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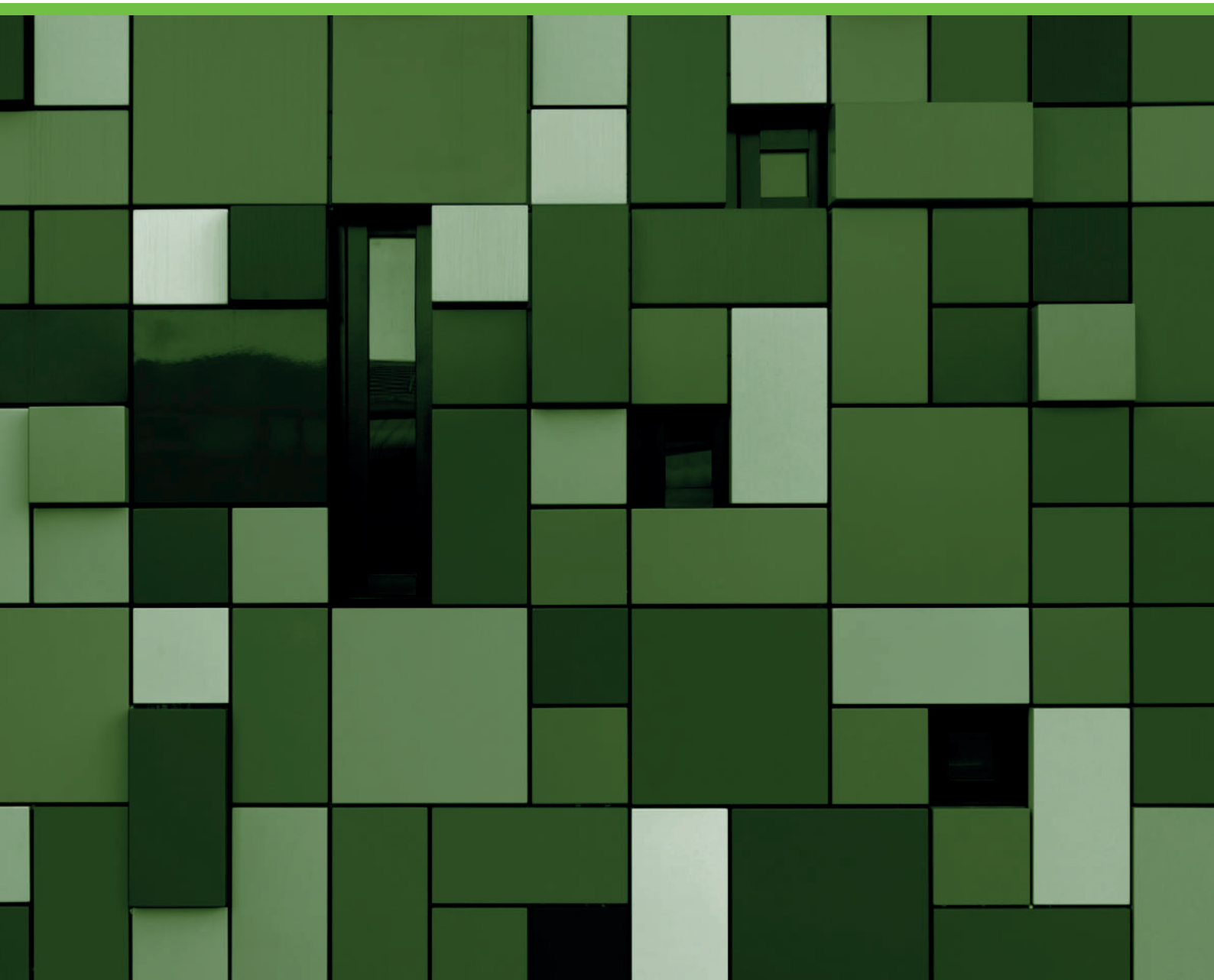
Greg Byrd, Lynn Byrd and Chris Pearce

Cambridge Checkpoint Mathematics

Skills Builder and Challenge

Teacher's Support



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Introduction

Not all students learn the same thing in the same way, or at the same time. Some will need additional support to access a topic; others will require additional challenges that go beyond a lesson's original design.

Labelling students according to their perceived abilities can place obstructions in their learning. Students are more engaged and successful learners if resources and activities are provided that take their level, and learning style into consideration. When more options are available that can meet the diverse needs of individual students, they can take ownership of their learning and become more involved and successful learners.

These Skills Builder and Challenge workbooks have been written to provide this flexibility in teaching and learning, offering content that can support or stretch where and when each student needs it. They can be used to offer teachers and parents different strategies that can be applied to help children progress at times where they find subject matter more difficult or where they are ready to be challenged further in their thinking.

Overview of the Skills Builder and Challenge Workbooks

The Skills Builder and Challenge Workbooks are write-in workbooks designed to support learners who are studying the Cambridge Secondary 1 Mathematics Curriculum Framework. They are intended for use alongside the core material in the Cambridge Checkpoint Mathematics Coursebooks and the Cambridge Checkpoint Mathematics Practice Books.

