



CONTENTS

Introduction	iv
Assessment	
1 Working with whole numbers	1
2 Fractions and decimals	2
3 Ratios and percentages	4
4 Powers, roots and reciprocals	6
5 Working with algebra	7
6 Algebraic equations	8
7 Graphs of straight lines	10
8 Simultaneous equations	12
9 Inequalities	13
10 Number sequences	14
11 Travel and other graphs	16
12 Working with shape and space	18
13 Circles and cylinders	20
14 Constructions and loci	22
15 Transformation and similarity	23
16 Pythagoras' theorem	25
17 Introducing trigonometry	26
18 2-D and 3-D objects	27
19 Circle theorems	28
20 Collecting data	30
21 Working with data	32
22 Probability	35
23 Using a calculator efficiently	36
24 Direct and inverse proportion	37
25 Quadratic equations	39
26 Advanced algebra	40
27 Further trigonometry	41
28 Graphs of curves	43
29 Vectors	45
30 Mathematical proof	46
31 Introducing coordinate geometry	47
32 Further probability and statistics	48
Answers to Assessments	49
Practice Examination Papers	
Paper 3	61
Mark Scheme for Paper 3	77
Paper 4	81
Mark Scheme for Paper 4	97
Answers to Higher Homework Exercises	101





CHAPTER 1

Working with whole numbers



Do not use a calculator for questions 1 to 12.

- Work out the answers to these multiplications. Show your method clearly.
a) 27×6 b) 45×12 c) 144×26
- Work out the answers to these divisions. Show your method clearly.
a) $72 \div 8$ b) $574 \div 14$ c) $851 \div 23$
- Write down three numbers that are multiples of 5 but not multiples of 3.
- Write down the highest common factor (HCF) for each of these pairs of numbers.
a) 12 and 20 b) 30 and 45 c) 18 and 30
- Work out the lowest common multiple (LCM) for each of these pairs of numbers.
a) 4 and 5 b) 6 and 8 c) 18 and 30
- The cost of a hockey stick is £14. Work out the cost of 23 of these hockey sticks.
- All the CDs in a shop are for sale at £7 each. Work out how many CDs you could buy for £100.
- A coach can seat 48 pupils and 7 teachers. A school hires 12 of these coaches.
a) Write down the total number of teachers that the 12 coaches can carry.
b) Work out the total number of pupils that the 12 coaches can carry. Show your method clearly.
- Copy the statement below and insert brackets to make it true.
 $5 + 2 \times 3 + 6 = 23$
- Write down all the factors of 42.
- You are given that $x = 2^4 \times 3^2$.
a) Express x as an ordinary number.
b) Express \sqrt{x} as an ordinary number.
c) Express \sqrt{x} as a product of primes, that is, in the form $2^a \times 3^b$.
- * When a large jar of sweets is shared out equally between 16 children, they each get 33 sweets. An identical jar of sweets is shared out equally between 22 children. Work out how many sweets each child gets.



You may use a calculator for questions 13 to 20.

- Andy buys three identical car tyres. The total cost of these three tyres is £255. Work out the total cost of eight of these tyres.
- Find all the factors of 120.
- a) Express 48 and 72 as products of their prime factors.
b) Use your answer to a) to work out the highest common factor (HCF) of 48 and 72.
- The number 1584 can be written as $2^x \times 3^y \times p$, where x and y are whole numbers and p is a prime number. Work out the values of x , y and p .
- Express 360 as a product of its prime factors.
- Find the lowest common multiple (LCM) of 44 and 55.
- a) Express 45 and 75 as products of their prime factors.
b) Use your answer to a) to work out the lowest common multiple (LCM) of 45 and 75.
- * Bethany is counting the coins in her moneybox. The coins are 50p, 10p or 2p. There are equal numbers of each of the three types of coin. Bethany has £8.06 in her moneybox altogether. Work out how many coins she has in her moneybox.



Fractions and decimals



Do not use a calculator for questions 1 to 17.

