$

Eighties: $\frac{45}{150} \times 360° = 108°$

Nineties: $\frac{37}{150} \times 360° = 88{,}8°$

Two-thousands: $\frac{28}{150} \times 360° = 67{,}2°$

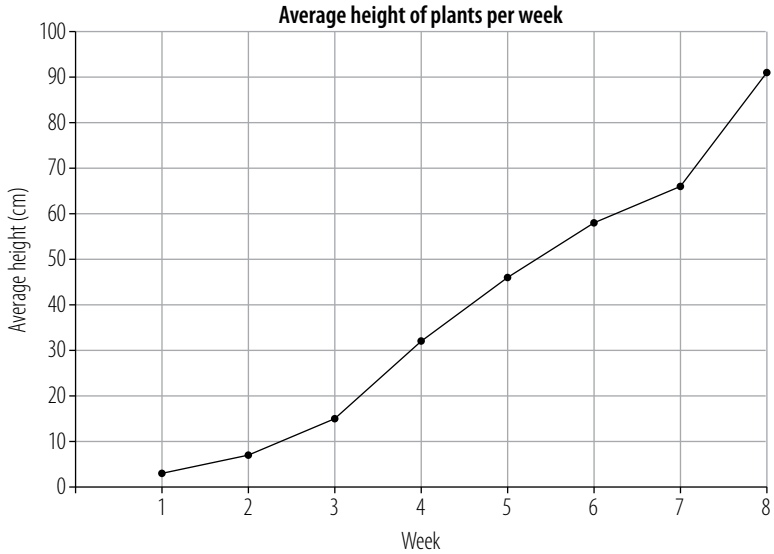
b.



c. The music of the nineties and two-thousands would probably be more popular as learners would be more familiar with this music. The music of the eighties might be a little less popular.

3. a.

Week	1	2	3	4	5	6	7	8
Height (cm)	3	7	15	32	46	58	66	91



b. Answers will differ.

4. a. Percentage of her earnings that she saves

$= \frac{750}{14\ 500} \times \frac{100}{1}$

$= 5{,}17\ \%$

b. Amount she spends: 2 100 + 1 000 = R3 100

c. Class discussion

d. A pie chart would be a suitable graph to show this data as it shows how much of her salary she spends on the various categories. At a glance, you can see that the largest position is her rent.

Rent: $\frac{3\ 600}{14\ 500} \times \frac{360}{1} = 89°$

Household accounts: $\frac{1\ 850}{14\ 500} \times \frac{360}{1} = 46°$

Car payment and petrol: 60°

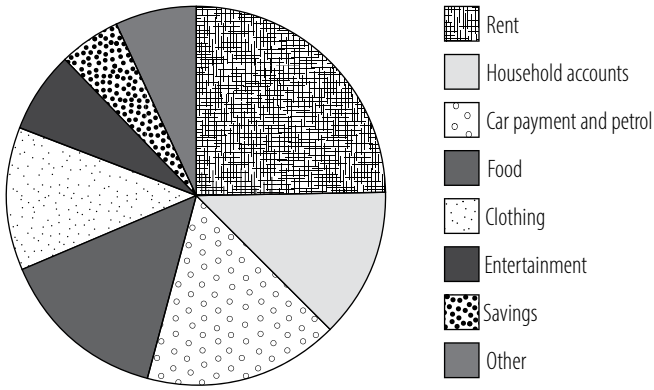
Food: 52°

Clothing: 44,7°

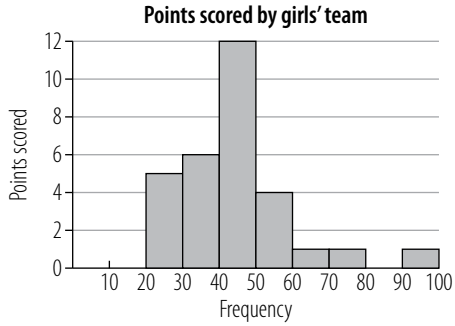
Entertainment: 24,8°

Savings: 18,6°

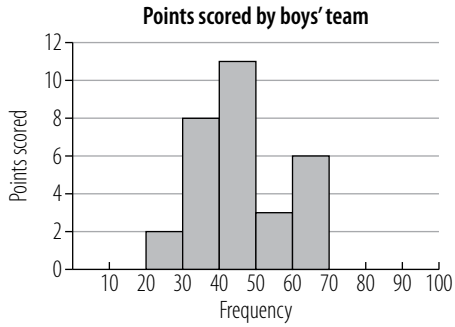
Other: 24,8°



5. a.



b.



2.10 **Practise** interpreting double bar graphs

Learner's Book page 479

1. a. TrueIQ
b. Datalink and Gau-commerce
c. TrueIQ
d. Gau-commerce
e. Gau-commerce
f. Speedlink
g. Keep good financial records of costs and income in order to determine your net profit accurately.

2. a. 74% of households had a radio in 2001. The percentage rose slightly to 78% in 2007.
b. About 25% of households had a landline in 2001. This dropped to 20% in 2007. A reason for this decline would be the fact that more people were using cellphones and no longer needed a landline.
c. Internet facilities at home
d. The greatest increase was in the percentage of households with cellphones. A reason could be that cellphones became cheaper.

3. a. Number of households with a landline telephone:
20% of 246 618 = 49 323,6

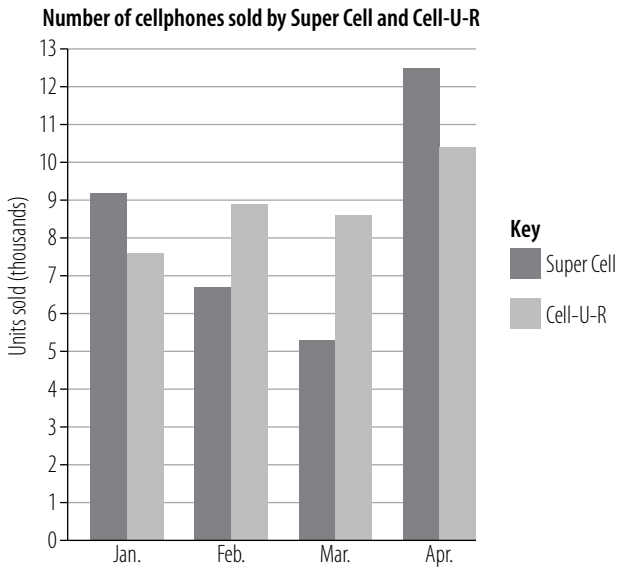
b. Number of households with access to the internet:
10% of 246 618 = 24 661,8

