

Oxford Revise GCSE Maths, Higher tier

Home-learning Pack: NUMBER

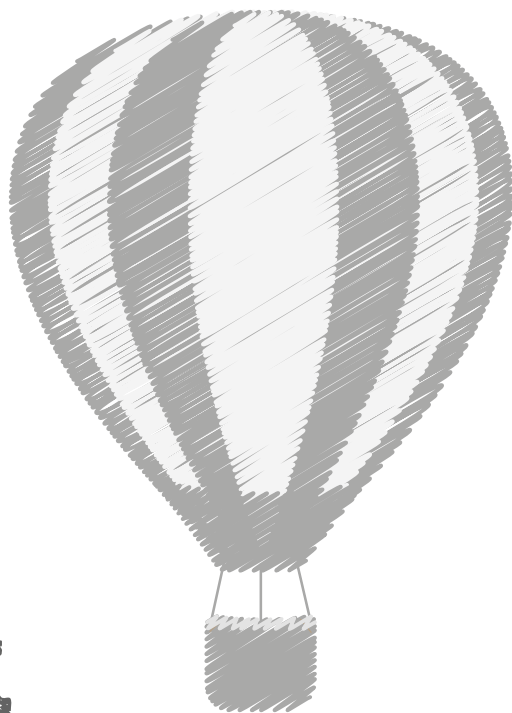
THIS PACK CONTAINS pages from the Higher Revision Workbook in the Oxford Revise series. It covers all the 'Number' topics within the GCSE Maths Higher tier specification. The full ebook can be accessed free [at this link](#). The print title can be found on Amazon [at this link](#). Comparable write-in Workbooks are available for both Edexcel and AQA Foundation and Higher GCSE Maths.

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Edexcel GCSE (9–1) Maths

Higher



Revision Workbook

Authors: Jemma Sherwood and Paul Hunt

Series Editor: Naomi Bartholomew-Millar

The Oxford Revise GCSE Maths Series: Our approach

Our no-fuss approach lets you dive straight into the practice you need for the exam. GCSE Grades help you monitor your own progress on every page, and 'Guided answers' at the back help you mark your own solutions. The practice exam papers come with guidance too: for every question we let you know which page to turn to for extra practice. And you'll find perfectly matched support on the exact same page in the revision guide.

Calculations

Grade
3



1. Work out

a) $25.043 - 17.82$

..... [I got ___ / 2 marks]

b) 7.4×0.26

..... [___ / 2 marks]

c) $17.12 \div 0.8$

..... [___ / 2 marks]

Grade
4



2. Work out

a) $(12 - 4 \times 2)^3$

..... [___ / 1 mark]

b) $\frac{4 \times 5^2}{4 \times 5 \div 2}$

..... [___ / 1 mark]

c) $5\sqrt{50 - 1} + 6 \times 3$

..... [___ / 1 mark]

d) $5 + (-3.2) \times 4$

..... [___ / 1 mark]

e) $(1 - 0.1) \times 4 - (-10)$

..... [___ / 2 marks]

f) $\frac{(-0.2) \times (-6)}{-1 + 0.7}$

..... [___ / 2 marks]

Grade
4



3. Supermarket A sells a pack of six vegan burgers for £4.65

Supermarket B sells a pack of eight for £6.59

Which supermarket is better value? Show your working.

..... [___ / 3 marks]

Grade
4



4. Marina's fence measures 1.4 m by 10.5 m. It costs £0.60 to paint the fence per square metre. How much does it cost to paint the fence in total?


£..... [___ / 3 marks]

Rounding & truncation

- Grade 3**
1. Round 20 193 to
- a) 4 significant figures
..... [I got ___ / 1 mark]
 - b) 3 significant figures
..... [___ / 1 mark]
 - c) 2 significant figures
..... [___ / 1 mark]
 - d) 1 significant figure.
..... [___ / 1 mark]

- Grade 3**
2. Round 0.006 802 to
- a) 1 significant figure
..... [___ / 1 mark]
 - b) 2 significant figures
..... [___ / 1 mark]
 - c) 3 significant figures.
..... [___ / 1 mark]

Hint
Where do significant figures start?

