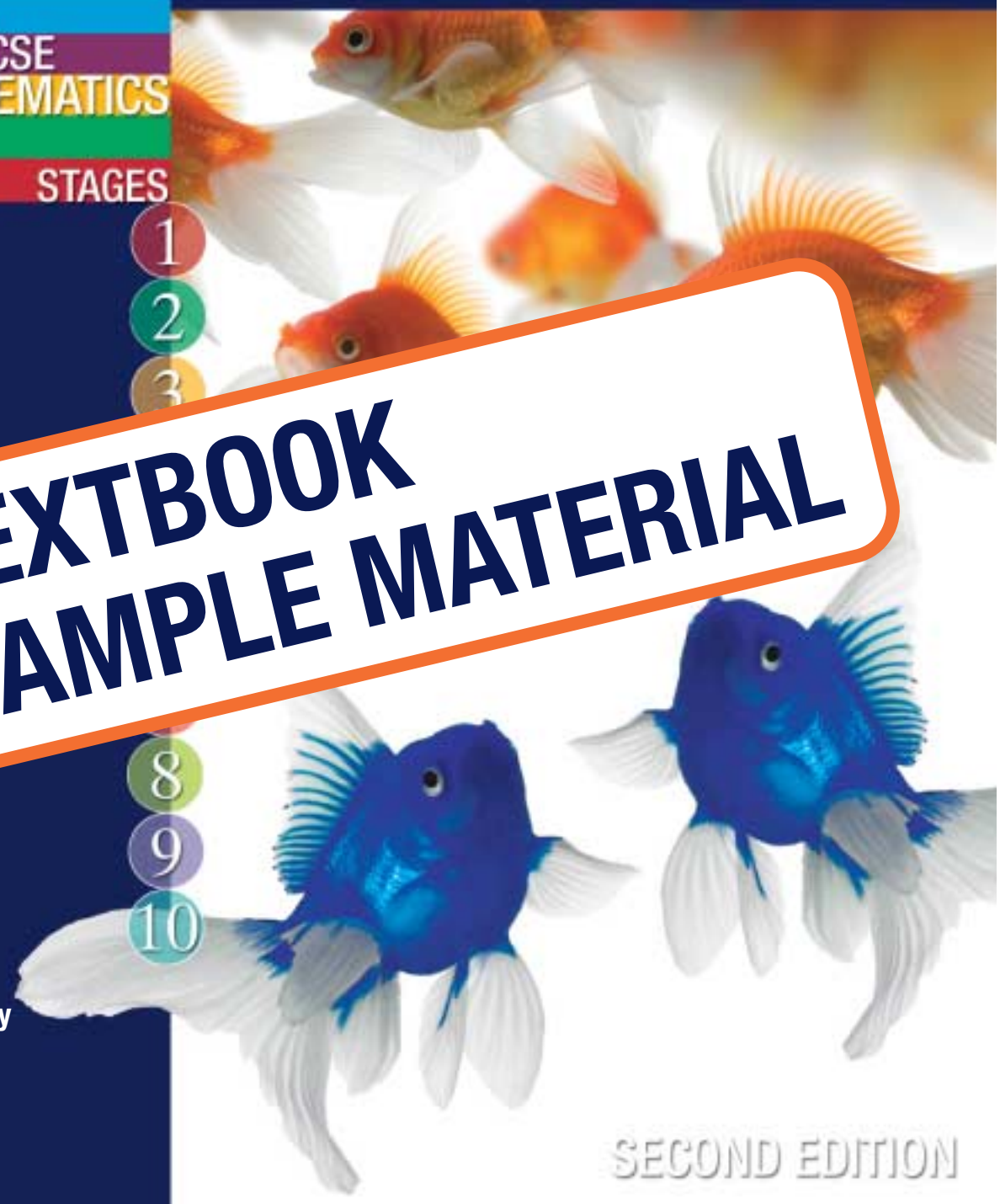
SERIES EDITOR: BRIAN SEAGER

GRADUATED ASSESSMENT

OCR GCSE MATHEMATICS

STAGES 1 2 3 8 9 10



- Howard Baxter
- Michael Handbury
- John Jeskins
- Jean Matthews
- Mark Patmore

SECOND EDITION

19 Drawing graphs using tables

You will learn about

- Using tables for linear equations
- Drawing graphs of linear equations

You should already know

- How to plot points in all four quadrants
- How to draw lines such as $y = 2$ and $x = -1$
- How to substitute in equations

Tables of values

$y = 2x$, $y = 3x + 1$, $y = 4x - 2$ and $y = -3x + 4$ are all equations of straight lines.