c. Number of households with a cellphone:
75% of 246 618 = 184 963,5

2.11 **Practise** drawing double bar-graphs

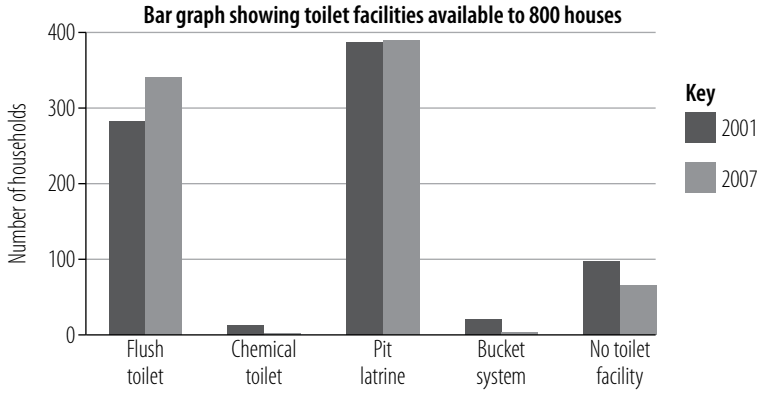
Learner's Book page 480

1. a.



b. The number of cellphones sold by Super Cell declined for the three months and then increased significantly. Cell-U-R's sales have not changed significantly over the four months although they also sold a larger number of cellphones in April.

2. a.



b. More flush toilets were used in 2007 than in 2001 and the number of people who had no toilet facility, chemical toilets and the bucket system decreased. The number of users of pit latrines remained about the same.

3. Answers will differ.

2.12 **Practise** interpreting stacked bar graphs

Learner's Book page 482

1. a. (125 + 230 +185 +220) kl = 760 kl

b. (25 + 15 + 75 + 90) kl = 205 kl

c.

	Volume of water used month 1
Cele	45
Malema	55
Kunune	25

d. In months 1 and 2, the Kunene's water consumption is very low. In month 3 the consumption increases steeply to 75 kl and then increases again to 90 kl in month 4.

e. the Cele household

f. Approximately 75 kl/month

g. It would appear that the Malema household had a leaking pipe in month 3. This is suggested by the fact that the household consumed 140 kl of water in that month.

2. a. You are only able to work out each company's total sales if you are given the actual total numbers. As this information has not been provided, you are not able to work out the company's total sales from this graph.

b. Company B

c. Company D

d. Company C

e. 12,5% of company A's sales are done over the internet. This represents $\frac{1}{8}$ of the sales.

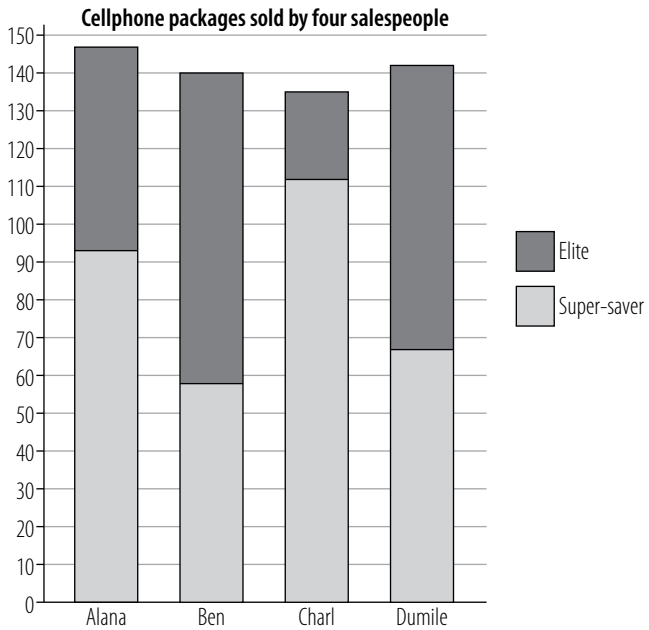
f.

Breakdown of company D's sales	
Direct from shop	15%
Internet sales	15%
Catalogue mail order	40%
Through agent	30%

2.13 **Practise** drawing a stacked bar graph

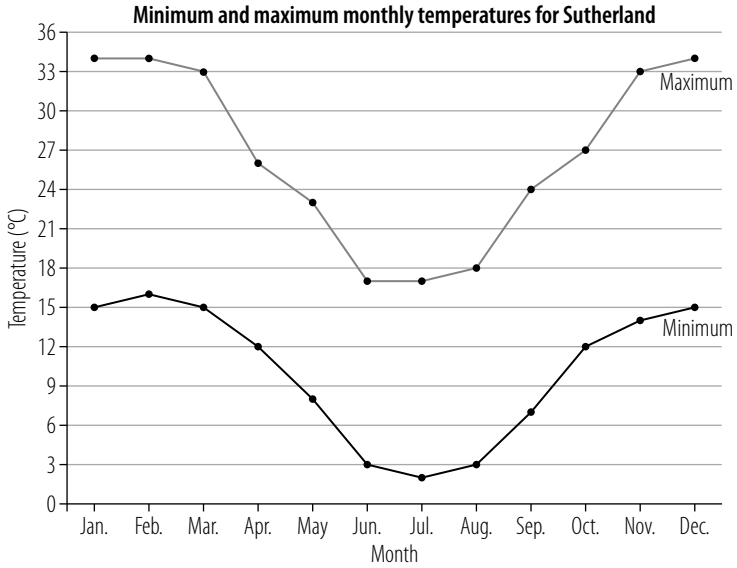
Learner's Book page 483

1.