- Grade 3**
3. a) Calculate $\frac{1}{3} (0.02 \times 11.9)^2$. Write all the figures on your calculator display.
..... [___ / 1 mark]
- 
- b) Write your answer to part a
- i) truncated to 2 decimal places
..... [___ / 1 mark]
 - ii) rounded to 2 significant figures.
..... [___ / 1 mark]

- Grade 3**
4. One bag of grass seed covers an area of 3.66 m² and costs £4.99. Fabio needs grass seed for a lawn of 32 m². How much will the grass seed cost Fabio? Give your answer to the nearest pound.
..... [___ / 3 marks]

- Grade 4**
5. Shirley rounds 0.065 29 to 2 significant figures and gives the answer 0.07. Shirley is wrong. Explain why.
..... [___ / 1 mark]

Hint
Think about the difference between significant figures and decimal places.

Estimation

Grade
4



1. Estimate the value of $\frac{317 + 48.6}{9.683}$. Show your working.

Hint

Always round numbers before calculating.

..... [I got ___ / 2 marks]

Grade
4



2. Estimate the value of $\frac{2.67 \times 1.36}{0.11 + 0.42}$. Show your working.

..... [___ / 2 marks]

Grade
4



3. A biologist visits a lake at the start of January and works out that the number of fish in the lake is approximately 1000. She thinks that the population is growing at a rate of 17 fish per day. Estimate how many fish there will be in the lake five months later.

..... [___ / 3 marks]

Grade
5



4. In one week, an Italian restaurant sells 96 portions of lasagne. The restaurant sells a portion of lasagne for £8.95 and each portion costs £3.20 to make. Estimate the profit the restaurant makes from lasagne in the week.

£..... [___ / 3 marks]

Grade
5



5. James is driving to visit his Gran who lives 405 km away. He leaves at 8.30 am and drives at an average speed of 77 km/h, stopping for a 25-minute lunch break on the way. Estimate the time he arrives at his Gran's.

..... [___ / 3 marks]

Grade
6



6. Giving your answers to 1 decimal place, estimate the value of

a) $\sqrt{47}$

..... [___ / 1 mark]

b) $\sqrt{200}$

..... [___ / 1 mark]

Error intervals & bounds

Grade 5 1. The length, p m, of a football pitch is given as 110 m.
Write the error interval for p if this value is rounded to

a) the nearest 10 metres

..... $\leq p <$ [I got ___ / 2 marks]

b) the nearest 5 metres.

..... $\leq p <$ [___ / 2 marks]

Grade 5 2. A number, x , is given rounded to a particular degree of accuracy.
Write the error interval for x in each case.

a) $x = 4.67$ to 2 decimal places

..... $\leq x <$ [___ / 2 marks]

b) $x = 5000$ to 1 significant figure.

..... $\leq x <$ [___ / 2 marks]

Grade 5 3. A number, y , is given truncated. Write the error interval for y .

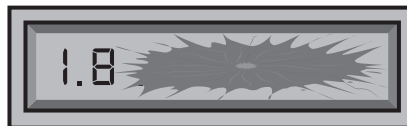
a) $y = 9$ truncated to an integer

..... $\leq y <$ [___ / 2 marks]

b) $y = 2.5$ truncated to 1 decimal place

..... $\leq y <$ [___ / 2 marks]

Grade 5 4. Sienna uses her calculator to answer a question. The display breaks and she can only see 1.8 at the start of her answer. Let x be the unknown number on the display and write the range of possible values for x as an error interval.



Hint
Remember your inequalities.

..... [___ / 2 marks]

Grade 7 5. The side length of a square is given as 15 cm to the nearest centimetre. Work out the error interval for the area, x cm², of the square.



