Collins

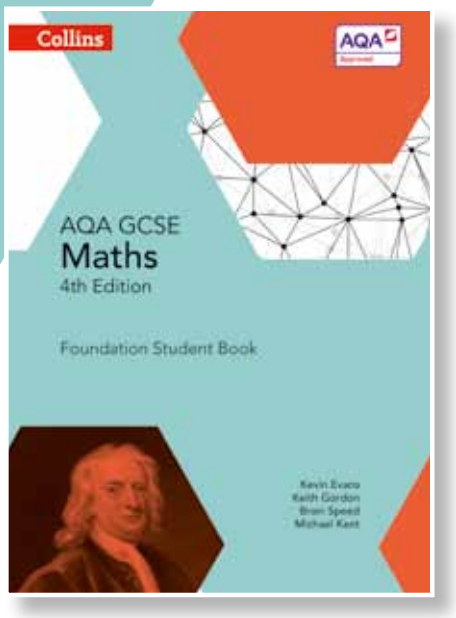
Available Spring 2015

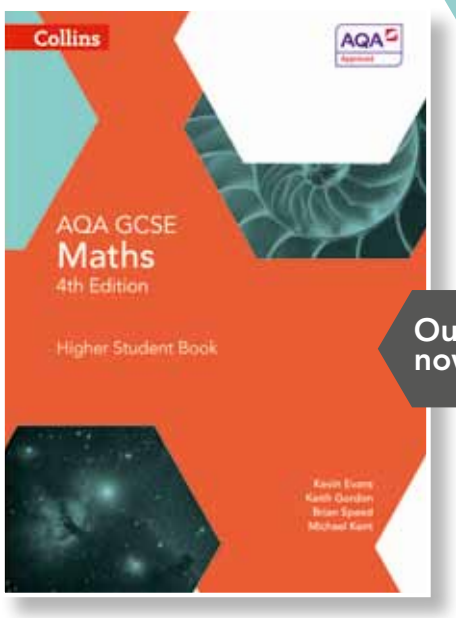
GCSE Maths for AQA 4th Edition

Your whole class will need frequent practice in problem-solving and reasoning skills to succeed in the new GCSE Maths exam.

Our resources provide exactly that, for students at every level.

And we've done it in the most easily accessible way.





Out now

Authors: Kevin Evans
Keith Gordon
Brian Speed
Michael Kent

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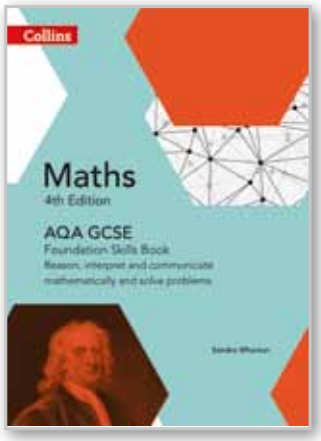
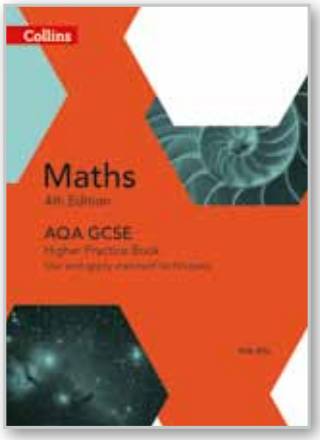
Your whole class will need frequent practice in problem-solving and reasoning skills to succeed in the new GCSE Maths exam.

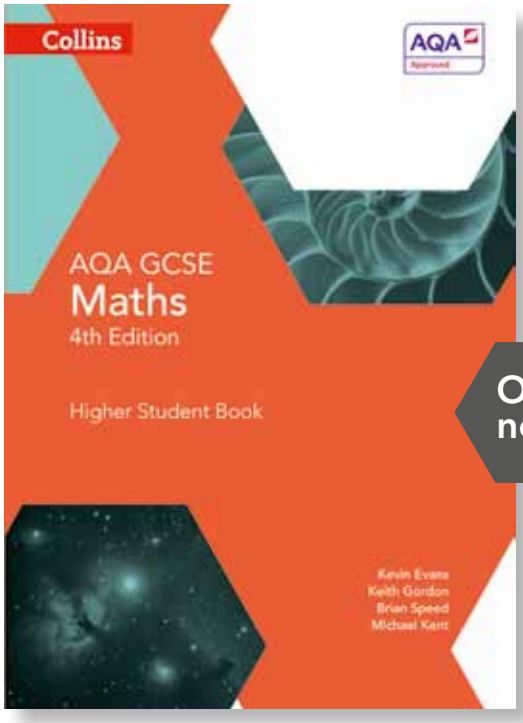
Our resources provide exactly that, for students at every level.

And we've done it in the most easily accessible way.

GCSE Maths is changing, and the Fourth Edition of GCSE Maths from Collins has been completely revised and updated to develop and embed the skills your students need, while providing a clear and supportive route through the new, more challenging GCSE content.