- 1 Work out the answers to these additions.
 a) $\frac{1}{4} + \frac{2}{5}$ b) $4\frac{1}{3} - 1\frac{3}{4}$ c) $\frac{3}{7} \times \frac{5}{6}$
- 2 $43 \times 164 = 7052$
 Use this information to write down the answers to:
 a) 430×1.64
 b) 0.43×0.164
 c) $705.2 \div 16.4$
- 3 Write down two different fractions that lie between $\frac{1}{2}$ and $\frac{3}{4}$.
- 4 A company sends out 32 packages to its customers. Each package weighs 12.3 kg. Work out the total weight of all 32 packages.
- 5 The list below gives six fractions and their decimal equivalents, jumbled up. Match each fraction with its decimal equivalent.
- | |
|--|
| $\frac{3}{5}$, 0.85, 0.72, 0.6, $\frac{11}{20}$, 0.75, |
| $\frac{17}{20}$, $\frac{3}{4}$, 0.875, 0.55, $\frac{18}{25}$, $\frac{7}{8}$ |
- 6 Write these lists of numbers in order of size. Start with the smallest number.
 a) $\frac{2}{3}$, $\frac{5}{6}$, $\frac{1}{4}$, $\frac{4}{5}$
 b) 3.1, 3.04, 0.34, 3.14, 3.004
- 7 a) Write the fraction $\frac{17}{125}$ as an exact decimal.
 b) Write the terminating decimal 0.52 as an exact fraction, in its lowest terms.
- 8 a) Work out $\frac{5}{6} - \frac{1}{4}$.
 You must show all your working.
 b) Work out $3\frac{3}{4} \times 4\frac{7}{9}$.
 Show your method clearly.
- 9 Work out the answers to these multiplications.
 a) $\frac{3}{4} \times 48$ b) $1\frac{2}{3} \times 5$ c) $2\frac{1}{2} \times 3\frac{1}{5}$
- 10 Work out the answers to these multiplications.
 a) 16.2×6 b) 18.4×2.5 c) 3.7×2.7
- 11 Find the total weight of 12 drawing pins if each pin weighs 8.3 grams.
- 12 Work out 60% of $\frac{3}{5}$.
 Give your answer as a fraction.

- 13 Simon spends $\frac{2}{3}$ of his money on clothes, $\frac{1}{4}$ of his money on CDs and the remaining £5 on a burger meal.
 How much does he spend altogether?
- 14 United's soccer ground could hold 48 000 fans, but it was only three-quarters full last Saturday. City's ground could hold 45 000 fans, and it was four-fifths full last Saturday.
 Karl says, 'There were more people at United's ground.'
 Anya says, 'There were more people at City's ground.'
 Marlon says, 'There were the same number of people at each ground.'
 Explain who is right. You must show your working.
- 15 Write $0.4\dot{5}$ as an exact fraction.
 Give your answer in its simplest form.
- 16 A school Maths department spends 70% of its budget on books and $\frac{2}{3}$ of the rest on photocopying. It has £600 left.
 Work out the total budget for the department.
- 17 Write $4.0\dot{1}\dot{5}$ as a mixed number.
 Give your answer in its simplest form.



You may use a calculator for questions 18 to 20.

- 18 A soccer pitch is in the shape of a rectangle. The length is measured to be 85 metres and the width is 32 metres.
 a) Taking these measurements to be exact, work out the area of the pitch.
 b) Work out the smallest possible area of the pitch, if these measurements are each correct to the nearest metre.
- 19 a) Use your calculator to work out the value of this expression.
- $$\frac{4.1 + 3.7^2}{14.6 - 1.5 \times 1.4}$$
- Write down all the figures on your calculator display.
 b) Round your answer to a) so that it is correct to 3 significant figures.
 c) Copy and put brackets into the following expression so that its value is 16.1.
 $3.2 + 1.8 \times 3.5 - 1.4$





20* When $\frac{1}{19}$ is written as a decimal, it has a recurring pattern 18 digits long. The same is true of $\frac{2}{19}, \frac{3}{19}$ and so on, but the recurring pattern begins in a different place.