..... [___ / 3 marks]

Grade 7 6. A car travels on the motorway at a speed of 110 km/h to 3 significant figures, for a distance of 45 km, correct to the nearest kilometre. By considering bounds, work out the time taken in hours to travel this distance to an appropriate degree of accuracy. Give a reason for your answer.



..... [___ / 5 marks]

Adding & subtracting fractions

Grade
3

1. Work out and simplify where possible



a) $\frac{2}{9} + \frac{5}{6}$

..... [I got ___ / 2 marks]

b) $3\frac{1}{6} - 2\frac{3}{4}$

..... [___ / 3 marks]

Grade
4

2. $\frac{1}{8}$ of the students in a class drive to school. $\frac{2}{3}$ of the students walk to school. The rest take the bus. What fraction of the students take the bus?



Hint
The whole class is represented by the number 1

..... [___ / 3 marks]

Grade
4

3. Daisy is building a model train track. Her track is $2\frac{4}{5}$ m long. She then takes out a piece of track which is $\frac{7}{8}$ m long and replaces it with a piece which is $1\frac{1}{20}$ m long. Work out the length of her track now.



.....m [___ / 3 marks]

Grade
4

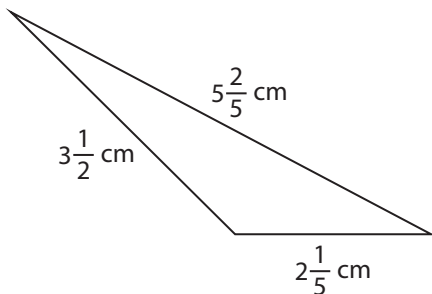
4. Maxwell is reading a book on his e-reader. When he picks it up one day, it tells him he is $\frac{1}{3}$ of the way through the book. He reads some and when he puts it down he is $\frac{3}{4}$ of the way through. What fraction of the book did he read?



..... [___ / 2 marks]

Grade
5

5. Work out the perimeter of the shape shown.




Hint
Add together the whole number parts and then add together the fraction parts.

.....cm [___ / 3 marks]


Multiplying & dividing fractions

Grade 3 1. A café uses up $\frac{2}{3}$ of a box of coffee beans every day. How many days will it take for it to use up 16 boxes of coffee beans?

 [I got ___ / 2 marks]

Grade 4 2. Work out and simplify where possible.


a) $1\frac{1}{2} \times 3\frac{5}{6}$

 [I got ___ / 3 marks]

b) $4\frac{4}{9} \div 2\frac{2}{3}$

..... [___ / 3 marks]


Grade 4 3. Rafael reserves $\frac{3}{10}$ of his monthly wage to pay his bills. $\frac{1}{4}$ of this amount is spent on his electricity bill.

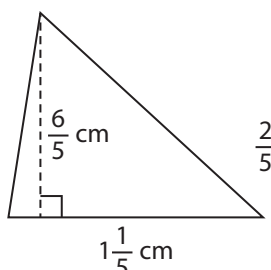
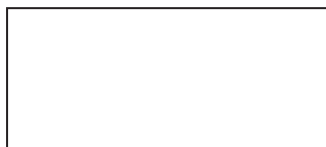
 What fraction of his monthly wage does Rafael spend on his electricity bill?

Hint
What calculation does the word 'of' represent?

..... [___ / 2 marks]

Grade 5 4. A triangle has base $1\frac{1}{5}$ cm and height $\frac{6}{5}$ cm. A rectangle has the same area as the triangle. If the width of the rectangle is $\frac{2}{5}$ cm, what is its length, x cm?

 Give your answer in its simplest form.

Hint
This question combines fractions and geometry. Find the area of the triangle. What is the same about both shapes?

.....cm [___ / 3 marks]

Grade 5 5. Vasiliki has a piece of material $3\frac{3}{4}$ m long. She is cutting it into smaller pieces of length $\frac{5}{6}$ m.