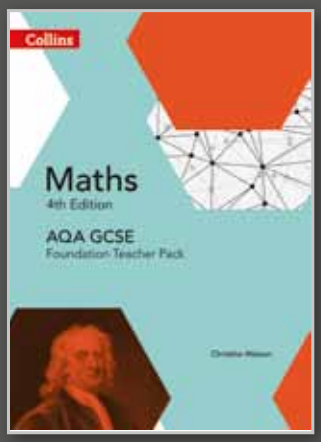


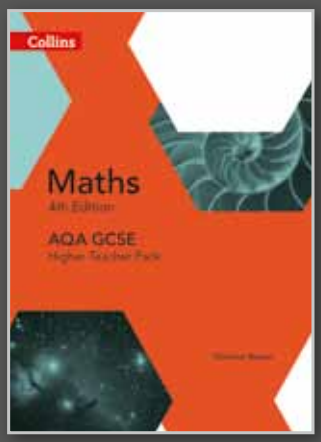


Out now

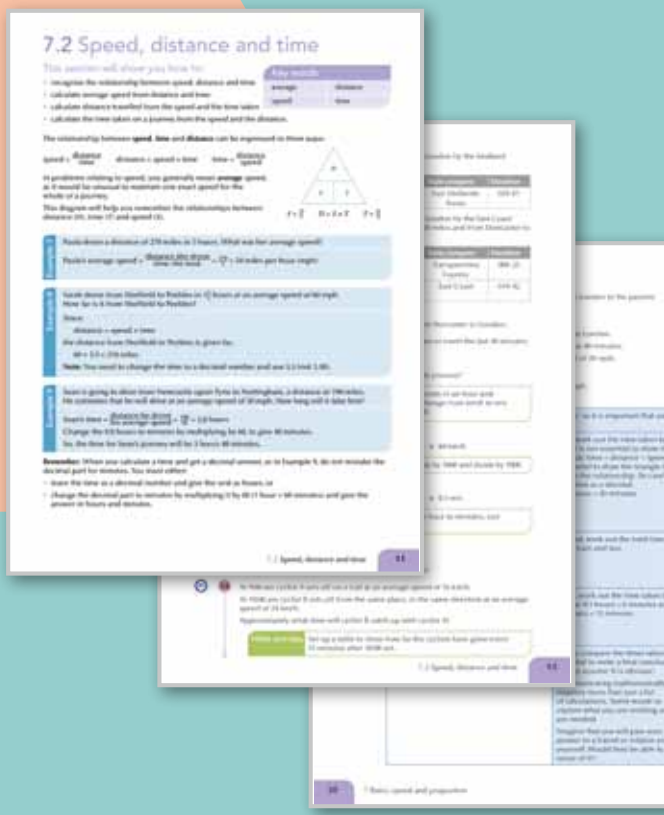
More opportunities for practice – targeted support for your students with tailored, differentiated resources designed to provide extra practice where it is most needed. Choose from Skills Books which focus on reasoning and problem solving, Practice Books which focus on fluency and a Booster Workbook to provide additional practice for Foundation tier students, plus hundreds of differentiated questions in the Student Books.

Flexible routes through the curriculum – however you want to teach it. The structured teacher resources provide options for covering the GCSE in two, three, or five years, plus support on how to tackle the new content that has moved from AS and A-level to GCSE and from Higher tier to Foundation.





Easy for your students to get to grips with – content is designed to be as clear and easy to understand as possible whilst covering all of the new, harder topics, featuring clear sign-posting of skills plus plenty of practice for fluency and consolidation.



Collins Connect

On-going assessment opportunities – track progress with auto-marked end of chapter, half term and end of year tests – which give you and your students regular knowledge checks before moving on, and prepare students for final assessment with exam-style question papers.

Changes to GCSE Maths

GCSE Maths for AQA 4th Edition

GCSE Maths is changing from September 2015 – you can read an overview of the main changes below. Find out more at **collins.co.uk/GCSEMaths**.

- New assessment objectives
- New, more challenging content for both tiers
- Linear course with exams at the end of Year 11
- Change to assessment time (4.5 hours)
- New grading (9–1 not A* to G)

A brief overview of the new Assessment Objectives

AO1: Use and apply standard techniques

AO2: Reason, interpret and communicate mathematically

AO3: Solve problems within mathematics in other contexts

Examples of new content

New to both Foundation and Higher tiers	New to Foundation tier	New to Higher tier
systematic listing strategies	standard form	inverse functions
Fibonacci type sequences	surds	composite functions
quadratic sequences	expanding and factorising quadratic expressions	graph of $y = \tan x$
simple geometrical progressions	solving quadratic equations by factorising	velocity-time graphs
pressure	simultaneous equations	quadratic inequalities
functions	trigonometry	nth term of a quadratic sequence
frequency trees		rates of change
Venn diagrams		iterative processes
		invariance

Move to linear assessment

No modules – all assessed at end of year 11

3 papers, 4.5 hours in total and any topic can feature in any paper

How will GCSE Maths for AQA support you and your students?