There are three Skills Builder Workbooks, one each for stages 7, 8 and 9. There are also three Challenge Workbooks, again one for each stage. Within each workbook, the topics are dealt with in the same sequence as in the relevant Coursebook. Topic numbers from the Coursebook are referenced at the top of each exercise, so that you can select suitable exercises to use alongside the core materials. Each exercise in the Skills Builder workbooks links students directly back to the appropriate section of the Coursebook, allowing them to re-engage with the course materials.

Who these workbooks are for

The Skills Builder Workbooks have been written to help learners who are finding difficulty with some aspects of their work. The exercises have been carefully selected to focus on key mathematical skills and provide simple, highly structured tasks, with clear guidance, that will increase the learner's confidence and understanding. Language is kept simple, bearing in mind that these learners may still be developing their fluency in reading and writing English.

The Challenge Workbooks are designed to motivate and stretch learners who are finding some of the core work easy, and who would benefit from or choose more stimulation and challenge with some aspects of their work. The exercises are not limited to the type of task that might be found on the Progression Tests or Checkpoint Tests. This is because their intention is not to test what learners can do, but to further develop their range of mathematical skills that will help them in all aspects of their work in the subject and hence help them to become more confident. Many of the tasks are relatively unstructured and require a combination of skills. The tasks do not take the content to a higher level, but rather ask learners to do more difficult things with this content.

Suggestions for how you might use the Skills Builder and Challenge Workbooks with your classes are explained on pages 6 to 7 of this document.

Developing skills

All of these workbooks, like the core Cambridge Checkpoint Mathematics Coursebooks and Practice Books, contain exercises that concentrate on the development and fluency of skills. Knowledge and understanding of the learning objectives, listed in the Mathematics Curriculum Framework, are not the main focus of the exercises. However, every exercise is firmly placed within the context of the framework, and so learners will almost inevitably increase their depth and breadth of understanding of this content as they work through any exercise.

The skills covered include many of those described in the learning objectives of the problem-solving strand of the Curriculum Framework. Ideas for addressing such learning objectives will be found in the many different activities included in the Coursebook and on the Teacher Resource CD-ROM.

How to use the Skills Builder Workbooks effectively

Effective use of the Skills Builder Workbooks in the classroom will help those students who have difficulty with some topics and skills to make progress and to gain confidence. The key to making the best use of the workbooks is good planning and integrating their use into your teaching, as well as knowing your students well.

In your overall course planning, it will be helpful to use the 'Teaching ideas' section of the Teacher's Resource CD-ROM. Here the possible lessons are set out along with the resources in the core Workbook and the Worksheets (also on the CD-ROM). The Overviews of units will also be helpful. By using your students' previous work, or carefully planning a question or activity that is designed to assess students' understanding you can identify the areas that your students might be finding difficult and look for exercises in the Skills Builder Workbook that reinforce learning or practice skills.

It will mean that every student is not doing the same task at the same time. They may not complete every task. The main point is that you, and they, see that they have achieved.

For example, in Unit 7.3 Comparing fractions: you may be talking through the ideas about comparing fractions as a class or in small groups. It is often difficult for some students to grasp the numerical aspect of this topic without a more extensive visual representation. Some of the class may quite successfully work through the core workbook exercise 7.3 Comparing Fractions but those needing the more extended visualisation of the problems could do Skills Builder exercise 7.3 which covers the skills required to compare fractions by using equivalent fractions. They could then move on to the core Workbook exercise, or at least the first part of it.

This approach means you need to be flexible, in order to respond to students' different needs, assisting them to learn as well as possible. Good planning in advance can help to ensure co-ordinating the different tasks in class is manageable. A starting point may be to use the different resources to set different homework tasks. The students will soon get used to the idea that not everyone is doing the same thing but you will need to make it clear that it is progress you are looking for.

The Skills Builder Workbooks can also be used as a quick intervention to target particular topics or skills that particular students find difficult. You may, for example, identify that a student has difficulty in drawing a graph; perhaps in devising the scale or in plotting the points. Using one of the Skills Builder exercises that gives a graph already set up with scales and the first point plotted can help to give the student confidence. The Remember boxes and clear instructions will guide them through the practice they need.

How to use the Challenge Workbooks effectively

The Challenge Workbooks can be used to achieve differentiation in similar ways to the Skills Builder Workbook. You could simply set three different levels of homework tasks. But if you can integrate the Challenge Workbook tasks into your lessons, the students who work quickly will avoid becoming bored and will begin to develop the skills they will need for the next stage of their education.

The planning for lessons using the Challenge Workbooks may need careful thought, as many of the tasks are longer. For example, in Stage 7, Unit 7.5 Adding and Subtracting Fractions: there is an exercise on adding and subtracting, mainly very straight forward, proper fractions in the core Workbook, a similar exercise but with more visual support in the Skills Builder Workbook, and in the Challenge Workbook task 7.5 asks students to add and subtract more complex fractions and mixed numbers. The Challenge exercises will probably take longer than the other tasks, so you could spend more time on the basic skills with the rest of the class.