How many smaller pieces can she get, and what fraction of a metre will be left over?

Number of small pieces = Fraction left =m

Hint
You need to divide fractions here.

..... [___ / 3 marks]

Fractions, decimals & percentages

Grade
4



1. In Lin's class, 6 out of 25 children read fantasy books. In Jay's class, 8 out of 32 children read fantasy books. Lin says the proportion of children who read fantasy books is greater in her class than in Jay's. Is Lin correct? Explain your answer.

.....
.....

[___ / 2 marks]

Grade
5



2. Sally says that multiplying by 0.01 is the same as dividing by 100. Is Sally correct? Explain your reasoning.

.....

[___ / 1 mark]

Grade
6



3. Explain, using prime factors, why $\frac{11}{28}$ is a recurring decimal.

.....
.....

[___ / 2 marks]

Grade
6



4. Jonathan ran some park races last year. 15% of his races were 5 km runs, $\frac{7}{10}$ of his races were 10 km runs and the rest were half marathons. If he ran 20 races in total, how many were half marathons?

.....

[___ / 3 marks]

Grade
6

5. In a city, 5.5 out of every 22 square metres are used for housing and services. If housing takes up $\frac{5}{8}$ of this space, what percentage of the total area is used for services?

.....

[___ / 3 marks]

Recurring decimals

Grade
6

1. Express these fractions as decimals.



a) $\frac{1}{18}$

..... [I got ___ / 2 marks]

b) $\frac{20}{33}$

..... [___ / 2 marks]

c) $\frac{3}{7}$

..... [___ / 2 marks]

Grade
7

2. Prove algebraically that $0.\dot{5} = \frac{5}{9}$

Hint

Let $x = 0.\dot{5}$ and find $10x$

[___ / 2 marks]

Grade
7

3. Write $0.\dot{8}\dot{4}$ as a fraction in its simplest form.



..... [___ / 3 marks]

Grade
8

4. Prove algebraically that $0.0\dot{5}\dot{6} = \frac{28}{495}$

[___ / 3 marks]

Surds

Grade
7

1. Write these expressions in the form $a\sqrt{2}$, where a is an integer.



a) $\sqrt{18} - \sqrt{8}$

..... [I got ___ / 2 marks]

b) $\sqrt{200} + \sqrt{72} - \sqrt{98}$

..... [___ / 2 marks]

c) $3\sqrt{2} + 7\sqrt{32}$

..... [___ / 2 marks]

d) $\frac{14}{\sqrt{2}}$

..... [___ / 2 marks]

Grade
8

2. Write these expressions in the form $a + b\sqrt{3}$, where a and b are integers.



a) $(1 + \sqrt{3})^2$

..... [___ / 2 marks]

b) $\frac{8}{2 - \sqrt{3}}$

Hint

Multiply numerator and denominator by the denominator with a changed sign.

c) $\frac{\sqrt{3} - 1}{\sqrt{3} + 1}$

..... [___ / 3 marks]

..... [___ / 3 marks]

Grade
8

3. Show that $(\sqrt{11} - \sqrt{8})(\sqrt{11} + \sqrt{8}) = 3$

..... [___ / 3 marks]

Index notation

Grade
4

1. Peter says that $2^3 \times 5^2$ simplifies to 10^5 . Peter is wrong. Explain why.

[I got ___ / 1 mark]

Grade
5

2. Simplify $\frac{(2^7 \times 2^4)^{-1}}{2}$ fully and leave your answer in index form.



Hint

A power of -1 gives the reciprocal and a power of $\frac{1}{n}$ gives the n th root.