- More opportunities to practice!
- Flexible routes through the curriculum
- Highly accessible and easy for your students to get to grips with
- On-going assessment opportunities

Find out more about how GCSE Maths for AQA will support you and your students in the course overview on the opposite page.

How is GCSE Maths for AQA structured?

GCSE Maths for AQA 4th Edition

Collins Connect

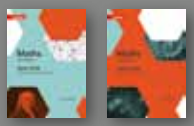
Content is available online at home and at school, meaning it's ideal for use as a front-of-class teaching tool and as a way to set homework and tests.

Teach

Teacher Packs

Available for Foundation and Higher tiers.

Deliver the new GCSE Maths curriculum with confidence using a detailed introduction to the course.

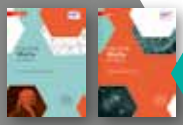


Learn

Student Books

Available for Foundation and Higher tiers.

Cover the content for the new AQA GCSE Maths specification with practice opportunities throughout and a focus on problem solving and reasoning – supporting the new AOs.



Assess

Track progress with automarked end of chapter, half term and end of year tests, and prepare students for final assessment with exam-style question papers.

Practise

Practice Books

Available for Foundation and Higher tiers.

Support students in mastering Assessment Objective AO1.

Booster Workbook

Available for Foundation tier. More practice for those students who require additional support.

Build Skills

Maths Skills Builder

Extra support for a smooth transition from KS3 to GCSE.

Skills Books

Available for Foundation and Higher tiers. Support students in mastering Assessment Objectives AO2 and AO3.

Using **Maths Frameworking, 3rd edition** and **GCSE Maths, 4th edition** together will give you a 5 year maths programme. A free 5 year Scheme of Work for Higher tier is included in the evaluation pack or go to collins.co.uk/GCSEMaths to download a copy.

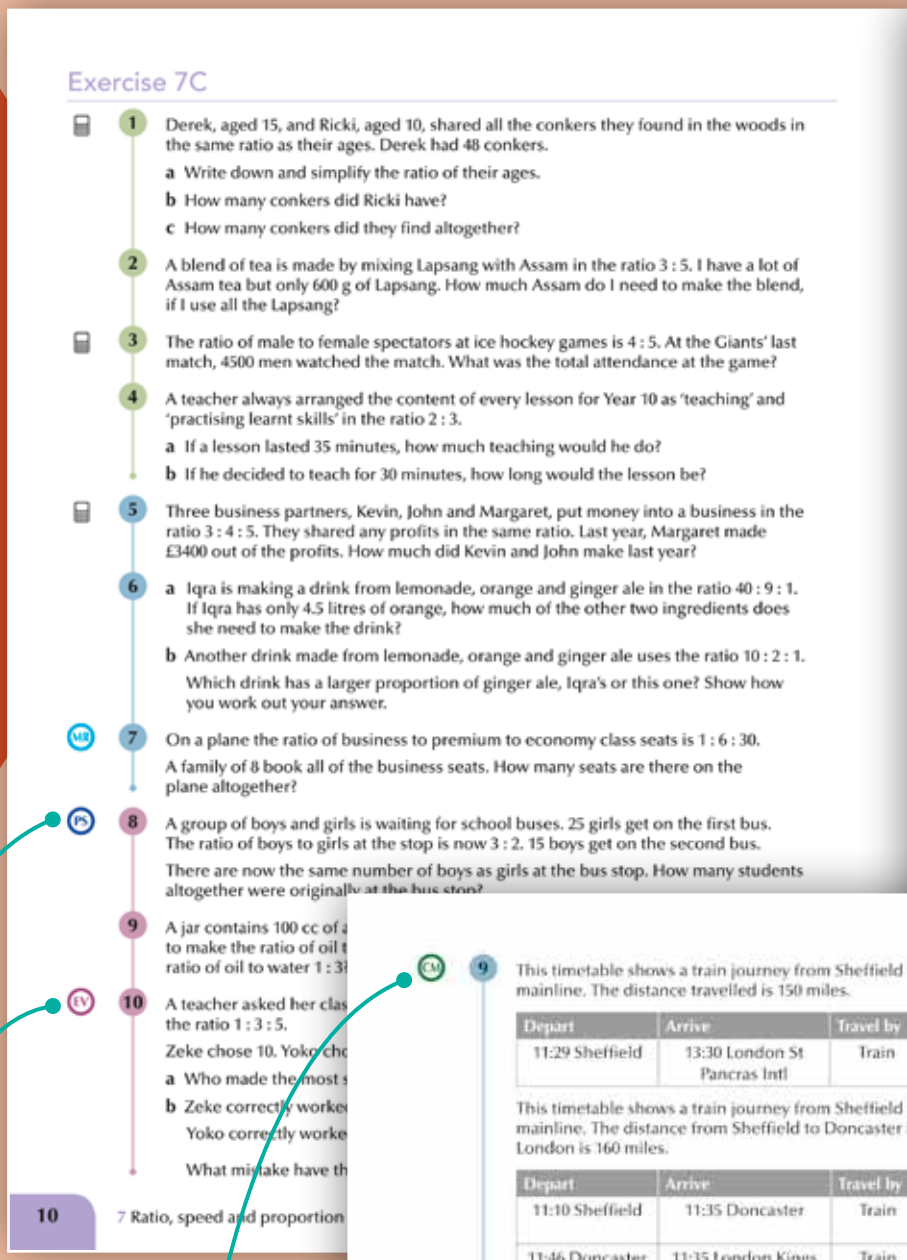
(Maths Frameworking and the 5 year Scheme of Work have not been entered into approval processes with AQA.)