- a)** Use your calculator to find the decimal equivalents for the fractions $\frac{1}{19}, \frac{2}{19}, \frac{3}{19}, \frac{16}{19}$ and $\frac{18}{19}$. Write each one to as many decimal places as possible.
- b)** Look at your results. Try to use them as a 'jigsaw' to build up all 18 digits in the decimal expansion of $\frac{1}{19}$. You might not need to use all the pieces.





CHAPTER 3

Ratios and percentages



Do not use a calculator for questions 1 to 10.

- Write each of these ratios in its simplest form.
a) $8 : 12$ b) $35 : 25$ c) $16 : 20 : 30$
- a) Share £140 in the ratio $3 : 4$.
b) Share £620 in the ratio $5 : 3 : 2$.
- There are 500 employees at a local insurance company. 32% of the employees are male.
a) Work out 32% of 500.
There are 210 telephonists.
b) Write 210 as a percentage of 500.
- a) Martin scored 32 out of 40 in a French test. What percentage is this?
b) He scored 70% in a Mathematics test. This test was out of 60 marks. How many marks did Martin score in the Mathematics test?
- Work out the simple interest on £3500 invested for 3 years at a rate of 4% per year.
- Bus fares have just been increased by 10%.
a) Work out the new fare for a journey that used to cost £1.20.
b) Work out the old fare for a journey that now costs £2.86.
- An *Ordnance Survey* Landranger map uses a scale of $1 : 50\,000$.
a) On a Landranger map two mountain tops are 6 cm apart. Work out the actual distance between the two mountain tops.
b) The actual distance between two towns is 9.6 km. Work out how far apart the two towns appear on a Landranger map.
- During the last month the shares in a company rose in value from 125 pence to 150 pence. Work out the percentage increase in value.
- The ratio of boys to girls in a sixth form college is $13 : 17$. There are 600 students at the college. Work out the number of boys at the college.
- a) Find:
(i) 10% of £350
(ii) 5% of £480
(iii) $2\frac{1}{2}$ % of £640
b) A DVD player costs £60 plus VAT at $17\frac{1}{2}$ %. Work out the total cost of the DVD player, including VAT.
Show all the steps in your working.



You may use a calculator for questions 11 to 20.

- Three chemicals, A, B and C, are mixed in the ratio $2 : 5 : 8$ to make a compound. Altogether, 250 grams of chemical A are used. Work out the total amount of the compound.
- When first built, a house was worth £220 000. One year later its value had increased to £250 000. Work out the percentage increase in value. Give your answer to the nearest whole number.
- A car costing £24 000 when new is worth £19 500 one year later. Work out the percentage depreciation.
- On a cruise ship, passengers travel in Luxury, Business or Economy class, in the ratio $2 : 7 : 11$. There are 460 passengers on the ship altogether.
a) How many passengers are travelling in Business class?
b) What percentage of the passengers is travelling in Economy class?
- Work out the compound interest on £3200 invested for 3 years at a rate of 6% per annum (compound).
- a) Write down the factor by which a number must be multiplied in order to increase by 12%.
(This is known as the *multiplying factor*.)
b) Write down the multiplying factor for a 15% increase.
c) A house increases in value by 12% in one year, then by 15% (of its new value) in the second year. Find the overall percentage increase for the two years.
- In a sale, all the prices are reduced by 15%.
a) A television was priced at £450 before the sale. Work out its price in the sale.
b) A computer is priced at £306 in the sale. Work out its price before the sale.
- In Fairlight School there are 380 boys and 456 girls.
a) Find the ratio of boys to girls. Give your answer as a ratio of two whole numbers, expressed as simply as possible.
b) Express your answer to a) in the form $1 : n$.