..... [___ / 2 marks]

Grade
6

3. Write in simplified index form



a) $\left(3^{\frac{1}{4}}\right)^{\frac{1}{4}}$

..... [___ / 1 mark]

b) $\sqrt[3]{5^2}$

..... [___ / 2 marks]

Grade
7

4. Work out



a) $\left(\frac{2}{5}\right)^3$

..... [___ / 1 mark]

b) $25^{\frac{1}{2}}$

..... [___ / 1 mark]

c) $8^{\frac{2}{3}}$

..... [___ / 2 marks]

d) $\left(\frac{16}{9}\right)^{-\frac{3}{2}}$

..... [___ / 3 marks]

Grade
8

5. $3 \times \sqrt{27} = 3^n$

Find the value of n

..... [___ / 3 marks]

Grade
9

6. $2^x \times 2^y = 64$ and $2^x \div 2^y = 4$

Find the values of x and y

Hint

Start by finding two simultaneous equations.

$x =$ $y =$ [___ / 4 marks]

Prime factor decomposition

Grade
4

1. Write 110 as a product of its prime factors.



..... [I got ___ / 2 marks]

Grade
4

2. a) Write 540 as a product of powers of its prime factors.



..... [___ / 2 marks]

b) By looking at its prime factors, explain why 540 is divisible by 15

Hint
What are the prime factors of 15?

..... [___ / 1 mark]

Grade
4

3. a) Write 750 as a product of its prime factors. Give your answer in index notation.



..... [___ / 2 marks]

b) By looking at its prime factors, explain why 750 is not divisible by 4

..... [___ / 1 mark]

Grade
5

4. The prime factor decomposition of a number, x , is $2 \times 3^2 \times 7 \times 13$



a) Is x even or odd? Explain your reasoning.

..... [___ / 1 mark]

b) What is the prime factor decomposition of a number twice as big as x ?

..... [___ / 1 mark]

Grade
5

5. A number is a multiple of 4, 5 and 6. Write the prime factor decomposition of the smallest number it could be.



..... [___ / 2 marks]

Finding HCF and LCM

Grade 4 1. a) Write 160 as a product of prime factors.
 [I got ___ / 2 marks]



b) Find the highest common factor of 160 and 280
 [___ / 2 marks]

c) Find the lowest common multiple of 160 and 280
 [___ / 2 marks]

Grade 5 2. Two numbers have prime factor decompositions $2^3 \times 5 \times 11$ and $2 \times 3^2 \times 5$
 Find
 a) the highest common factor of the two numbers
 [___ / 2 marks]

b) the lowest common multiple of the two numbers.
 [___ / 1 mark]

Grade 5 3. Fran is sorting her books into piles. She has 225 yellow books and 324 orange books. She does not want to mix the colours and wants every pile to contain the same number of books. Work out the biggest number of books she can put in each pile.
 [___ / 3 marks]



Grade 6 4. Two numbers, A and B , have prime factor decompositions $A = 2 \times 3 \times 7 \times x$ and $B = 2^2 \times 5^2$
 The highest common factor of the two numbers is 4
 a) Work out the value of x .
 [___ / 1 mark]

Hint
 How does the HCF relate to the prime factor decomposition?

b) Work out the value of the number A .
 [___ / 1 mark]

Standard form

Grade
3

1. Write these as ordinary numbers.



a) 1.56×10^8

..... [I got ___ / 1 mark]

b) 8.02×10^{-3}

..... [___ / 1 mark]

Grade
3

2. Write these numbers in standard form.



a) 48 000 000 000

..... [___ / 1 mark]

b) 0.000 0703

..... [___ / 1 mark]

c) 95×10^6

..... [___ / 1 mark]

d) 0.68×10^{-4}

..... [___ / 1 mark]

Grade
3

3. The distance from the Sun to Earth is approximately 150 000 000 km. Write this number in standard form.



..... km [___ / 1 mark]

Grade
4

4. Put these numbers in order of size, starting with the biggest.

2.1×10^4

2.3×10^5

0.21×10^4

2200



Hint

Write all the numbers in the same form.