GCSE Maths for AQA 4th Edition

Student Books

- Fully revised and updated for the new GCSE specifications for AQA
- Written by experienced teachers and expert authors
- Focused on mathematical reasoning and problem solving to build the skills students need for success at GCSE

Student Books are structured to cover all the content required for the complete GCSE. Separate Student Books for Foundation and Higher tier are available.



Exercise 7C

1 Derek, aged 15, and Ricki, aged 10, shared all the conkers they found in the woods in the same ratio as their ages. Derek had 48 conkers.
a Write down and simplify the ratio of their ages.
b How many conkers did Ricki have?
c How many conkers did they find altogether?

2 A blend of tea is made by mixing Lapsang with Assam in the ratio 3 : 5. I have a lot of Assam tea but only 600 g of Lapsang. How much Assam do I need to make the blend, if I use all the Lapsang?

3 The ratio of male to female spectators at ice hockey games is 4 : 5. At the Giants' last match, 4500 men watched the match. What was the total attendance at the game?

4 A teacher always arranged the content of every lesson for Year 10 as 'teaching' and 'practising learnt skills' in the ratio 2 : 3.
a If a lesson lasted 35 minutes, how much teaching would he do?
b If he decided to teach for 30 minutes, how long would the lesson be?

5 Three business partners, Kevin, John and Margaret, put money into a business in the ratio 3 : 4 : 5. They shared any profits in the same ratio. Last year, Margaret made £3400 out of the profits. How much did Kevin and John make last year?

6 a Iqra is making a drink from lemonade, orange and ginger ale in the ratio 40 : 9 : 1. If Iqra has only 4.5 litres of orange, how much of the other two ingredients does she need to make the drink?
b Another drink made from lemonade, orange and ginger ale uses the ratio 10 : 2 : 1. Which drink has a larger proportion of ginger ale, Iqra's or this one? Show how you work out your answer.

MR 7 On a plane the ratio of business to premium to economy class seats is 1 : 6 : 30. A family of 8 book all of the business seats. How many seats are there on the plane altogether?

PS 8 A group of boys and girls is waiting for school buses. 25 girls get on the first bus. The ratio of boys to girls at the stop is now 3 : 2. 15 boys get on the second bus. There are now the same number of boys as girls at the bus stop. How many students altogether were originally at the bus stop?

9 A jar contains 100 cc of a
to make the ratio of oil t
ratio of oil to water 1 : 3

EV 10 A teacher asked her clas
the ratio 1 : 3 : 5.
Zeke chose 10. Yoko cho
a Who made the most
b Zeke correctly worke
Yoko correctly worke
What mistake have th

10 7 Ratio, speed and proportion

CM 9 This timetable shows a train journey from Sheffield
mainline. The distance travelled is 150 miles.

Depart	Arrive	Travel by
11:29 Sheffield	13:30 London St Pancras Intl	Train

This timetable shows a train journey from Sheffield
mainline. The distance from Sheffield to Doncaster
London is 160 miles.

Depart	Arrive	Travel by
11:10 Sheffield	11:35 Doncaster	Train
11:46 Doncaster	11:35 London Kings Cross	Train

a Work out the average speed of each journey.
b Work out the average speed of the train journey

MR 10 A train travels at 50 km/h for 2 hours. Then it slows
of its journey at 40 km/h.
a What is the total distance of this journey?
b What is the average speed of the train over the w

Hints and tips Remember that there are 3600
1000 metres in a kilometre. So
multiply by 1000 and divide by

11 Change each speed to metres per second.
a 36 km/h b 12 km/h

Hints and tips To change from m/s to km/h mul

12 Change each speed to kilometres per hour.
a 25 m/s b 12 m/s

Hints and tips To convert a decimal fraction of
multiply by 60.

13 A train travels at an average speed of 18 m/s.
The train sets off at 07:30 on a 40 km journey.
At approximately what time will it reach its destinati

PS 14 At 9:00 am cyclist A sets off on a trail at an average s
At 10:00 am cyclist B sets off from the same place, in
speed of 24 km/h.
Approximately what time will cyclist B catch up with

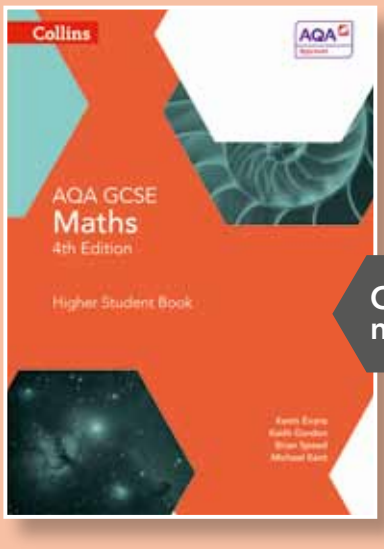
Hints and tips Set up a table to show how far t
15 minutes after 10:00 am.