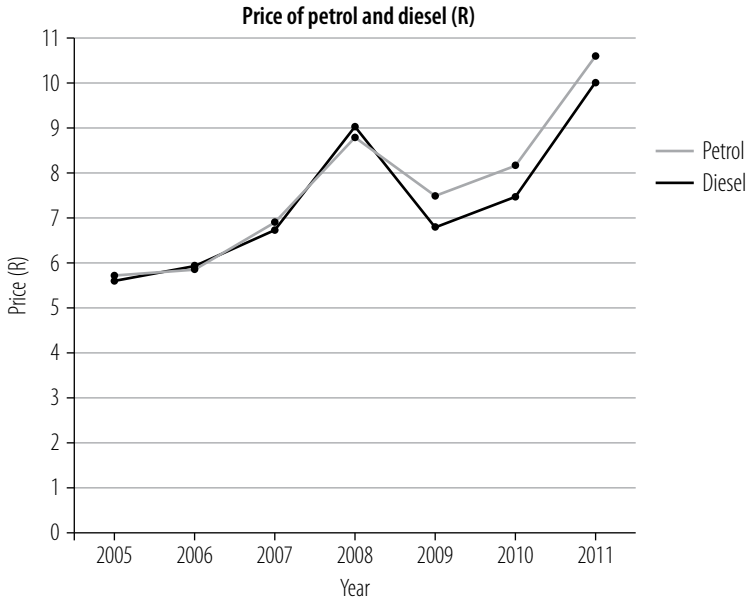
2. Answers will differ.

1. a.



b. The temperatures are average monthly temperatures. For the average for a month to be below zero, minimum temperatures would have to be below for most of the month.

2. a.



b. Starting in 2005 the price of both petrol and diesel increase sharply until 2008. There is a sharp drop in both prices in 2009, then a more steady increase to 2010 and thereafter a steep increase in 2011.

c. 2006; 2008

d. In 2009. The graph slopes down from left to right showing that prices are decreasing.

e. Class discussion

3. a. Nathi's car depreciates.

b. The price of a new car increases from year to year.

c. From 2012 to 2013, the value of Nathi's car decreased by R15 000.

d. Price of a new car in 2013: R60 000
Price of a new car in 2018: R105 000
Difference: R45 000
Percentage increase: $\frac{45\,000}{60\,000} \times \frac{100}{1} = 75\%$

e. Value of Nathi's car in 2012: R60 000
Value of Nathi's car in 2018: R25 000
Difference: R35 000
Percentage decrease: $\frac{35\,000}{60\,000} \times \frac{100}{1} = 58{,}33\%$

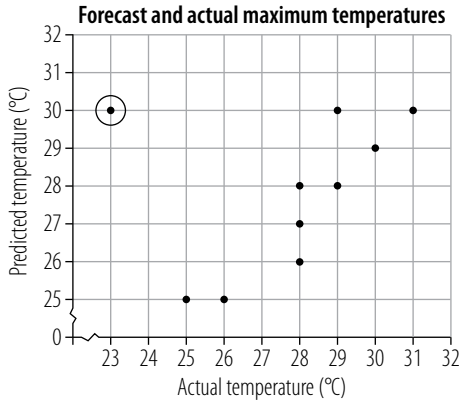
f. Difference Nathi will have to pay: R105 000 – R25 000 = R80 000

g. Factors could include the condition of the car and the mileage.

2.15 **Practise** drawing and interpreting scatter plots

Learner's Book page 487

1. a.



b. There is a positive relationship. As one value increases the other value also increases.

c. See graph.

d. The predicted temperatures are fairly close to the actual temperatures.

2. a. The learner who is about 1,5 m tall and wears a size 8 shoe is an outlier.

b. The scatter plot suggests that there is a positive relationship between height and shoe size.

c. He or she would wear a size 5.

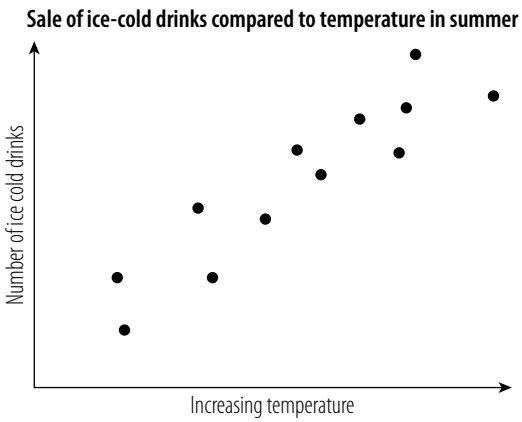
d. Taller than 1,7 m (about 1,74 m)

3. a. The colder the weather, the more cups of hot chocolate are sold. So, there is a negative relationship between the weather and the number of cups of hot chocolate sold.

b. About 17 cups.

c. About 5 °C

4.



5. a.

Treatment	Relationship between hair growth and amount of treatment used
A	No noticeable relationship. Hair growth was recorded, but did not depend on the amount of treatment used.
B	There is no noticeable relationship. There was not much hair growth record irrespective of how much treatment was used.
C	There is a positive relationship. The more treatment that was used, the more hair growth was recorded.

b. Treatment C shows conclusively that it is effective in promoting hair growth while the results for the other two products are rather inconclusive.

c. i. The statement is not entirely true. Some customers experienced minimal hair growth.

ii. The statement is not true at all.

2.16 **Practise** choosing the most appropriate graph

Learner's Book page 490

1. Scatter plot graph – it shows a connection between two sets of data.
2. Bar graph – it makes it easy to compare the average rainfall for the towns.
3. Line graph – continuous data and will show maximum and minimum values clearly.
4. Double bar graph – it allows you to compare how often boys and girls exercise.
5. Stacked bar graph – there can be one bar for wins, one for losses and one for draws.
6. Line graph – when working with continuous numerical data this is a clear way to represent patterns and relationships.
7. Line graph – it shows patterns and relationships clearly.
8. Dual bar graph – it clearly shows differences between costs and income.
9. Pie chart – it clearly shows what percentage of the whole budget is spent on different items.
10. Pie chart – it shows clearly what proportion of the whole community has each type of toilet facility.

2.17 **Practise** interpreting and analysing data critically

Learner's Book page 491

1. a. The use of trains has decreased quite drastically.

b. Car transport

c. The proportion of people who use the bus has decreased, but not to the same extent as train use has decreased.

2. a. The information helps you interpret the data given in 1995 and 2015 differently.

b. No. The 1995 sample was not asked the same question as the 2015 sample. So the situations were different. If we wished to follow trends of how transport has changed over time, we would have to use samples in a similar context and ask respondents the same question.

3. a. The graphs have different scales on their vertical axes.

b. The first graph

c. Telkom may possibly find the second graph useful. It might imply that although the number of cellphone subscribers increased in the last ten years, the increase is not very big and plenty of people are still using landlines.