Like anything new, planning and executing good lessons where students are doing different tasks takes practice. By sharing your experiences and techniques with other teachers you will become more skilled at it. Explaining your approach to your students and why you are using it, asking for their feedback will also help you to continue to develop your methods. The benefits to the students and their progress certainly makes it worth the effort.

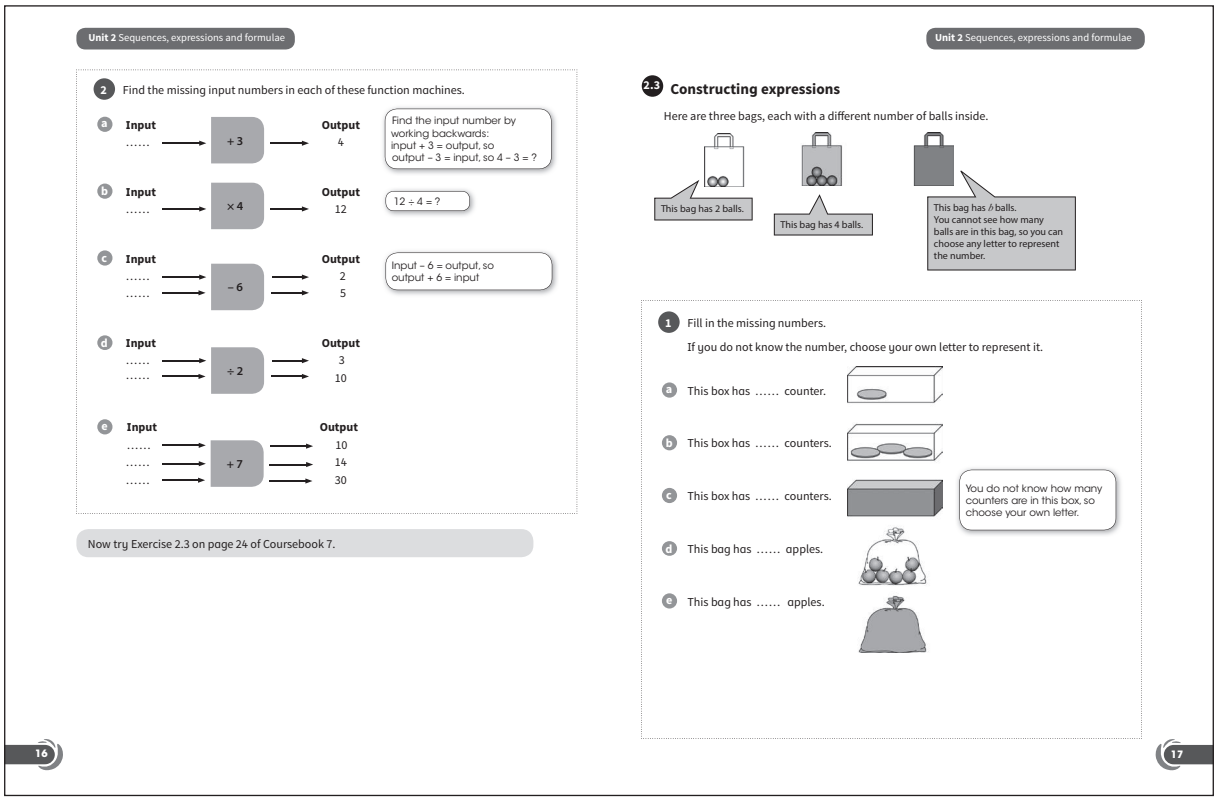
Look inside… Skills Builder

The Skills Builder Workbooks are written to make them accessible to those students who are struggling with some of the skills and topics in the core Checkpoint Mathematics course. The aim is to make the students successful in each exercise, giving them confidence and building up their skills gradually.

The pages are designed to be clear and uncluttered so that the students do not have to search hard for information and are not overwhelmed by too much information. The questions are direct and only require straightforward calculations and short answers.

Each exercise has clear introductory text which gives the students essential information on the skills they will be working on in the task.

The exercises have been kept short and simple so that students can access the information easily. Illustrations are used to avoid lengthy descriptions, to make unfamiliar vocabulary clear or to clarify a practical set-up or procedure.



Unit 2 Sequences, expressions and formulae

2 Find the missing input numbers in each of these function machines.

a Input ..... → +3 → Output 4

Find the input number by working backwards: input + 3 = output, so output − 3 = input, so 4 − 3 = ?

b Input ..... → ×4 → Output 12

12 ÷ 4 = ?

c Input ..... → −6 → Output 2

Input − 6 = output, so output + 6 = input

d Input ..... → ÷2 → Output 3

e Input ..... → +7 → Output 10, 14, 30

Now try Exercise 2.3 on page 24 of Coursebook 7.

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Unit 2 Sequences, expressions and formulae

2.3 Constructing expressions

Here are three bags, each with a different number of balls inside.

This bag has 2 balls.

This bag has 4 balls.

This bag has h balls. You cannot see how many balls are in this bag, so you can choose any letter to represent the number.

1 Fill in the missing numbers.

If you do not know the number, choose your own letter to represent it.

a This box has ..... counter.

b This box has ..... counters.

c This box has ..... counters.