To plot the line you can choose whatever values of x you like and make a table of values.

EXAMPLE 1

Copy and complete this table for the equation $y = 2x$.

x	-3	-2	-1	0	1	2	3
$y = 2x$							

To find the y-value you multiply the x-value by 2.

For example, when $x = -3$, $y = 2 \times -3 = -6$.

x	-3	-2	-1	0	1	2	3
$y = 2x$	-6	-4	-2	0	2	4	6

As there is only one term for y, the table is very simple.

Pages 159–160 not included

C CHALLENGE 1

a) Can you spot a pattern in the results for Examples 1 to 3?

b) Explain the pattern.

c) What pattern would you get for these equations?

i) $y = 4x$ **ii)** $y = 6x - 9$ **iii)** $y = {}^{-}7x + 16$

EXERCISE 19.1

1 Copy and complete this table for the equation $y = 3x$.

x	$^{-}3$	$^{-}2$	$^{-}1$	0	1	2	3
$y = 3x$		$^{-}6$					9

2 Copy and complete this table for the equation $y = 5x - 3$.

x	$^{-}3$	$^{-}2$	$^{-}1$	0	1	2	3
$5x$		$^{-}10$					
-3		$^{-}3$					
$y = 5x - 3$		$^{-}13$					

3 Copy and complete this table for the equation $y = 4x + 2$.

x	$^{-}3$	$^{-}2$	$^{-}1$	0	1	2	3
$4x$							
$+2$							
$y = 4x + 2$							

4 Copy and complete this table for the equation $y = x + 2$.

x	$^{-}4$	$^{-}3$	$^{-}2$	$^{-}1$	0	1	2
$+2$							
$y = x + 2$							

Pages 162–165 not included

C CHALLENGE 2

To hire a mini-bus, Delaney's Cabs charge £20 plus £2 a mile and Tracey's Cars charge £50 plus £1·50 a mile.

C is the charge and n is the number of miles.

For Delaney's Cabs the equation is $C = 2n + 20$.

For Tracey's Cars the equation is $C = 1{\cdot}5n + 50$.

a) On the same graph, draw a line for each equation for values of n up to 100.

b) Use your graph to find the number of miles for which the two firms charge the same amount.

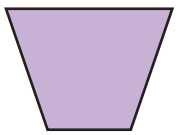
K KEY IDEAS

- To draw a straight-line graph, first make a table of values.
- Always work out at least three points.

Revision Exercise

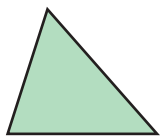
1 State the order of rotation symmetry of each of these shapes.

a)

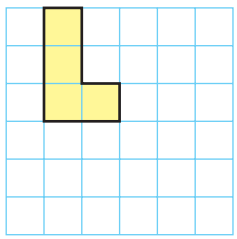


b)

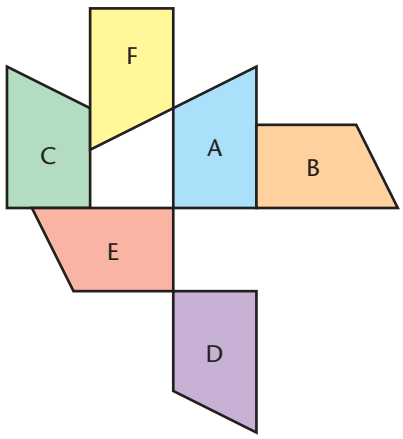
c)



2 Copy and complete this pattern so that it has rotation symmetry of order 4.



3 Which of these shapes are rotations of shape A?



4 **a)** Plot the points (4, 6), (6, 6) and (6, 3) and join them to make a triangle. Label it A.
b) Plot the points (1, 1), (4, 3), and (1, 3) and join them to make a triangle. Label it B.
c) Through what angle do you rotate triangle A to fit it on to triangle B?