Solve problems within mathematics and in other contexts with clearly flagged questions

Reason, interpret and communicate mathematically with plenty of practice questions

Provide rigorous maths practice with hundreds of high-quality questions

Differentiate at the top end with more challenging questions



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GCSE Maths for AQA Higher Student Book is approved by AQA.
GCSE Maths for AQA Foundation Student Book is approved by AQA.

7.2 Speed, distance and time

This section will show you how to:

- recognise the relationship between speed, distance and time
- calculate average speed from distance and time
- calculate distance travelled from the speed and the time taken
- calculate the time taken on a journey from the speed and the distance.

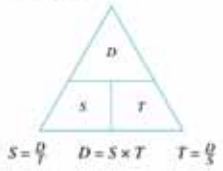
Key words	
average	distance
speed	time

The relationship between **speed**, **time** and **distance** can be expressed in three ways:

$\text{speed} = \frac{\text{distance}}{\text{time}}$ $\quad \text{distance} = \text{speed} \times \text{time}$ $\quad \text{time} = \frac{\text{distance}}{\text{speed}}$

In problems relating to speed, you generally mean **average** speed, as it would be unusual to maintain one exact speed for the whole of a journey.

This diagram will help you remember the relationships between distance (D), time (T) and speed (S).



$S = \frac{D}{T}$ $\quad D = S \times T$ $\quad T = \frac{D}{S}$

Example 7

Paula drove a distance of 270 miles in 5 hours. What was her average speed?

Paula's average speed = $\frac{\text{distance she drove}}{\text{time she took}} = \frac{270}{5} = 54$ miles per hour (mph)

Example 8

Sarah drove from Sheffield to Peebles in $3\frac{1}{2}$ hours at an average speed of 60 mph. How far is it from Sheffield to Peebles?

Since:

distance = speed × time

the distance from Sheffield to Peebles is given by:

$60 \times 3.5 = 210$ miles

Note: You need to change the time to a decimal number and use 3.5 (not 3.30).

Example 9

Sean is going to drive from Newcastle upon Tyne to Nottingham, a distance of 190 miles. He estimates that he will drive at an average speed of 50 mph. How long will it take him?

to London by the Midland

Train company	Duration
East Midlands Trains	02h 01

to London by the East Coast
is 20 miles and from Doncaster to

Train company	Duration
Transpennine Express	00h 25
East Coast	01h 42

rom Doncaster to London.

lown to travel the last 30 minutes

hole journey?

econds in an hour and
o change from km/h to m/s
600.

c 60 km/h

tiply by 3600 and divide by 1000.

c 0.5 m/s

an hour to minutes, just

on?

peed of 16 km/h.

the same direction at an average

cyclist A?

he cyclists have gone every

Worked exemplars

CM 1 Jonathan is comparing two ways to travel from his flat in London to his parents' house.

Tube, train and taxi

It takes 35 minutes to get to the railway station by tube in London.

The train journey from London to Doncaster takes 1 hour 40 minutes.

From Doncaster it is 15 miles by taxi at an average speed of 20 mph.

Car

The car journey is 160 miles at an average speed of 50 mph.

Which journey takes longer: tube, train and taxi or car?

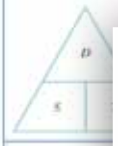
This question assesses 'communicating mathematically' so it is important that you show your methods clearly.

For the taxi:

time = distance ÷ speed = $\frac{15}{20}$

= 0.75 hour (or 45 minutes)

First, work out the time taken by the taxi. It is not essential to show the formula 'time = distance ÷ speed' but it is useful to draw the triangle that shows the relationship. Be careful



Total time for
and taxi

= 35
+ 4
= 3 h

For the car:

time = dist
= 3.2

Travelling by

Ready to progress?

I can simplify a ratio.

I can calculate average speeds from data.
I can calculate distance from speed and time.
I can calculate time from speed and distance.
I can compare prices of products to find the 'best buy'.

I can solve direct proportion problems.
I can use ratio to solve problems.

Review questions

1 The total cost of these three pens is £1.20.
Work out the total cost of eight of these pens.
Give your answer in pounds.

2 These are the ingredients for making apple pie for eight people.

Apple pie for 8 people	
240 g flour	5 eggs
320 g apples	210 ml milk
105 g butter	

Bill makes an apple pie for five people.

a Work out how much flour he needs.

Jenny makes an apple pie for 18 people.

b Work out how much milk she needs.