You do not know how many counters are in this box, so choose your own letter.

d This bag has ..... apples.

e This bag has ..... apples.

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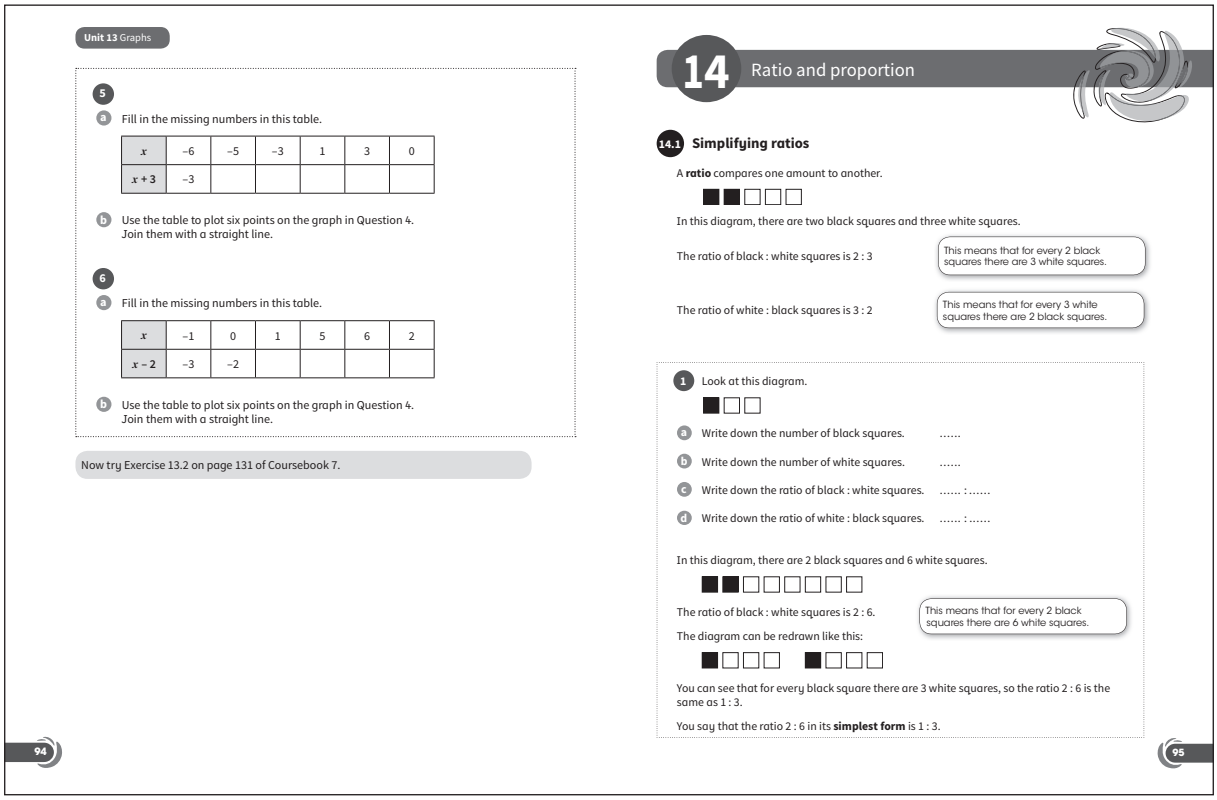
Skills Builder 7, pp 16-17 9781316637371

The questions are structured so that the student is not afraid to attempt an answer. Some questions only require students to draw lines between question and answer so that they can concentrate on the maths in question, rather than having to show workings for an answer. These questions will however require understanding and thinking to establish the correct answer. Where workings are required we have given the learners some framework so that they can structure their workings in small steps rather than being faced with a large number of blank writing lines.

We have built up the skills, for example, working with fractions over the three stages, 7, 8 and 9, of the Skills Builder Workbooks. At each level we have included an overlap, to allow for some revision before extending the topic. We have also increased the difficulty and removed some of the help given in the earlier stages. For example in the early stages we have provided a lot of diagrams to aid visualisation and greater understanding of the questions. While still providing diagrams where essential in later books, there is less emphasis upon diagrams as an aid to understanding.



Unit 13 Graphs

5 a Fill in the missing numbers in this table.

x	−6	−5	−3	1	3	0
$x + 3$	−3					

b Use the table to plot six points on the graph in Question 4. Join them with a straight line.

6 a Fill in the missing numbers in this table.

x	−1	0	1	5	6	2
$x - 2$	−3	−2				

b Use the table to plot six points on the graph in Question 4. Join them with a straight line.

Now try Exercise 13.2 on page 131 of Coursebook 7.

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14 Ratio and proportion

14.1 Simplifying ratios

A **ratio** compares one amount to another.

In this diagram, there are two black squares and three white squares.

The ratio of black : white squares is 2 : 3

This means that for every 2 black squares there are 3 white squares.

The ratio of white : black squares is 3 : 2

This means that for every 3 white squares there are 2 black squares.

1 Look at this diagram.

a Write down the number of black squares. .....

b Write down the number of white squares. .....

c Write down the ratio of black : white squares. ..... : .....

d Write down the ratio of white : black squares. ..... : .....