- 19** Anton earned £45 and saved 12% of it.
Beth earned a different amount and saved 8% of it.
Anton and Beth both saved exactly the same amount of money.
How much did Beth earn?
- 20*** My patio has a length of 4 metres and a width of 3 metres.
I extend it so that the length and width each increase by 10%.
- Explain carefully why the area does not increase by 10%.
 - Work out the correct percentage increase in the area.





INTRODUCTION

This Assessment Pack contains photocopy masters of questions designed to practise and consolidate examination-style questions for the Edexcel Linear GCSE Mathematics specification. The Pack is divided into two main parts.

The first part comprises 32 exercises of questions corresponding to the 32 chapters in the Hodder Murray Edexcel Higher GCSE Mathematics Student's Book. Each Assessment has been carefully arranged to demonstrate the variety of questions that might be encountered on that particular part of the specification. In each Assessment, an icon indicates whether or not a calculator should be used. Answers to the Assessments are given at the end of this part of the pack.

The second part contains two practice examination papers – Paper 3 is non-calculator and Paper 4 is calculator allowed. These have been written to the framework used by the board for when setting live papers. Each practice paper is accompanied by a full exam-style mark scheme, showing how marks would be awarded by a GCSE examiner. The mark scheme also matches each question to the corresponding part of the specification and its target grade.

Students should be encouraged to write down all the intermediate steps and make their methods clear in the spaces provided. This helps keep their own thoughts on target, and also allows the examiner to award part-marks in the event of the final answer not being correct – especially important in the calculator allowed paper.

Note that the 32 Assessments are intended to be done using additional file paper or exercise books. The two practice papers, however, are complete 'write-on' papers, with space for working and answers, like those that will be encountered in the exam.

Each of the two practice papers is designed to be done in two hours.

In addition, at the end of this book are the Answers to questions in the Higher Homework Book. A CD-ROM is included, containing everything in this book.





Answers to Assessments

Chapter 1: Working with whole numbers

- 1 a) 162 b) 540 c) 3744
 2 a) 9 b) 41 c) 37
 3 (for example) 5, 10, 20
 4 a) 4 b) 15 c) 6
 5 a) 20 b) 24 c) 90
 6 £322
 7 14
 8 a) 84 b) 576
 9 $5 + 2 \times (3 + 6) = 23$
 10 1, 2, 3, 6, 7, 14, 21, 42
 11 a) 144 b) 12 c) $2^2 \times 3^1$
 12* 24
 13 £680
 14 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120
 15 a) $48 = 2^4 \times 3^1$, $72 = 2^3 \times 3^2$ b) 24
 16 $x = 4$, $y = 2$, $p = 11$
 17 $2^3 \times 3^2 \times 5$
 18 220
 19 a) $45 = 3^2 \times 5^1$, $75 = 3^1 \times 5^2$ b) 225
 20* 39 coins

Chapter 2: Fractions and decimals

- 1 a) $\frac{13}{20}$ b) $2\frac{7}{12}$ c) $\frac{5}{14}$
 2 a) 705.2 b) 0.070 52 c) 43
 3 (for example) $\frac{5}{8}$, $\frac{5}{9}$
 4 393.6 kg
 5 $\frac{3}{5} = 0.6$, $\frac{11}{20} = 0.55$, $\frac{17}{20} = 0.85$, $\frac{3}{4} = 0.75$, $\frac{18}{25} = 0.72$,
 $\frac{7}{8} = 0.875$
 6 a) $\frac{1}{4}$, $\frac{2}{3}$, $\frac{4}{5}$, $\frac{5}{6}$ b) 0.34, 3.004, 3.04, 3.1, 3.14
 7 a) 0.136 b) $\frac{13}{25}$
 8 a) $\frac{7}{12}$ b) $17\frac{11}{12}$
 9 a) 36 b) $8\frac{1}{3}$ c) 8
 10 a) 97.2 b) 46 c) 9.99
 11 99.6 grams