3 Maura travelled 80 miles in 1 hour 40 minutes.
Work out Maura's average speed.
Give your answer in miles per hour.

Focus on literacy skills with key words per topic

Show step-by-step working through clear worked examples

Build skills and techniques to tackle the new assessment objectives

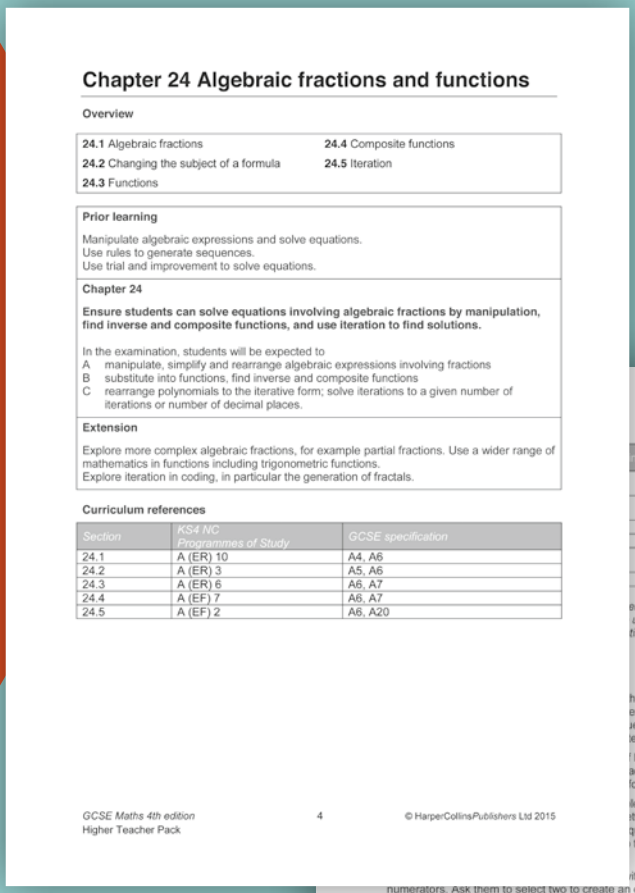
Evaluate progress before moving on

Teacher Packs

Available for Foundation and Higher tiers

- Deliver the new GCSE Maths curriculum with confidence using a detailed introduction to the course
- Help students achieve a smooth transition from KS3 to GCSE with carefully structured lessons and thorough explanations of the assessment objectives
- Plan ahead with detailed, practical schemes of work for 2, 3 and 5 year teaching
- Pick up and teach with detailed lesson plans – perfect for cover lessons, NQTs and full of ideas for more experienced teachers
- Extra teacher support on more challenging topics
- Answers to all questions from the Student Books included

Go to collins.co.uk/GCSEmaths to download sample chapters from the Foundation and Higher Teacher Packs.



Chapter 24 Algebraic fractions and functions

Overview

24.1 Algebraic fractions	**24.4** Composite functions
24.2 Changing the subject of a formula	**24.5** Iteration
24.3 Functions	

Prior learning

Manipulate algebraic expressions and solve equations.
Use rules to generate sequences.
Use trial and improvement to solve equations.

Chapter 24

Ensure students can solve equations involving algebraic fractions by manipulation, find inverse and composite functions, and use iteration to find solutions.

In the examination, students will be expected to
A manipulate, simplify and rearrange algebraic expressions involving fractions
B substitute into functions, find inverse and composite functions
C rearrange polynomials to the iterative form; solve iterations to a given number of iterations or number of decimal places.

Extension

Explore more complex algebraic fractions, for example partial fractions. Use a wider range of mathematics in functions including trigonometric functions.
Explore iteration in coding, in particular the generation of fractals.

Curriculum references

Section	KS4 NC Programmes of Study	GCSE specification
24.1	A (ER) 10	A4, A6
24.2	A (ER) 3	A5, A6
24.3	A (ER) 6	A6, A7
24.4	A (EF) 7	A6, A7
24.5	A (EF) 2	A6, A20

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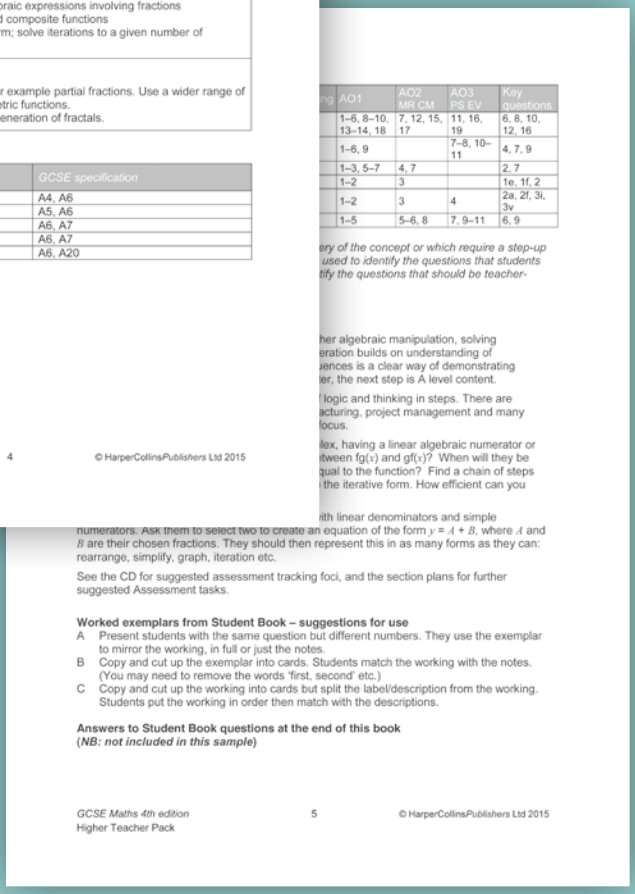