In this diagram, there are 2 black squares and 6 white squares.

The ratio of black : white squares is 2 : 6.

This means that for every 2 black squares there are 6 white squares.

The diagram can be redrawn like this:

You can see that for every black square there are 3 white squares, so the ratio 2 : 6 is the same as 1 : 3.

You say that the ratio 2 : 6 in its **simplest form** is 1 : 3.

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Skills Builder 7, pp 94-95 9781316637371

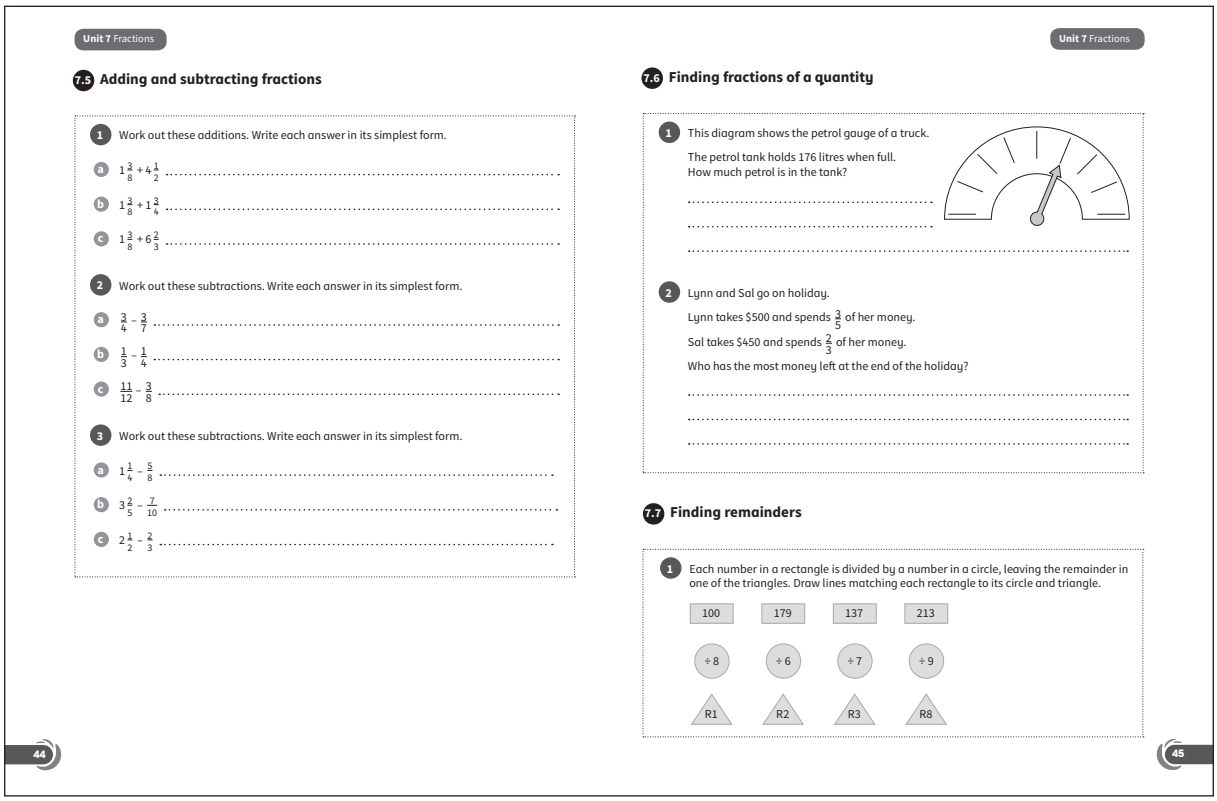
To help the students by giving key information and some general guidance we have provided ‘Hint’ boxes with tips or instructions for when they are stuck. This should reduce the number of times they need to ask for help.

The whole purpose of the Skills Builder workbooks is to build the confidence and the skills needed in this course and the books are written so that small steps can be made to guide the students towards success.

Look inside… Challenge

The Challenge Workbooks are written as an extension to the core Checkpoint Mathematics Practice Books and questions in the Coursebooks. The aim, as their name suggests, is to give more demanding questions and hence to further students' progress in higher-order thinking and skills. The progression is in skills rather than content, so each Challenge Workbook stretches the learner within the relevant stage of the Curriculum Framework without requiring coverage of content in the next higher stage.

While the language level has been carefully controlled, the Challenge tasks require a higher level of reading and literacy skills than the Skills Builder exercises. The page layouts cue less visual learning and involve more reading, but an open attractive layout has been retained.



Unit 7 Fractions

7.5 Adding and subtracting fractions

1 Work out these additions. Write each answer in its simplest form.

a $1\frac{3}{8} + 4\frac{1}{2}$ .....

b $1\frac{3}{8} + 1\frac{3}{4}$ .....

c $1\frac{3}{8} + 6\frac{2}{3}$ .....

2 Work out these subtractions. Write each answer in its simplest form.

a $\frac{3}{4} - \frac{3}{7}$ .....

b $\frac{1}{3} - \frac{1}{4}$ .....

c $\frac{11}{12} - \frac{3}{8}$ .....