..... [___ / 3 marks]

Grade
4

5. The size of a bacteria cell is 4×10^{-7} m and the size of a virus is 0.000 000 05 m. Which is smaller, the bacteria cell or the virus? Show your working.



..... [___ / 2 marks]

Grade
4

6. Here are the populations of four countries.

Angola: 31.8×10^6

Uzbekistan: 3.29×10^7

Malaysia: 31.9 million

Mongolia: 3.2×10^6



Which country has the largest population? Show your working.

..... [___ / 2 marks]

Calculating with standard form

Grade
5



1. Work out the value of each expression, giving your answers in standard form.

a) $(5 \times 10^4) + (6 \times 10^5)$

..... [I got ___ / 2 marks]

b) $(9 \times 10^{-3}) - (3 \times 10^{-4})$

..... [___ / 2 marks]

c) $(2.1 \times 10^8) \times (3 \times 10^{-5})$

..... [___ / 2 marks]

d) $(8.2 \times 10^3) \div (4.1 \times 10^7)$

..... [___ / 2 marks]

Grade
6



2. The MiG 25 fighter jet can fly at 4×10^3 km/h. How long would it take to travel a distance of 3000 km? Give your answer in minutes.

Hint
Remember that
 $\text{speed} = \frac{\text{distance}}{\text{time}}$

..... minutes [___ / 3 marks]

Grade
6



3. A region on a map forms the shape of a rectangle with width 1.2×10^2 km and length 7×10^3 km. Work out the area of this region in standard form.

..... km² [___ / 3 marks]

Grade
7



4. The circumference of Earth is 4.0075×10^9 cm. The circumference of another planet is 0.2 times the circumference of Earth.

Hint
Start by rounding the circumference of Earth.

a) Work out an estimate for the circumference of this planet. Give your answer in standard form.

..... cm [___ / 3 marks]

b) Is your answer in part a an underestimate or an overestimate? Explain your answer.

..... [___ / 1 mark]

Guided answers

Page 1, Calculations

$$1. \text{ a } \begin{array}{r} ^1 ^{14} ^1 \\ 25.043 \\ -17.820 \\ \hline 7.223 \end{array}$$

1 mark for lining up the digits correctly in columns;

1 mark for the correct answer.

$$\text{b } \begin{array}{r} 74 \\ \times 26 \\ \hline 444 \\ +1480 \\ \hline 1924 \end{array}$$

$$\text{Since } 74 \times 26 = 1924,$$

$$7.4 \times 0.26 = 1924 \div 10 \div 100 = 1.924$$

1 mark for multiplying 74×26 to get 1924; **1 mark** for the correct answer.

$$\text{c } 17.12 \div 0.8 = 171.2 \div 8$$

$$\begin{array}{r} 21.4 \\ 8 \overline{)171.2} \end{array}$$

$$171.2 \div 8 = 21.4$$

1 mark for dividing 171.2 by 8; **1 mark** for the correct answer.

$$2. \text{ a } (12 - 4 \times 2)^3 = (12 - 8)^3 = 4^3 = 64$$

1 mark for correct answer.

$$\text{b } \frac{4 \times 5^2}{4 \times 5 \div 2} = \frac{4 \times 25}{10} = \frac{100}{10} = 10$$

1 mark for correct answer.

$$\text{c } 5\sqrt{50-1} + 6 \times 3 = 5 \times \sqrt{49} + 6 \times 3 = 5 \times 7 + 6 \times 3 = 35 + 18 = 53$$

1 mark for correct answer.

$$\text{d } 5 + (-3.2) \times 4 = 5 + (-12.8) = -7.8$$

1 mark for correct answer.

$$\text{e } (1 - 0.1) \times 4 - (-10) = 0.9 \times 4 - (-10) = 3.6 - (-10) = 13.6$$

1 mark for 3.6; **1 mark** for the correct answer.

$$\text{f } \frac{(-0.2) \times (-6)}{-1 + 0.7} = \frac{1.2}{-0.3} = -4$$

1 mark for either 1.2 in the numerator or -0.3 in the denominator; **1 mark** for the correct answer.

$$3. \text{ Supermarket A: } £4.65 \div 6 = £0.775 \text{ per burger}$$

$$\text{Supermarket B: } £6.59 \div 8 = £0.82375 \text{ per burger}$$

$$0.775 < 0.82375$$

Therefore, Supermarket A is better value.