- 12 $\frac{9}{25}$
 13 £60
 14 Marlon (both grounds had 36 000 fans)
 15 $\frac{5}{11}$
 16 £6000
 17 $4\frac{1}{66}$
 18 a) 2720 m² b) 2661.75 m²
 19 a) 1.4232 b) 1.42
 c) $(3.2 + 1.8) \times 3.5 - 1.4$
 20* a) $\frac{1}{19} = 0.05263157895$ $\frac{2}{19} = 0.1052631579$
 $\frac{3}{19} = 0.1578947368$ $\frac{16}{19} = 0.8421052632$
 $\frac{18}{19} = 0.9473684211$
 b) 0.052631578947368421

Chapter 3: Ratios and percentages

- 1 a) 2 : 3 b) 7 : 5 c) 8 : 10 : 15
 2 a) £60, £80 b) £310, £186, £124
 3 a) 160 b) 42%
 4 a) 80% b) 42 marks
 5 £420
 6 a) £1.32 b) £2.60
 7 a) 3 km b) 19.2 cm
 8 20%
 9 260 boys
 10* a) (i) £35 (ii) £24 (iii) £16
 b) $£60 + £6 + £3 + £1.50 = £70.50$
 11 1875 grams (1.875 kg)
 12 14%
 13 18.75%
 14 a) 161 b) 55%
 15 £611.25
 16 a) 1.12 b) 1.15 c) 28.8%
 17 a) £382.50 b) £360
 18 a) 5 : 6 b) 1 : 1.2
 19 £67.50
 20* a) Extending just the length would increase the area by 10%, then increasing the width increases the area by even more.
 b) $1.1 \times 1.1 = 1.21$ so the increase is 21%.





- 10 30 11 180 12 78.98
 13 9100 14 20 15 0.0562
 16 130 17 132.5 18 489 mm²
 19 Yes: the least 6400 can be is 6350.
 20 No: $49\,000 \neq 24\,000 \times 2$

- 9 5 10 10 11 2 12 2
 13 11 14 3 15 7 16 1
 17 441 18 13.7 19 166 20 512
 21 1480 22 17.6 23 4.47 24 7.94
 25 2.97 26 6.88 27 2.68 28 1.24
 29 15.8 30 6.3

Chapter 3: Ratios and percentages

Exercise 3.1

- 1 2 : 3 2 3 : 2
 3 5 : 2 4 6 : 5
 5 4 : 7 : 8 6 3 : 5 : 7
 7 2 : 7 : 9 8 5 : 8 : 20
 9 3 : 4 : 5 10 2 : 5 : 9
 11 £30, £50, £70 12 28, 36, 56
 13 10 cm, 15 cm, 35 cm 14 \$10, \$25, \$35
 15 6 kg, 36 kg, 48 kg 16 £120, £160, £240
 17 12 nuts 18 10 : 11 : 12
 19 a) £100 b) £850
 20 15 books (20p each; 24 books cost 22.5p each)
 21 9 carrots, 6 onions, 3600 ml stock, 225 g lentils,
 18 g thyme

Exercise 3.2

- 1 $\frac{13}{20}$ 2 $\frac{9}{10}$ 3 $\frac{9}{25}$ 4 $\frac{3}{40}$
 5 $\frac{3}{25}$ 6 $3\frac{2}{5}$ 7 $\frac{1}{8}$ 8 $\frac{2}{3}$
 9 56% 10 75% 11 95% 12 40%
 13 40% 14 40% 15 30% 16 45%
 17 $\frac{4}{11}$, 0.4, 41%, 0.42, $\frac{3}{7}$, 45%
 18 a) £8 b) 20%
 19 Bertie's ($73\frac{1}{3}\%$ beef) 20 25%

Exercise 3.3

- 1 424.8 2 61 540 3 3366 4 £50.75 5 $16\frac{2}{3}\%$
 6 a) £19 360 b) £13 193.30
 7 364 students
 8 a) £48.80 b) £7.32
 9 a) 25% loss b) $12\frac{1}{2}\%$ profit
 10 £234.90