3 Work out these subtractions. Write each answer in its simplest form.

a $1\frac{1}{4} - \frac{5}{8}$ .....

b $3\frac{2}{5} - \frac{7}{10}$ .....

c $2\frac{1}{2} - \frac{2}{3}$ .....

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Unit 7 Fractions

7.6 Finding fractions of a quantity

1 This diagram shows the petrol gauge of a truck.

The petrol tank holds 176 litres when full.
How much petrol is in the tank?

.....

.....

.....

2 Lynn and Sal go on holiday.

Lynn takes $500 and spends $\frac{3}{5}$ of her money.

Sal takes $450 and spends $\frac{2}{3}$ of her money.

Who has the most money left at the end of the holiday?

.....

.....

.....

7.7 Finding remainders

1 Each number in a rectangle is divided by a number in a circle, leaving the remainder in one of the triangles. Draw lines matching each rectangle to its circle and triangle.

100 179 137 213

÷8 ÷6 ÷7 ÷9

R1 R2 R3 R8

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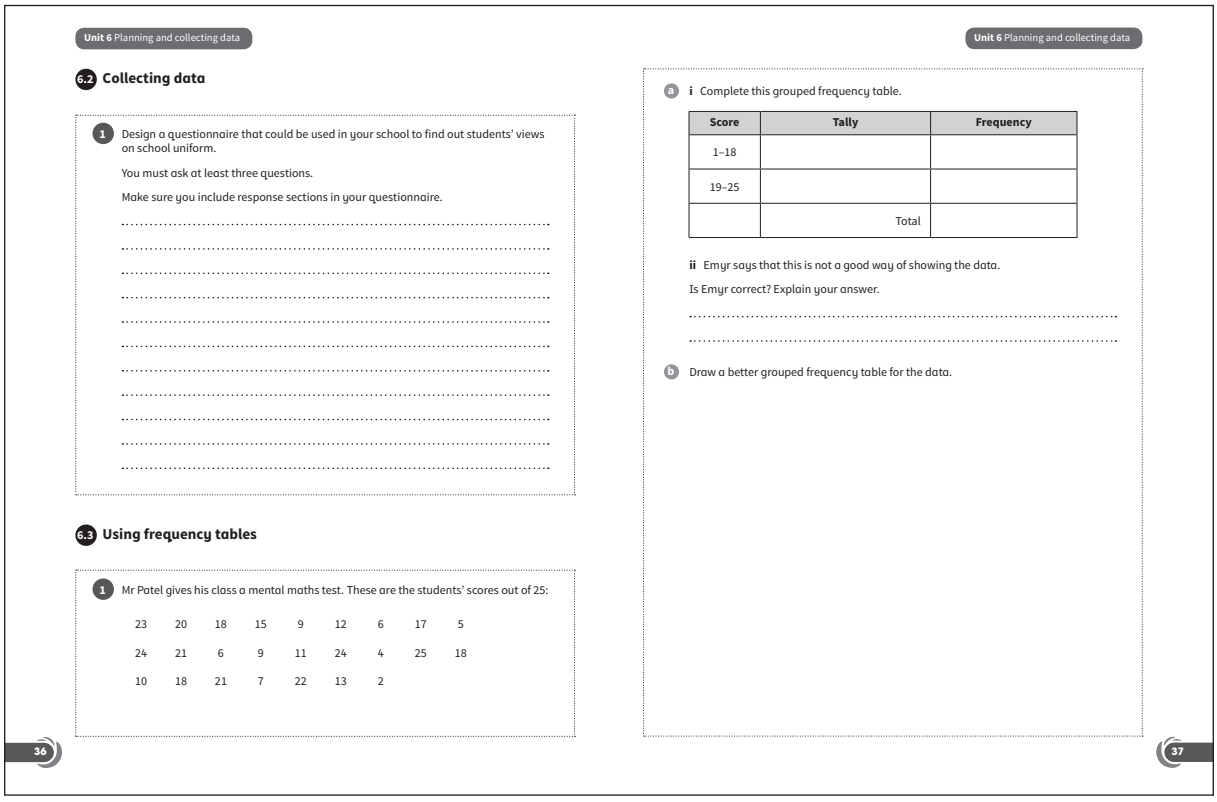
Challenge 7, pp 44-45 9781316637418

Many of the questions in the Challenge Workbooks focus on developing the range of students' thinking and encouraging problem solving. The skills required to answer these questions are of a higher level than those required for recall of facts or for the application of factual knowledge.

There is progression through the three Stages, 7, 8 and 9. At each stage we have increased the level of demand and reduced the level of scaffolding. For example, drawing grouped frequency tables between Stages 7 and 8.



Unit 6 Planning and collecting data

6.2 Collecting data

1 Design a questionnaire that could be used in your school to find out students' views on school uniform.

You must ask at least three questions.

Make sure you include response sections in your questionnaire.

.....

.....

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6.3 Using frequency tables

1 Mr Patel gives his class a mental maths test. These are the students' scores out of 25:

23	20	18	15	9	12	6	17	5
24	21	6	9	11	24	4	25	18
10	18	21	7	22	13	2		

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Unit 6 Planning and collecting data

a i Complete this grouped frequency table.