5 Find these.
a) 14 as a percentage of 35
b) £48 as a percentage of £400
c) 20 cm as a percentage of 4 m

6 Find £2·50 as a percentage of £31. Give your answer correct to the nearest 1%.

7 Find 40 cm as a percentage of 3 m. Give your answer correct to 1 decimal place.

8 Promo washing powder used to cost £3·60 for a large packet. The price was increased to £3.87.
What percentage increase was this?

9 Stephen bought an apartment in London for £310 000. He sold it two years later for £305 000.
What was his percentage loss? Give your answer correct to 1 decimal place.

10 Draw the graph of $y = 2x - 7$ for values of x from 0 to 6.

11 The cost £C of an advert in a newspaper is given by the formula $C = 10 + 3n$, where n is the number of lines.
a) Draw the graph of $C = 10 + 3n$ for values of n from 0 to 40.
b) From the graph find the value of n when $C = 55$. Give your answer correct to the nearest whole number.

6 Fractions

You will learn about

- Ordering fractions
- Adding and subtracting fractions
- Adding and subtracting mixed numbers

You should already know

- How to find equivalent fractions
- How to convert between improper fractions and mixed numbers

Ordering fractions

To put fractions in order, change them to equivalent fractions all with the same denominator and order them by the numerator.

EXAMPLE 1

Which is the bigger, $\frac{3}{4}$ or $\frac{5}{6}$?

First find a common denominator. 24 is an obvious one, as $4 \times 6 = 24$, but a smaller one is 12.

So convert both fractions into $\frac{1}{12}$ths.

$$\frac{3 \times 3}{4 \times 3} = \frac{9}{12}, \qquad \frac{5 \times 2}{6 \times 2} = \frac{10}{12}$$

$\frac{10}{12}$ is bigger than $\frac{9}{12}$, so $\frac{5}{6}$ is bigger than $\frac{3}{4}$.

EXAM TIP

Multiplying the two denominators together will always work to find a common denominator but the lowest common multiple is sometimes smaller.

Pages 51–52 not included

The diagram shows $\frac{1}{4} - \frac{1}{5}$

5 squares – 4 squares = 1 square = $\frac{1}{20}$

This can be written as $\frac{1}{4} - \frac{1}{5} = \frac{5}{20} - \frac{4}{20} = \frac{1}{20}$

Change both fractions so that they have the same denominator, as with adding, but then subtract the numerators.

EXAM TIP

When adding or subtracting fractions, change to equivalent fractions all with the same denominator and add or subtract the numerators. The most common error is to add the denominators and add the numerators.

EXAMPLE 4

Work out these.

a) $\frac{3}{5} - \frac{2}{5}$ **b)** $\frac{3}{4} - \frac{2}{3}$ **c)** $\frac{5}{6} + \frac{1}{4} - \frac{1}{3}$

a) $\frac{3}{5} - \frac{2}{5} = \frac{1}{5}$ They have the same denominator so just subtract the numerators.

b) $\frac{3}{4} - \frac{2}{3} = \frac{9}{12} - \frac{8}{12}$ 4 and 3 both divide into 12, so make 12 the denominator for both.

$= \frac{1}{12}$ Multiply $\frac{3}{4}$ by 3 top and bottom and $\frac{2}{3}$ by 4 top and bottom.

c) $\frac{5}{6} + \frac{1}{4} - \frac{1}{3} = \frac{10}{12} + \frac{3}{12} - \frac{4}{12}$ All the denominators divide into 12 so make the common denominator 12.

$= \frac{9}{12}$

$= \frac{3}{4}$ Write the answer in its lowest terms.

A ACTIVITY 1

a) Use shading in a rectangle with 12 squares to show the addition $\frac{1}{6} + \frac{3}{4}$.

Then write the working using common denominators.

b) Use shading in a rectangle with 24 squares to show the subtraction $\frac{5}{8} - \frac{1}{3}$.

Then write the working using common denominators.