Exercise 3.4

- 1 a) £23.80 b) £20
 2 £3120 3 £89.87
 4 a) 14.4 kg b) 80 kg
 5 1500 people 6 £68 000
 7 a) 135 b) 1100
 8 a) 2.4 m by 4 m b) 13.8 m²
 9 a) £5000 b) £1668
 10 a) 8.4 cm b) 5 cm c) 96%

Exercise 3.5

- 1 £576 2 £146.56 3 £50 4 £1528.13
 5 7% 6 £400 7 30 years 8 £1515.82
 9 a) Plan A (A = £354, B = £347.29)
 b) Plan B (A = £480, B = £488.67)
 10 20 years

Chapter 4: Powers, roots and reciprocals

Exercise 4.1

- 1 9 2 125 3 36 4 1
 5 64 6 216 7 100 8 0

Exercise 4.2

- 1 64 2 3 3 125 4 10
 5 8 6 256 7 20 8 30
 9 243 10 0.1 11 216 12 2
 13 32 800 14 373.2 15 7.53 16 0.0789
 17 2.06 18 7.14 19 4.454 20 0.974

Exercise 4.3

- 1 27 2 25 3 8 4 10 000
 5 1 6 8 7 128 8 0.04
 9 81 10 32 11 1000 12 36

Exercise 4.4

- 1 $\frac{1}{8}$ 2 $\frac{1}{49}$ 3 1 4 $\frac{1}{81}$
 5 $\frac{1}{125}$ 6 $\frac{1}{100}$ 7 $\frac{1}{8}$ 8 $\frac{1}{64}$
 9 $\frac{1}{9}$ 10 $\frac{1}{900}$ 11 $\frac{7}{8}$ 12 $\frac{17}{10}$ or $1\frac{7}{10}$
 13 $\frac{8}{27}$ 14 $\frac{36}{25}$ or $1\frac{11}{25}$ 15 81 16 $\frac{7}{9}$
 17 $\frac{11}{4}$ or $2\frac{3}{4}$ 18 $\frac{3}{10}$ 19 $\frac{25}{16}$ or $1\frac{9}{16}$ 20 $\frac{27}{64}$

Exercise 4.5

- 1 7^{14} 2 2^{16} 3 10^6
 4 5^{12} 5 8^5 6 9^{10}
 7 15^{80} 8 37^7 9 2.6^{15}
 10 58^5 11 6^{12} 12 9^4
 13 81 14 49 15 9
 16 125 17 64 18 64
 19 4096 20 64 21 1
 22 81 23 1 24 1 000 000

Exercise 4.6

- 1 2.76×10^5 2 1.28×10^3 3 7.3×10^4
 4 9×10^6 5 7.2×10^{-2} 6 4.63×10^{-3}
 7 6.1×10^{-1} 8 7.52×10^1 9 2.8703×10^2
 10 1.0×10^{-5} 11 72 000 12 3910
 13 0.06 14 0.405 15 573 000
 16 0.000 82 17 998.7 18 0.001 04
 19 0.000 02 20 67 673

Exercise 4.7

- 1 2.5×10^4 2 2.739×10^4 3 7.2×10^5
 4 -4.8×10^7 5 7.2×10^{16} 6 3.5×10^5
 7 7×10^8 8 5×10^8 9 1.42×10^{-9}
 10 2.34×10^{14} 11 5.61×10^{-3} 12 8.91×10^5
 13 1.76×10^{10} 14 -2.96×10^5 15 1.8×10^8

Chapter 5: Working with algebra

Exercise 5.1

- 1 a) 5 b) 10 c) -7 d) 1
 2 a) 36 b) 11 c) 7 d) 81
 3 a) 19 b) 36 c) 105 d) -6
 4 a) 37.4 b) 6
 5 a) 191 b) 11.3
 6 a) 14 b) 330.2