	AO1	AO2 MR CM	AO3 PS EV	Key questions
	1–6, 8–10, 13–14, 18	7, 12, 15, 17	11, 16, 19	6, 8, 10, 12, 16
	1–6, 9		7–8, 10–11	4, 7, 9
	1–3, 5–7	4, 7		2, 7
	1–2	3		1e, 1f, 2
	1–2	3	4	2a, 2f, 3i, 3v
	1–5	5–6, 8	7, 9–11	6, 9

ery of the concept or which require a step-up used to identify the questions that students tify the questions that should be teacher-

her algebraic manipulation, solving eration builds on understanding of iences is a clear way of demonstrating er, the next step is A level content.

logic and thinking in steps. There are acturing, project management and many ocus.

lex, having a linear algebraic numerator or tween $fg(x)$ and $gf(x)$? When will they be qual to the function? Find a chain of steps the iterative form. How efficient can you

ith linear denominators and simple numerators. Ask them to select two to create an equation of the form $y = A + B$, where A and B are their chosen fractions. They should then represent this in as many forms as they can: rearrange, simplify, graph, iteration etc.

See the CD for suggested assessment tracking foci, and the section plans for further suggested Assessment tasks.

Worked exemplars from Student Book – suggestions for use

A Present students with the same question but different numbers. They use the exemplar to mirror the working, in full or just the notes.
B Copy and cut up the exemplar into cards. Students match the working with the notes. (You may need to remove the words 'first, second' etc.)
C Copy and cut up the working into cards but split the label/description from the working. Students put the working in order then match with the descriptions.

Answers to Student Book questions at the end of this book
(NB: not included in this sample)

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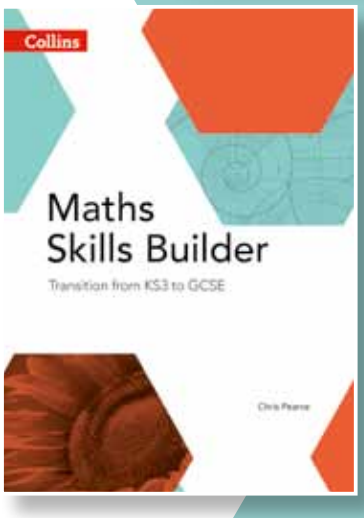
Out now!

Extra support for a smooth transition from KS3 to GCSE

Maths Skills Builder

Author: Chris Pearce

- Get a head start on GCSE in Year 9
- Focus on two of the main aims of the new curriculum – mathematical reasoning and problem-solving
- Develop GCSE skills with longer, more descriptive questions that support the development of students' literacy, thinking skills and investigative strategies
- Use flexibly in the classroom or as a homework resource
- Assess learning with answers and comments included in a tear-out section



Collins Connect resources, Teacher Packs and the Maths Skills Builder are not being entered into the AQA approval process.

Go to collins.co.uk/GCSEmaths to download a sample chapter from the Maths Skills Builder.

Collins Connect

GCSE Maths for AQA 4th Edition

Teach GCSE Maths flexibly and in a way that suits your students with a full suite of digital resources.

Powered by an innovative online learning platform, **Collins Connect** makes GCSE Maths content available at home and at school, meaning it's ideal for use as a front-of-class teaching tool and as a way to set homework and tests.

Digital resources for **Collins GCSE Maths** have been selected to improve and build on key skills in maths such as fluency, problem-solving, correcting common misconceptions, using the correct vocabulary, applying maths to real-life scenarios and encouraging independent learning.

Collins Connect also contains automarked test questions to help students check their progress and understanding of topics as they move through the course and provide you with an overview of areas of strengths and weaknesses. You can assign homework and tests to individuals or your whole class via your VLE or by email in just a few clicks.

You can trial **Collins Connect** completely free for 14 days.
Email **education.support@harpercollins.co.uk** to find out more.

Sample material is also available for you to look at online for free – visit **connect.collins.co.uk/secondary-teaching-resources**.

Discover GCSE Maths for AQA resources on Collins Connect

- You can access the Student Book on Connect, formatted for easy use section-by-section in classroom.
- Individual student log-ins are also available
- Progress and review feature that helps students know what they should have learnt and how they are progressing, followed by useful review questions
- End of chapter homework auto-marked tests for every chapter
- A problem-solving feature in every chapter
- Interactive glossary

Collins Connect for GCSE Maths also contains Tests

- 25 auto-marked half term tests, labelled for 2 year and 3 year GCSE respectively
- 3 auto-marked end of year tests

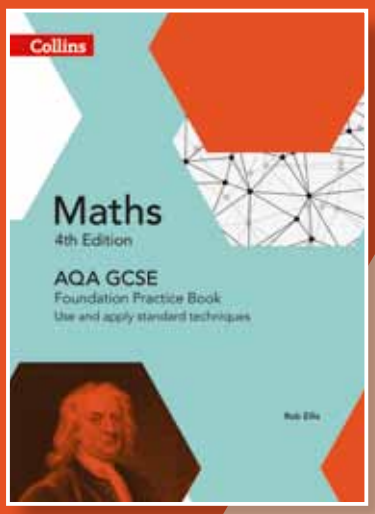
And, downloadable exam-style practice papers with mark schemes.