4. a. City C

b. City E

c. In general, people earn more in urban areas. If one looked at living costs as a proportion or percentage of total income, city A might be relatively cheaper than city E or any of the cities that appear to be cheaper as represented in this bar graph.

2.18 **Investigation:** Choose, collect and report on data

Learner's Book page 492

Investigations will differ.

Revise and consolidate: Data handling

Learner's Book page 495

1. a. median

b. double bar graph

c. a sample

d. numerical data

2. Answers will differ.

3. a. The question has not been worded in such a way that it sounds neutral – "so that people who have to work all week have time to do their shopping" encourages people to answer the question positively.

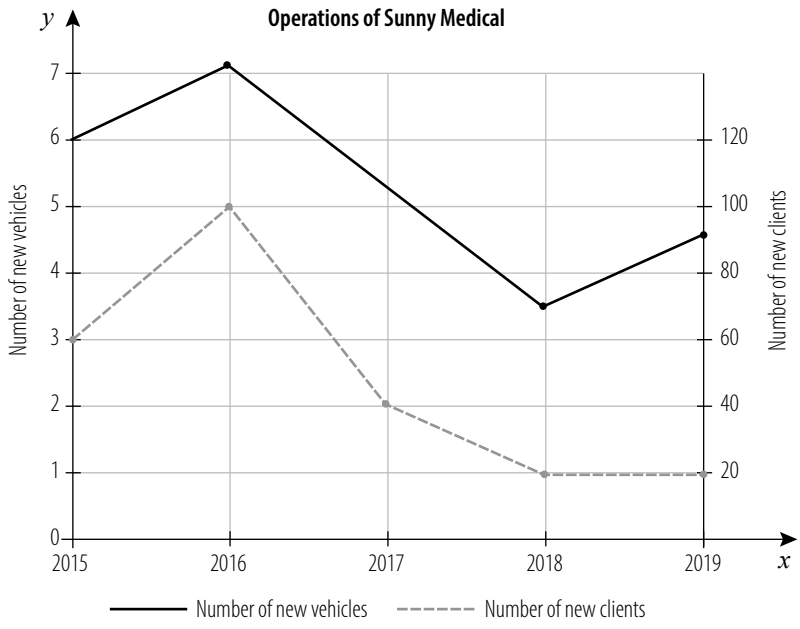
b. Should shops close on Sunday so that the shop assistants who work all week have a day off to spend with their families?

c. Should shops remain open on Sundays?

4. a. Mr Smit has represented the number of new clients as the total number of clients.

b. No. The graph suggests that the number of new clients increases each year whereas the number of new clients decreases each year.

c.



d. Class discussion

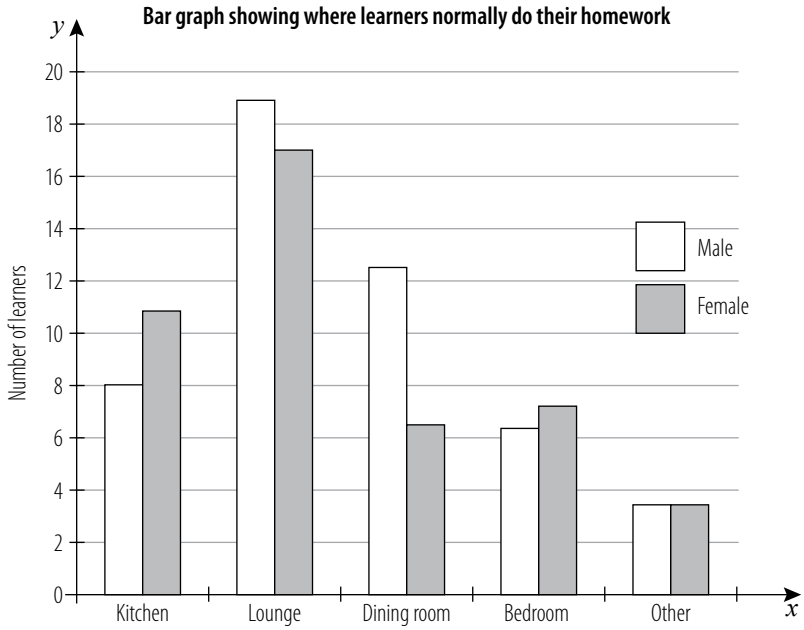
5. **a.** Answers will differ. Learners should motivate their answers.

b. No, the sector for product A looks much bigger than the sector for product D.

c. The perspective skews the appearance of the 3-D pie chart.

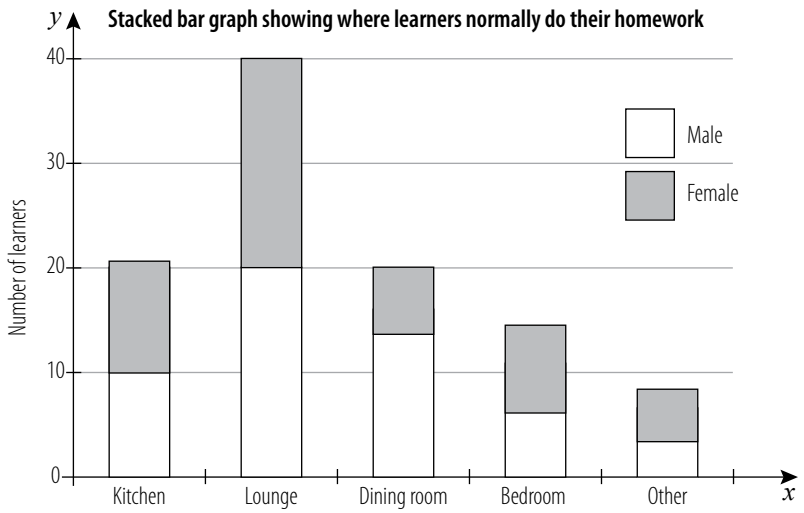
6. **a.** 105

b.



c. They do their homework in the lounge – the bars are highest for that room.

d.



7. **a.** Discrete; the distance flown during each flight stands alone.

b. Brick: 10,45 m
Flying Arrow: 10,88 m
Bullet: 2,95 m

c. 10,9 m

d. 3,1 m

e. Brick: 9,1 m
Flying Arrow: 1,9 m
Bullet: 0,4 m

f. Brick flies the furthest distance but Flying Arrow is more consistent as shown by its the small range.