Score	Tally	Frequency
1–18		
19–25		
	Total	

ii Emyr says that this is not a good way of showing the data.

Is Emyr correct? Explain your answer.

.....

.....

b Draw a better grouped frequency table for the data.

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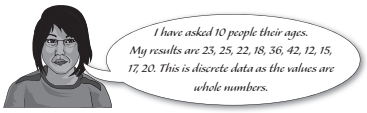
Challenge 7, pp 36-37 9781316637418

2 Give an example of continuous data that some people may think is discrete data.

For example:



6.3 Using frequency tables

1 Here are some times, to the nearest minute, that 30 students took to complete a puzzle.

11	3	6	8	10	3	13	5	10	9
17	6	4	11	18	7	7	9	23	12
14	4	8	15	9	12	5	6	11	20

a Draw a grouped frequency table for this data.

Make sure your table has five or six class intervals and the intervals are the same size.

b Write a conclusion based on the results of your grouped frequency table.

2 80 students were asked their favourite English football team.

Of the 48 boys, $\frac{1}{4}$ chose Arsenal and $\frac{1}{3}$ chose Liverpool, but none chose Chelsea.

Of the girls, 25% chose Manchester City. This number is the same as the Chelsea total.

None of the girls chose Liverpool and only 1 chose Manchester United.

The total for Manchester United was 3 more than the total for Manchester City.

Complete the two-way table showing the information above.

	Arsenal	Chelsea	Liverpool	Manchester City	Manchester United	Total
Boys						
Girls						
Total						

Challenge 8, pp42-43 9781316637425

The purpose of the Challenge series of workbooks is to provide a valuable teaching tool in your classroom that will extend differentiated learning through challenging, interesting and relevant questions.

Author biographies

Lynn Byrd

Lynn gained an honours degree in mathematics at Southampton University in 1987 and then moved onto Swansea University to do her teacher training in Maths and P.E. in 1988.

She taught mathematics in two different secondary schools in West Wales for 11 years for all ability levels, teaching across the range of age groups up to GCSE and Further Mathematics A level. During this time she started work as an examiner for two awarding bodies. In 1999, she finished teaching and became a senior examiner, while also becoming involved in writing resources and exam papers for these boards. She has written or co-authored a number of text books, homework books, work books and teacher resources for secondary mathematics qualifications.

Greg Byrd

After university and a year of travel and work, Greg started teaching in Pembrokeshire, Wales, in 1988. Teaching mathematics to all levels of ability he was instrumental in helping his department to improve GCSE results. His innovative approaches led him to become chairman of the 'Pembrokeshire Project 2000', an initiative to change the starting point of every mathematics lesson of every pupil in the county. By this time he had already started authoring. To date he has authored or co-authored over 60 text books from Key Stage 3 and GCSE to GNVQ and A level having his books sold in schools and colleges across the UK and in over 50 countries worldwide.

Chris Pearce

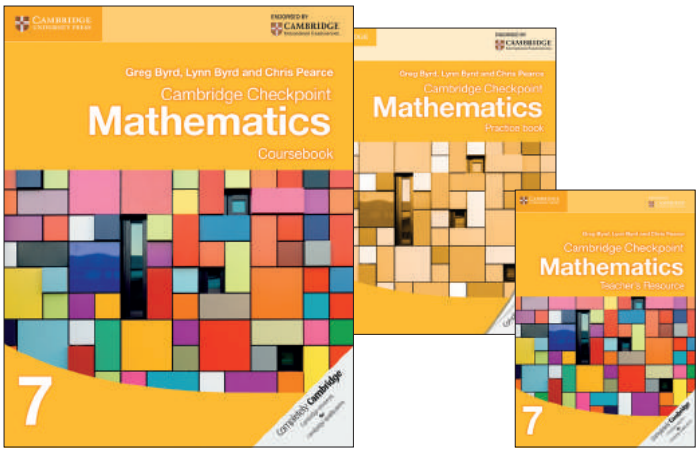
Chris has an MA from the University of Oxford where he read mathematics.

He has taught mathematics for over 30 years in secondary schools to students aged 11 to 18, and for the majority of that time he was the head of the mathematics department.

After teaching he spent six years as a mathematics advisor for a local education authority working with schools to help them improve their teaching. He has also worked with teachers in other countries, including Qatar, China and Mongolia.

Chris is now a full-time writer of text books and teaching resources for students of secondary age, writing books and other materials for several publishers throughout the 11 to 18 age range, including Cambridge Checkpoint, GCSE, IGCSE and A level. Chris is also an examiner with awarding bodies.