EXERCISE 6.2

1 Copy and complete these equivalent fractions.

a) $\frac{3}{8} = \frac{6}{\square} = \frac{\square}{24}$

b) $\frac{4}{11} = \frac{12}{\square} = \frac{\square}{55}$

2 Write these fractions in their lowest terms.

a) $\frac{7}{35}$ **b)** $\frac{24}{54}$

c) $\frac{18}{72}$ **d)** $\frac{40}{64}$

3 Add these fractions.

a) $\frac{1}{8} + \frac{1}{8}$ **b)** $\frac{1}{8} + \frac{3}{8}$

c) $\frac{1}{4} + \frac{1}{8}$ **d)** $\frac{1}{2} + \frac{3}{8}$

e) $\frac{5}{8} + \frac{1}{4}$

4 Subtract these fractions.

a) $\frac{3}{8} - \frac{1}{8}$ **b)** $\frac{5}{8} - \frac{3}{8}$

c) $\frac{1}{4} - \frac{1}{8}$ **d)** $\frac{1}{2} - \frac{3}{8}$

e) $\frac{5}{8} - \frac{1}{4}$

5 Add these fractions.

a) $\frac{1}{10} + \frac{1}{10}$ **b)** $\frac{1}{10} + \frac{3}{10}$

c) $\frac{1}{5} + \frac{1}{10}$ **d)** $\frac{1}{2} + \frac{3}{10}$

e) $\frac{3}{10} + \frac{2}{5}$

6 Subtract these fractions.

a) $\frac{3}{10} - \frac{1}{10}$ **b)** $\frac{5}{10} - \frac{3}{10}$

c) $\frac{1}{5} - \frac{1}{10}$ **d)** $\frac{1}{2} - \frac{3}{10}$

e) $\frac{7}{10} - \frac{2}{5}$

7 Add these fractions.

a) $\frac{2}{3} + \frac{1}{3}$ **b)** $\frac{1}{3} + \frac{1}{2}$

c) $\frac{3}{5} + \frac{1}{4}$ **d)** $\frac{1}{6} + \frac{2}{3}$

e) $\frac{2}{5} + \frac{3}{8}$ **f)** $\frac{3}{4} + \frac{1}{6}$

8 Add these fractions.

a) $\frac{2}{7} + \frac{4}{7}$ **b)** $\frac{1}{3} + \frac{1}{6}$

c) $\frac{2}{3} + \frac{1}{4}$ **d)** $\frac{1}{5} + \frac{3}{4}$

e) $\frac{3}{8} + \frac{1}{5}$ **f)** $\frac{3}{4} + \frac{2}{5}$

9 Subtract these fractions.

a) $\frac{2}{7} - \frac{1}{7}$ **b)** $\frac{5}{6} - \frac{1}{3}$

c) $\frac{2}{3} - \frac{1}{4}$ **d)** $\frac{11}{12} - \frac{2}{3}$

e) $\frac{5}{8} - \frac{1}{3}$ **f)** $\frac{7}{9} - \frac{5}{12}$

10 Subtract these fractions.

a) $\frac{3}{4} - \frac{1}{4}$ **b)** $\frac{1}{2} - \frac{1}{3}$

c) $\frac{3}{4} - \frac{3}{5}$ **d)** $\frac{3}{4} - \frac{1}{6}$

e) $\frac{3}{5} - \frac{1}{2}$ **f)** $\frac{7}{8} - \frac{2}{3}$

11 Add these fractions.

a) $\frac{1}{8} + \frac{1}{8} + \frac{1}{8}$ **b)** $\frac{1}{8} + \frac{3}{8} + \frac{1}{4}$

c) $\frac{1}{4} + \frac{1}{8} + \frac{1}{8}$ **d)** $\frac{1}{2} + \frac{1}{8} + \frac{3}{8}$

e) $\frac{1}{8} + \frac{1}{4} + \frac{1}{8}$

12 Add these fractions.

a) $\frac{1}{12} + \frac{1}{12} + \frac{3}{12}$ **b)** $\frac{1}{12} + \frac{1}{4} + \frac{1}{3}$

c) $\frac{1}{4} + \frac{5}{12} + \frac{1}{6}$ **d)** $\frac{1}{10} + \frac{1}{5} + \frac{3}{10}$