SECTION 5

RESOURCES

A Multiplication tables

The 1 times table

$1 \times 1 = 1$
$2 \times 1 = 2$
$3 \times 1 = 3$
$4 \times 1 = 4$
$5 \times 1 = 5$
$6 \times 1 = 6$
$7 \times 1 = 7$
$8 \times 1 = 8$
$9 \times 1 = 9$
$10 \times 1 = 10$
$11 \times 1 = 11$
$12 \times 1 = 12$

The 2 times table

$1 \times 2 = 2$
$2 \times 2 = 4$
$3 \times 2 = 6$
$4 \times 2 = 8$
$5 \times 2 = 10$
$6 \times 2 = 12$
$7 \times 2 = 14$
$8 \times 2 = 16$
$9 \times 2 = 18$
$10 \times 2 = 20$
$11 \times 2 = 22$
$12 \times 2 = 24$

The 3 times table

$1 \times 3 = 3$
$2 \times 3 = 6$
$3 \times 3 = 9$
$4 \times 3 = 12$
$5 \times 3 = 15$
$6 \times 3 = 18$
$7 \times 3 = 21$
$8 \times 3 = 24$
$9 \times 3 = 27$
$10 \times 3 = 30$
$11 \times 3 = 33$
$12 \times 3 = 36$

The 4 times table

$1 \times 4 = 4$
$2 \times 4 = 8$
$3 \times 4 = 12$
$4 \times 4 = 16$
$5 \times 4 = 20$
$6 \times 4 = 24$
$7 \times 4 = 28$
$8 \times 4 = 32$
$9 \times 4 = 36$
$10 \times 4 = 40$
$11 \times 4 = 44$
$12 \times 4 = 48$

The 5 times table

$1 \times 5 = 5$
$2 \times 5 = 10$
$3 \times 5 = 15$
$4 \times 5 = 20$
$5 \times 5 = 25$
$6 \times 5 = 30$
$7 \times 5 = 35$
$8 \times 5 = 40$
$9 \times 5 = 45$
$10 \times 5 = 50$
$11 \times 5 = 55$
$12 \times 5 = 60$

The 6 times table

$1 \times 6 = 6$
$2 \times 6 = 12$
$3 \times 6 = 18$
$4 \times 6 = 24$
$5 \times 6 = 30$
$6 \times 6 = 36$
$7 \times 6 = 42$
$8 \times 6 = 48$
$9 \times 6 = 54$
$10 \times 6 = 60$
$11 \times 6 = 66$
$12 \times 6 = 72$

The 7 times table

$1 \times 7 = 7$
$2 \times 7 = 14$
$3 \times 7 = 21$
$4 \times 7 = 28$
$5 \times 7 = 35$
$6 \times 7 = 42$
$7 \times 7 = 49$
$8 \times 7 = 56$
$9 \times 7 = 63$
$10 \times 7 = 70$
$11 \times 7 = 77$
$12 \times 7 = 84$

The 8 times table

$1 \times 8 = 8$
$2 \times 8 = 16$
$3 \times 8 = 24$
$4 \times 8 = 32$
$5 \times 8 = 40$
$6 \times 8 = 48$
$7 \times 8 = 56$
$8 \times 8 = 64$
$9 \times 8 = 72$
$10 \times 8 = 80$
$11 \times 8 = 88$
$12 \times 8 = 96$

The 9 times table

$1 \times 9 = 9$
$2 \times 9 = 18$
$3 \times 9 = 27$
$4 \times 9 = 36$
$5 \times 9 = 45$
$6 \times 9 = 54$
$7 \times 9 = 63$
$8 \times 9 = 72$
$9 \times 9 = 81$
$10 \times 9 = 90$
$11 \times 9 = 99$
$12 \times 9 = 108$

The 10 times table

$1 \times 10 = 10$
$2 \times 10 = 20$
$3 \times 10 = 30$
$4 \times 10 = 40$
$5 \times 10 = 50$
$6 \times 10 = 60$
$7 \times 10 = 70$
$8 \times 10 = 80$
$9 \times 10 = 90$
$10 \times 10 = 100$
$11 \times 10 = 110$
$12 \times 10 = 120$

The 11 times table

$1 \times 11 = 11$
$2 \times 11 = 22$
$3 \times 11 = 33$
$4 \times 11 = 44$
$5 \times 11 = 55$
$6 \times 11 = 66$
$7 \times 11 = 77$
$8 \times 11 = 88$
$9 \times 11 = 99$
$10 \times 11 = 110$
$11 \times 11 = 121$
$12 \times 11 = 132$