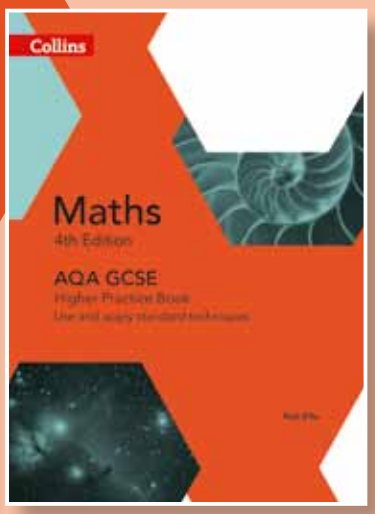
Practice Books

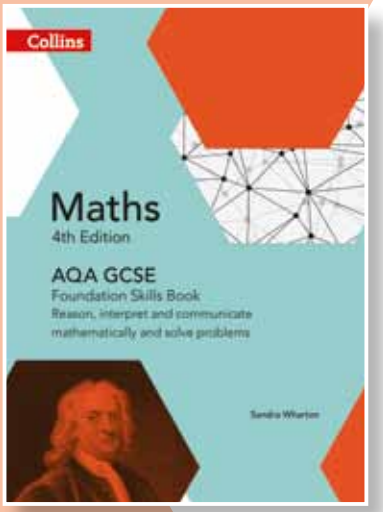
Available for Foundation and Higher tiers, the AQA Practice Books are designed to support students in mastering Assessment Objective AO1 – using and applying standard techniques. They follow the same structure as the Student Books, making them ideal for use both in the classroom for additional practice or as a homework resource.

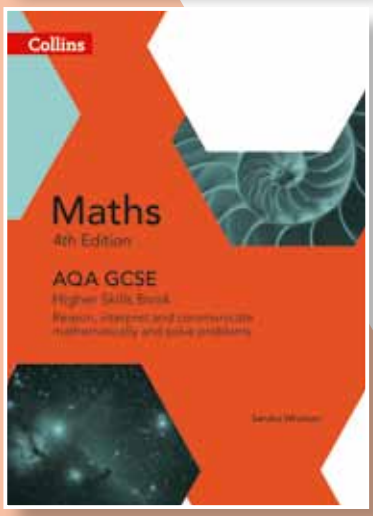
- Build students' confidence with hundreds of differentiated practice questions
- Easily identify topics for further practice, intervention, prior knowledge recall and revision
- Challenge the most able students with plenty of challenging questions

Go to collins.co.uk/GCSEmaths to download a sample chapter from the Higher Practice Book.









Skills Books

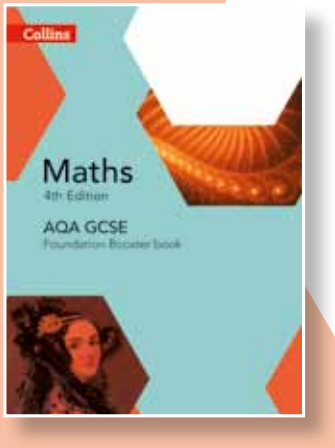
Available for Foundation and Higher tiers, the AQA Skills Books support students in mastering Assessment Objectives AO2 and AO3: reason, interpret and communicate mathematically; and solve problems. Structured by strand, the resources are easily used alongside both the Practice Book and the Student Books.

- Build confidence in tackling longer questions in class and allow further practice at home
- Improve literacy, thinking skills and investigative strategies by providing opportunities for students to tackle problems within and outside mathematics
- Encourage students to think and analyse their work with questions designed to encourage independence

Go to collins.co.uk/GCSEmaths to download a sample chapter from the Higher Skills Book.

Practice Books, Skills Books and the Booster Workbook are not being entered into the AQA approval process.

GCSE Maths for AQA 4th Edition



Booster Workbook

Available for Foundation tier, this write-in Booster Workbook provides more practice for those students who require additional support.

- Ideal for revision, intervention groups and booster classes
- Improve students' confidence with plenty of practice questions targeted at the right level

About the authors

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Keith is an experienced author and education consultant who has written for a wide range of KS3 and GCSE materials. He was previously a Head of Department for many years.

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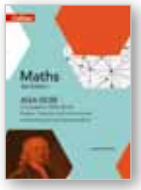
Skills Books AO2 and AO3 extra practice		Foundation 978-0-00-811386-5 Jun 2015 • £7.99		Higher 978-0-00-811385-8 Apr 2015 • £7.99
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