e) $\frac{1}{5} + \frac{1}{20} + \frac{3}{10}$

13 Work out these.

a) $\frac{1}{2} + \frac{3}{8}$ **b)** $\frac{4}{9} + \frac{1}{3}$

c) $\frac{5}{6} - \frac{1}{4}$ **d)** $\frac{11}{12} - \frac{2}{3}$

e) $\frac{4}{5} + \frac{1}{2}$ **f)** $\frac{5}{7} + \frac{3}{4}$

14 Work out these.

a) $\frac{8}{9} - \frac{1}{6}$ **b)** $\frac{7}{10} + \frac{4}{5}$

c) $\frac{8}{9} + \frac{5}{6}$ **d)** $\frac{7}{15} + \frac{3}{10}$

e) $\frac{4}{9} - \frac{1}{12}$ **f)** $\frac{7}{20} + \frac{5}{8}$

15 Work out these.

a) $\frac{4}{5} + \frac{7}{10} - \frac{3}{5}$ **b)** $\frac{3}{5} + \frac{5}{6} - \frac{2}{3}$

c) $\frac{2}{3} + \frac{3}{4} - \frac{1}{2}$ **d)** $\frac{2}{5} + \frac{5}{8} - \frac{3}{4}$

e) $\frac{1}{5} + \frac{3}{10} - \frac{1}{2}$ **f)** $\frac{3}{7} + \frac{5}{14} - \frac{1}{2}$

16 Work out these.

a) $\frac{3}{5} + \frac{2}{5} - \frac{7}{10}$ **b)** $\frac{1}{4} + \frac{3}{8} - \frac{1}{6}$

c) $\frac{1}{6} + \frac{2}{3} - \frac{1}{4}$ **d)** $\frac{5}{8} + \frac{3}{5} - \frac{3}{4}$

e) $\frac{3}{4} - \frac{5}{6} + \frac{2}{3}$ **f)** $\frac{3}{20} - \frac{2}{5} + \frac{3}{4}$

Contents lists for each stage

Stage 1

1 Numbers
2 Probability
A1 Revision exercise
3 Direction and position
4 Scales
B1 Revision exercise
5 Algebra patterns and using letters for numbers
6 Solving problems
C1 Revision exercise
7 Shapes
8 Units, perimeter, area and volume
D1 Revision exercise
9 Representing data
10 Listing
E1 Revision exercise

Stage 2

1 Using decimals
2 Sequences
3 Angles
4 Multiplication and division
A1 Revision exercise
5 Mass or weight
6 Probability
7 Percentages
8 Negative numbers
B1 Revision exercise
9 Estimating lengths and angles
10 Solids
11 Median and mode
12 Formulae
C1 Revision exercise
13 Drawing reflections
14 Maps and plans
15 Two-way tables
D1 Revision exercise

Stage 3

1 Multiplying with decimal numbers
2 Time
3 Powers, roots, multiples and factors
4 Formulae
A1 Revision exercise
5 Estimating and reading scales
6 Fractions
7 Probability
8 Conversion graphs
B1 Revision exercise
9 Equations
10 Mean and range
11 Percentage
12 Drawing three-dimensional shapes
C1 Revision exercise
13 Collecting and illustrating data
14 Order of operations
15 Scale drawings
16 Enlargement
D1 Revision exercise

Stage 4

1 Decimals, fractions and percentages
2 Coordinates
3 Sequences
4 Problems involving decimals
A1 Revision exercise
5 Averages and range
6 Multiplying and dividing without a calculator
7 Writing formulae
8 Angle properties
B1 Revision exercise
9 Reading from graphs
10 Factors and multiples
11 Area
12 Probability
C1 Revision exercise
13 Reflection
14 Ratio and proportion
15 Rotational symmetry
16 Solving problems
17 Metric and imperial measurements
D1 Revision exercise

Stage 5

1 Cuboids
2 Rounding numbers and estimating
3 Index notation
4 Substitution
A1 Revision exercise
5 Maps, bearings and scale drawings
6 Solving equations
7 Estimation
8 Pie charts
B1 Revision exercise
9 Fractions
10 Listing events and probability
11 Classifying quadrilaterals
12 Simplifying algebra
C1 Revision exercise
13 Constructing triangles
14 Interpreting statistical data and measures
15 Positive and negative integers
16 Fractions, decimals and percentages
D1 Revision exercise
17 Rotations
18 Working with percentages
19 Drawing graphs using tables
E1 Revision exercise