The 12 times table

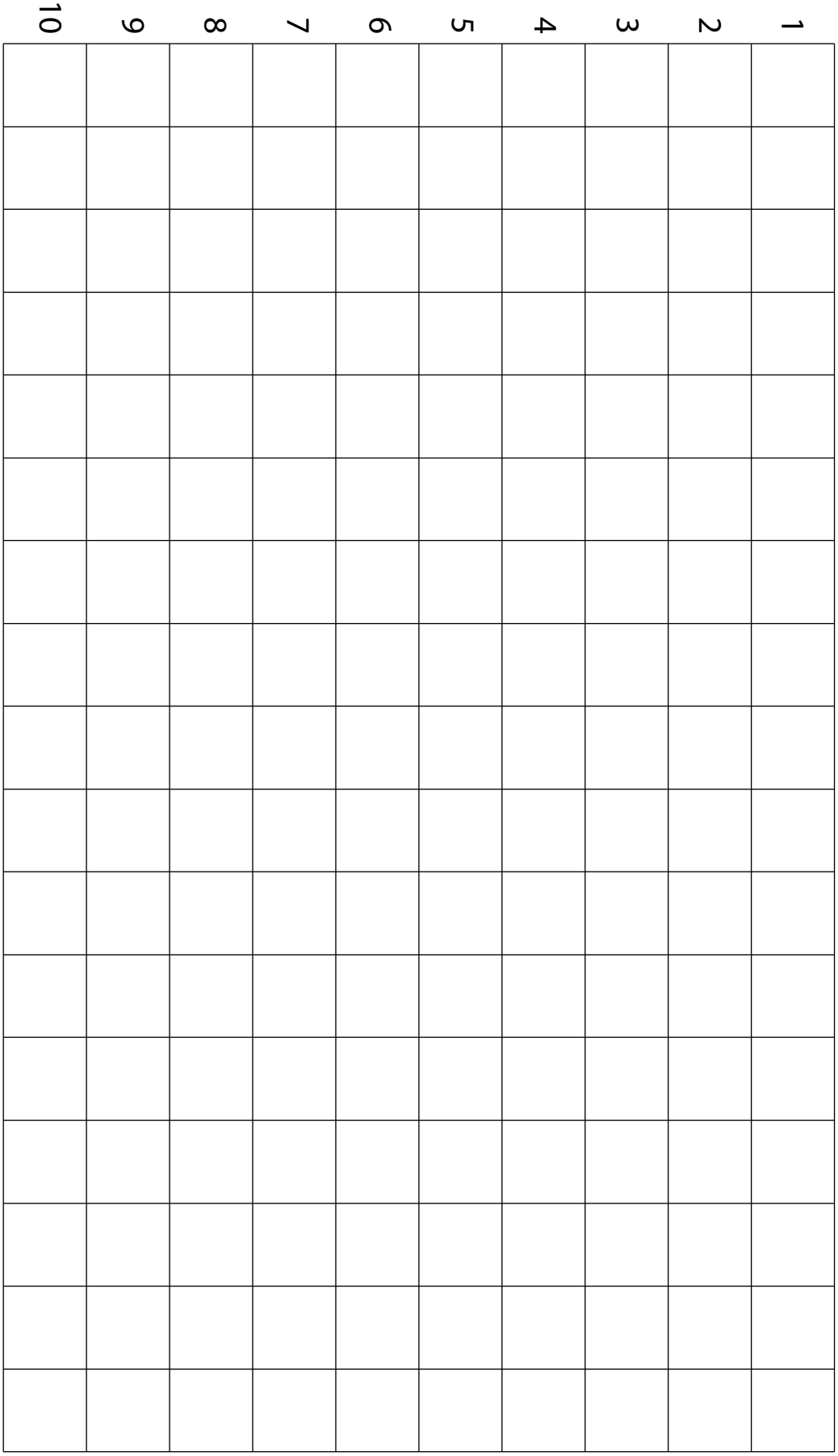
$1 \times 12 = 12$
$2 \times 12 = 24$
$3 \times 12 = 36$
$4 \times 12 = 48$
$5 \times 12 = 60$
$6 \times 12 = 72$
$7 \times 12 = 84$
$8 \times 12 = 96$
$9 \times 12 = 108$
$10 \times 12 = 120$
$11 \times 12 = 132$
$12 \times 12 = 144$