The Checkpoint Maths suite



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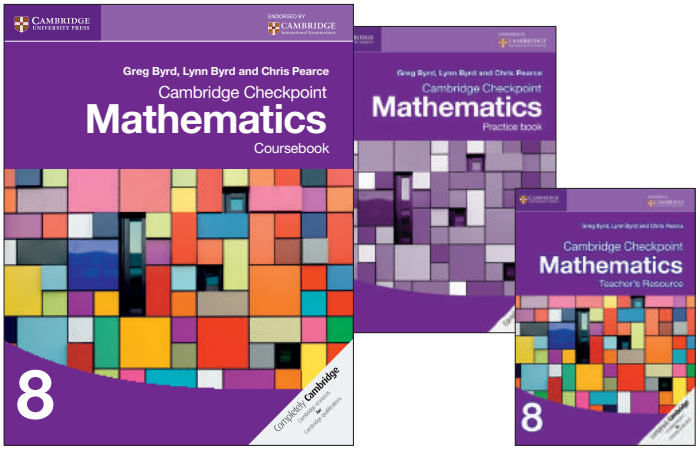

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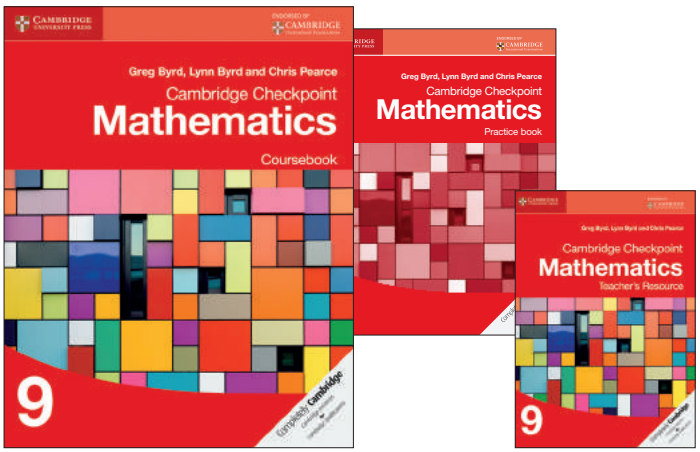

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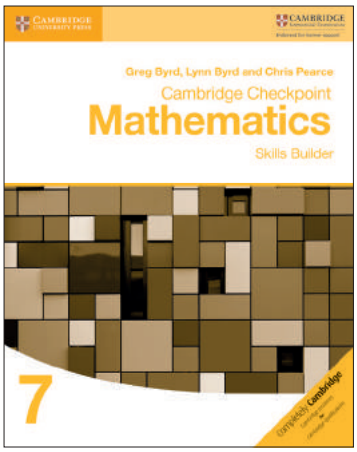

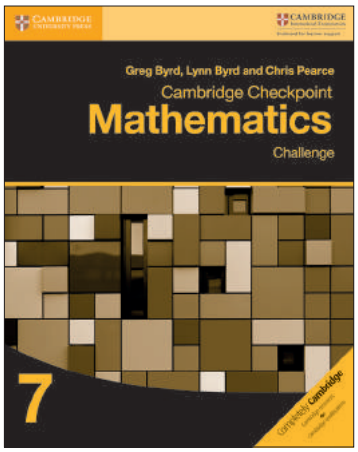

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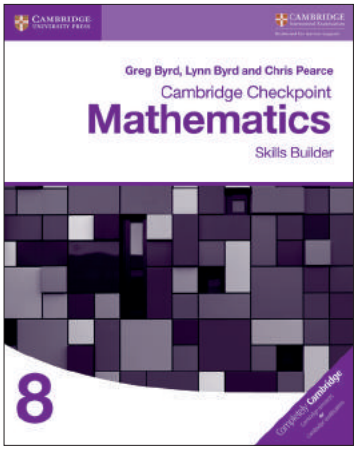

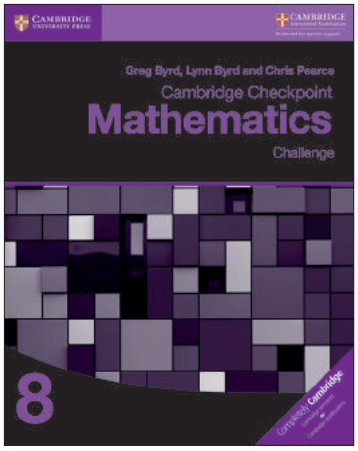

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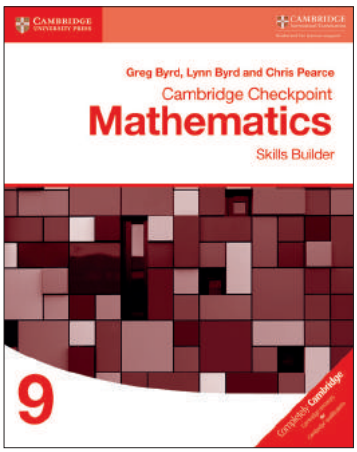

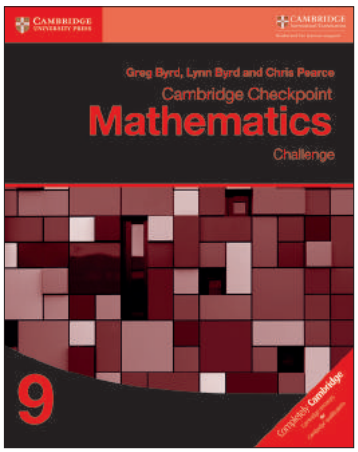

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