Stage 6

1 Using a calculator effectively
2 Brackets and factors
3 Angles
4 Probability
5 Translations
A1 Revision exercise
6 Fractions
7 Plans and elevations
8 Ratio
9 Solving equations
10 Powers and indices
11 Circles
B1 Revision exercise
12 Scatter diagrams
13 Rotations
14 Multiplying and dividing fractions
15 Decimals
16 Linear graphs
17 Real-life graphs
C1 Revision exercise
18 Drawing triangles and other shapes
19 Area and perimeter
20 Volume and surface area
21 Grouping data
22 Enlargement
23 Transformations
D1 Revision exercise

Stage 7

1 Coordinates
2 Percentages
3 Ratio and proportion
4 Probability
5 Using and generating formulae
A1 Revision exercise
6 Solving angle problems
7 Direct proportion
8 Checking solutions and calculations
9 Scatter diagrams and correlation
10 Pythagoras' theorem
B1 Revision exercise
11 Quadratic graphs
12 Finding the mean of grouped data
13 Equations and inequalities 1
14 Compound measures
15 Reciprocals, factors and multiples
C1 Revision exercise
16 Circles and tangents
17 Changing the subject of a formula
18 Equations and inequalities 2
19 Loci
20 Decimals
D1 Revision exercise
21 Accuracy
22 Indices
23 Trial and improvement
24 Sequences
25 Expanding brackets
26 Prisms
E1 Revision exercise

Stage 8

1 Fractions
2 Cubic and reciprocal graphs
3 Probability
4 Equations and inequalities
A1 Revision exercise
5 Percentage increase and decrease
6 Linear inequalities
7 Cumulative frequency and box plots
8 Repeated percentage and proportionate change
B1 Revision exercise
9 Transformations
10 Simultaneous equations
11 Significant figures and standard form
12 The equation of a straight-line graph
C1 Revision exercise
13 Similar figures
14 Comparing distributions
15 Trigonometry
16 Dimensions
D1 Revision exercise
17 Quadratics
18 Time series and moving averages
19 Equations and formulae
E1 Revision exercise

Stage 9

1 Checking answers
2 Algebraic manipulation
3 Proportion and variation
A1 Revision exercise
4 Indices
5 Rearranging formulae
6 Arcs, sectors and volumes
7 Upper and lower bounds
B1 Revision exercise
8 Volumes and surface areas of similar figures
9 Probability
C1 Revision exercise
11 Histograms
12 Circle properties
13 The equation of a straight-line graph
14 Surveys and sampling
D1 Revision exercise

Stage 10

1 Growth and decay
2 Using graphs to solve equations
3 Rational and irrational numbers
4 Trigonometry in non-right-angled triangles
A1 Revision exercise
5 Trends and time series
6 Proving and using congruency
7 Calculating the roots of an equation
8 Surface areas and complex shapes
B1 Revision exercise
9 Working with algebraic fractions
10 Vectors
11 Comparing sets of data
12 Simultaneous equations
C1 Revision exercise
13 Trigonometrical functions
14 Transforming functions
15 Probability
D1 Revision exercise

OCR GCSE MATHEMATICS

THE COMPLETE COURSE
GRADUATED ASSESSMENT

STAGE 1&2
Student's Book: 0340 91591 9
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Homework Book: 0340 91586 2

STAGE 3&4
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Teacher's Resource: 0340 91597 8
Homework Book: 0340 91587 0

STAGE 5
Student's Book: 0340 91593 5
Teacher's Resource: 0340 91598 6
Homework Book: 0340 91588 9

STAGE 6
Student's Book: 0340 92751 8
Teacher's Resource: 0340 92753 4
Homework Book: 0340 92755 0

STAGE 7
Student's Book: 0340 91594 3
Teacher's Resource: 0340 91599 4
Homework Book: 0340 91589 7

STAGE 8
Student's Book: 0340 92752 6
Teacher's Resource: 0340 92754 2
Homework Book: 0340 92756 9

STAGE 9&10
Student's Book: 0340 91595 1
Teacher's Resource: 0340 91600 1
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