TIMES TABLES
Quick reference chart

×	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

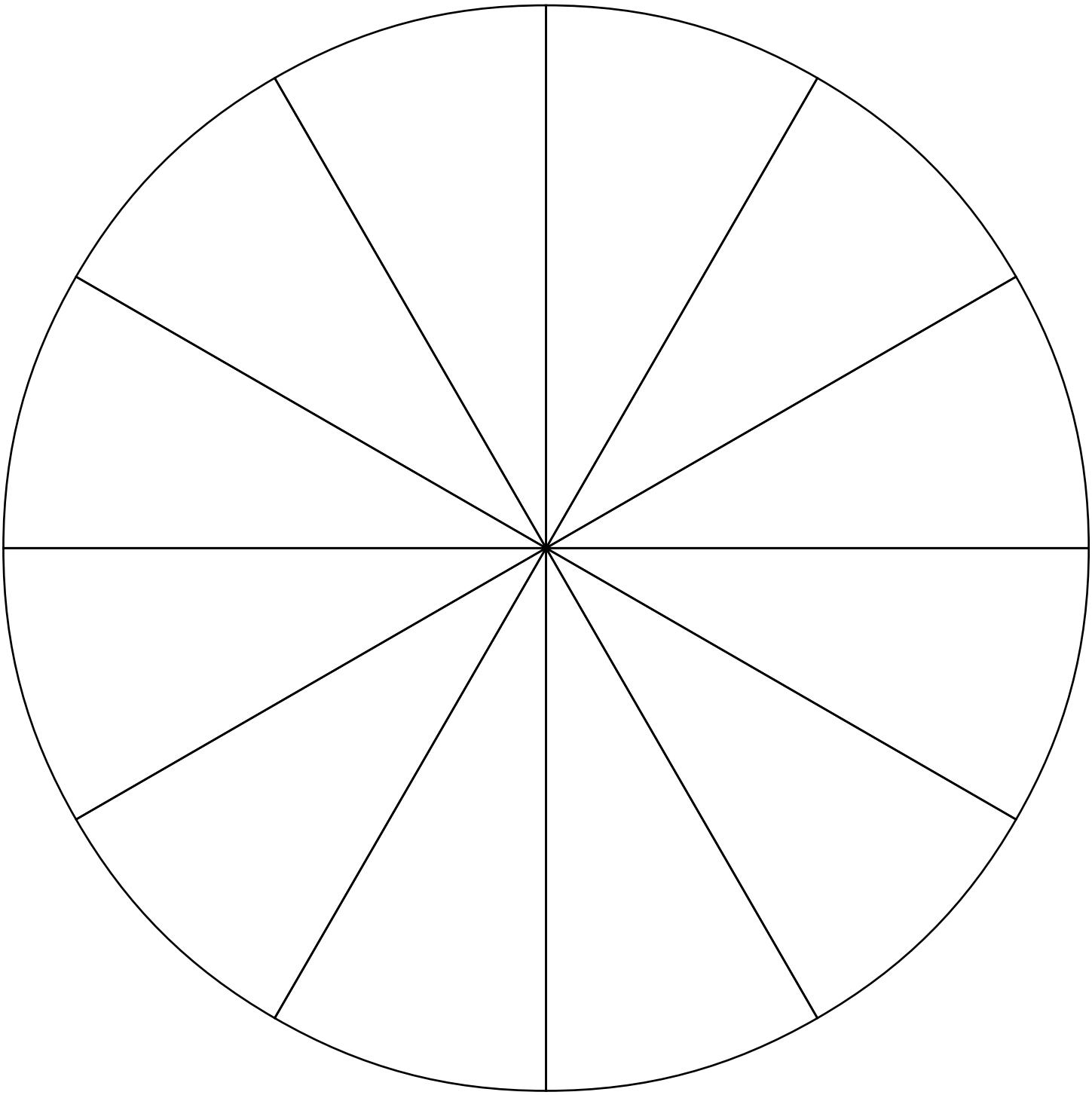
B Transparencies

Alpha-numeric grid

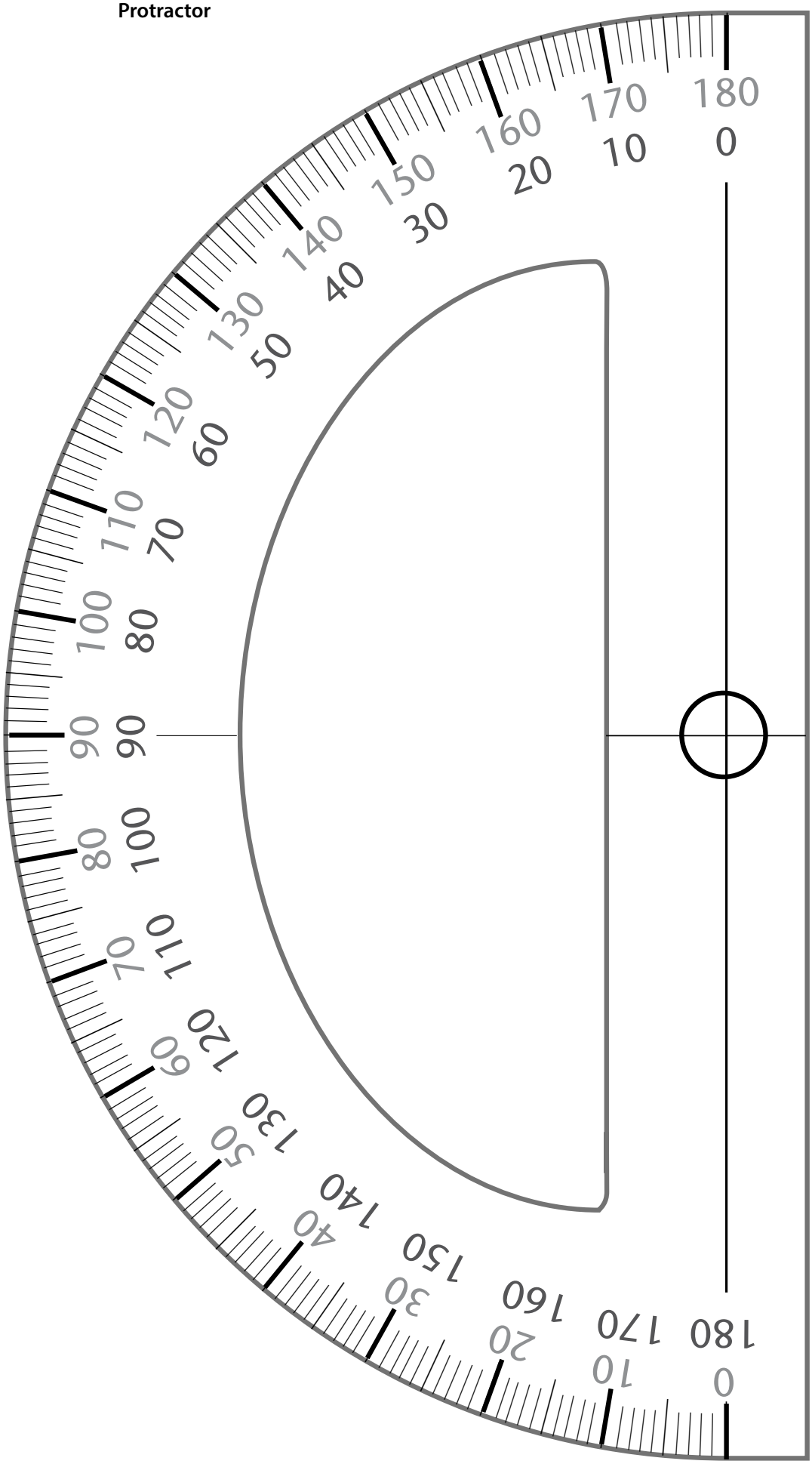


Graph paper

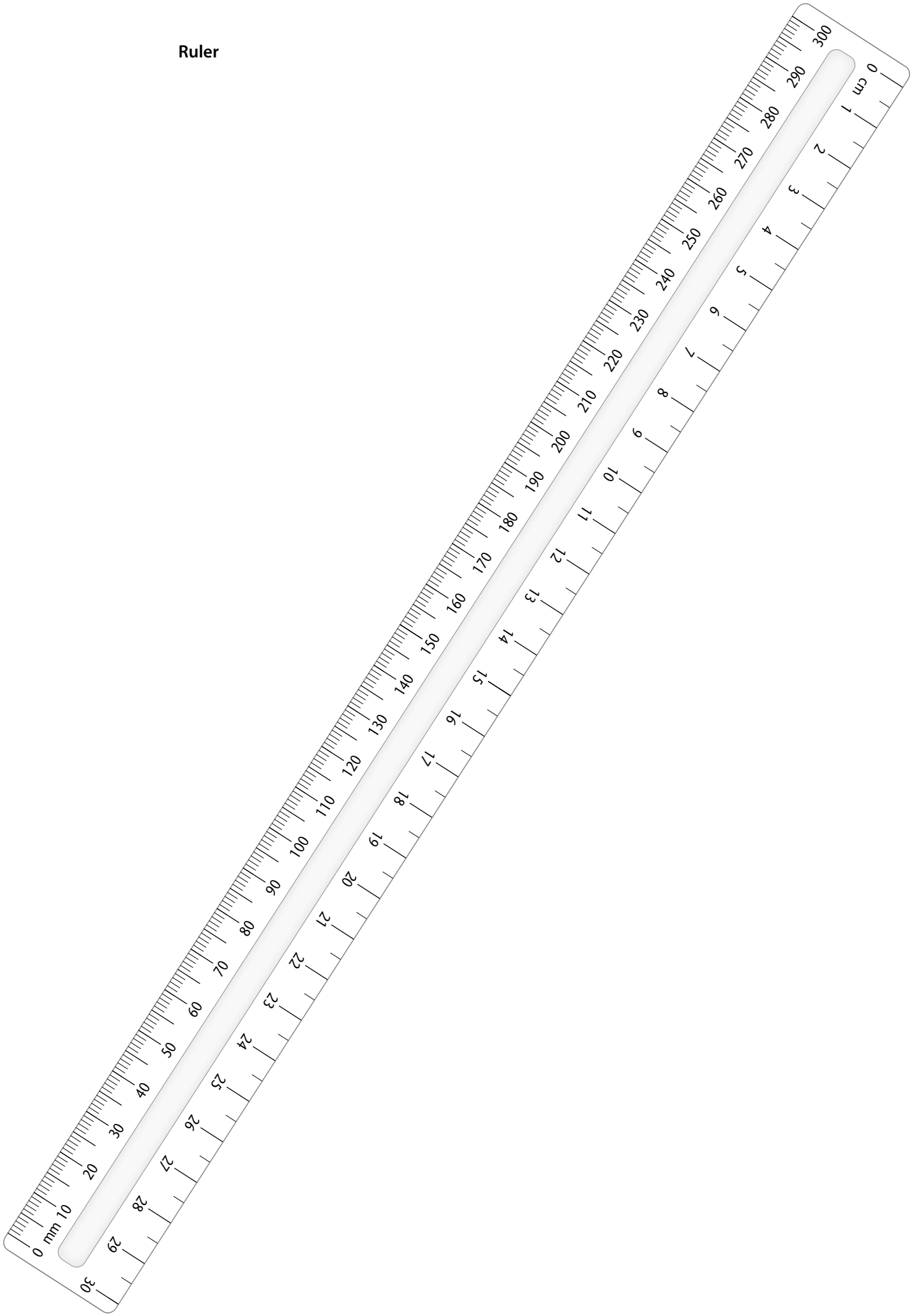
Pie chart



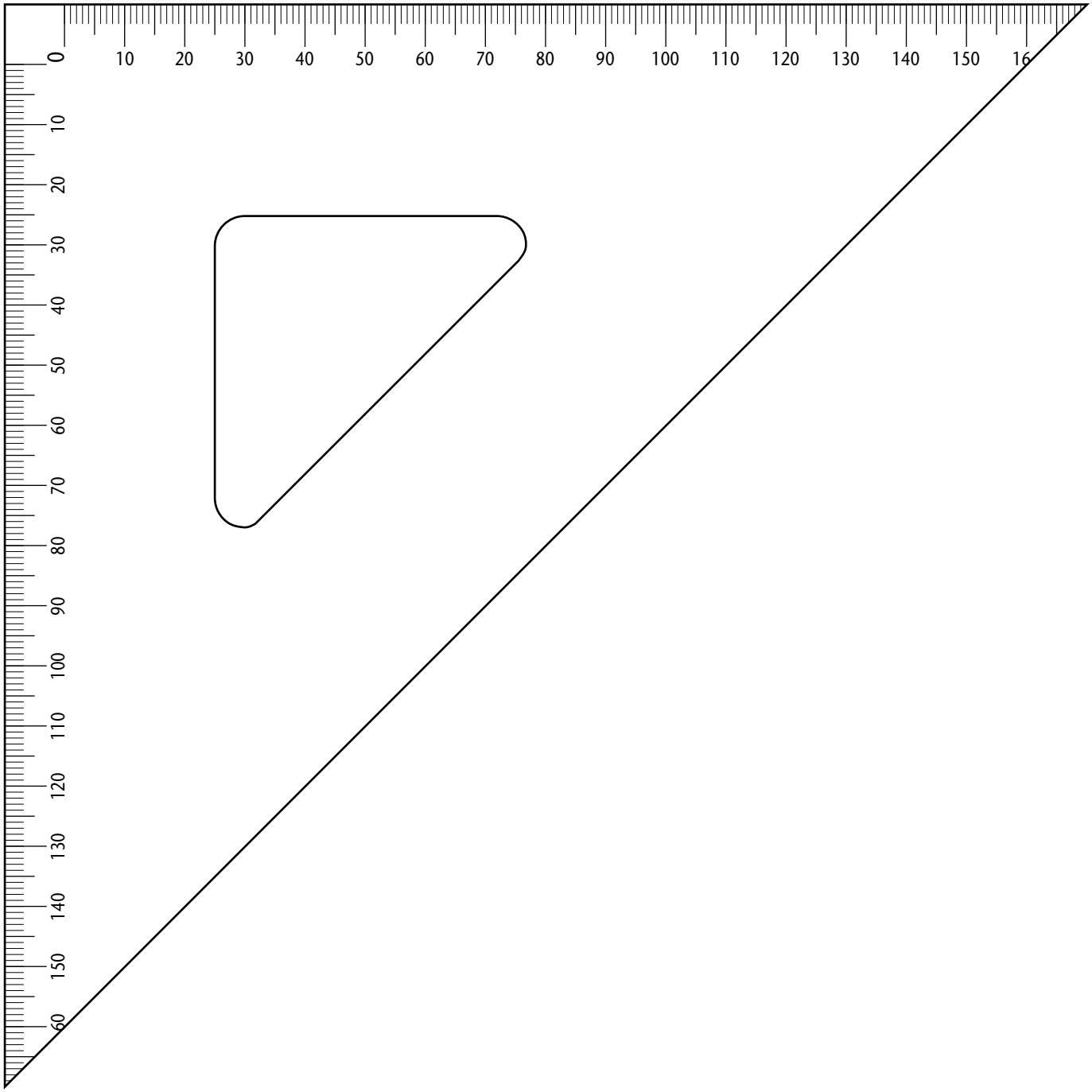
Protractor


0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

Ruler


0 mm 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300
0 cm 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

Set square



SECTION 6

DOCUMENTS

Insert your own notes and documents, for example the CAPS document for Mathematical Literacy in this section.

Grade 11

AMENDED CAPS UPDATED

Study & Master

Mathematical Literacy

Study & Master Mathematical Literacy Grade 11 has been especially developed by an experienced author team according to the Curriculum and Assessment Policy Statement (CAPS) and the CAPS Amendment of 2019. This UPDATED and easy-to-use course helps learners to master essential content and skills in Mathematical Literacy.

The comprehensive Learner's Book includes:

- a reference section of the basic skills topics to revise the knowledge, skills and concepts in Mathematical Literacy
- margin notes to assist learners with new concepts
- ample examples with a strong visual input to connect Mathematical Literacy to everyday life
- a summary checklist and revision exercises at the end of each topic.

The Teacher's Guide includes:

- a weekly teaching schedule, divided into the four terms, to guide the teacher on what to teach
- guidelines for the amended Programme of Assessment and structure of the exam papers
- exemplar papers and memorandums
- solutions to all the activities in the Learner's Book.

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