1 mark for 0.775; **1 mark** for 0.82375; **1 mark** for correct conclusion with full justification. Total 3 marks.

$$4. \text{ Area of fence} = 1.4 \times 10.5 = 14.7 \text{ m}^2$$

$$\text{Cost} = 14.7 \times 0.6 = £8.82$$

1 mark for multiplying lengths; **1 mark** for multiplying by cost per square metre; **1 mark** for correct answer. Total 3 marks.

Page 2, Rounding & truncation

$$1. \text{ a } 20190 \qquad \text{b } 20200$$

$$\text{c } 20000 \qquad \text{d } 20000$$

1 mark for each correct answer.

$$2. \text{ a } 0.007 \qquad \text{b } 0.0068 \qquad \text{c } 0.00680$$

1 mark for each correct answer.

$$3. \text{ a } 21.568361\dots$$

$$\text{b i } 22 \qquad \text{ii } 21.5$$

1 mark for each correct answer.

$$3. \text{ a } 0.0188813\dots$$

$$\text{b i } 0.01 \qquad \text{ii } 0.019$$

1 mark for each correct answer.

$$4. 32 \div 3.66 = 8.743\dots$$

He can only buy whole bags, so round up to the next integer: 9 bags.

$$\text{Total cost} = 9 \times 4.99 = £44.91$$

$$= £45 \text{ to the nearest pound}$$

1 mark for correct division; **1 mark** for rounding up and multiplying by £4.99; **1 mark** for correct answer. Total 3 marks.

$$5. \text{ Shirley has rounded } 0.06529 \text{ to 2 dp instead of 2 sf. The correct answer is } 0.065$$

1 mark for a correct explanation.

Page 3, Estimation

$$1. \frac{317 + 48.6}{9.683} \approx \frac{300 + 50}{10} \approx \frac{350}{10} \approx 35$$

1 mark for rounding to 1 sf; **1 mark** for correct answer.

$$2. \frac{2.67 \times 1.36}{0.11 + 0.42} \approx \frac{3 \times 1}{0.1 + 0.4} \approx \frac{3}{0.5} \approx 6$$

1 mark for rounding to 1 sf; **1 mark** for correct answer.

$$3. \text{ Number of fish at start of January} \approx 1000$$

$$\text{Increase} \approx 20 \text{ fish per day}$$

$$\text{Five months} \approx 5 \times 30 \approx 150 \text{ days}$$

$$\text{Number of fish after five months} \approx 150 \times 20 + 1000 \approx 4000$$

1 mark for rounding rate of increase to 1 sf; **1 mark** for correct calculation for the number of fish after five months;

1 mark for correct answer. Total 3 marks.

$$4. \text{ Number of portions sold} \approx 100$$

$$\text{Sale price per portion} \approx £9.00$$

$$\text{Cost per portion} \approx £3.00$$

$$\text{Profit per portion} \approx £9.00 - £3.00 \approx £6.00$$

$$\text{Total profit} \approx £6.00 \times 100 \approx £600$$

1 mark for rounding portions, sale price and cost to 1 sf;

1 mark for a profit calculation; **1 mark** for correct answer.

Total 3 marks.

Note that there are alternative methods.

$$5. \text{ Distance driven} \approx 400 \text{ km}$$

$$\text{Average speed} \approx 80 \text{ km/h}$$

$$\text{Time driving} \approx \frac{400}{80} \approx 5 \text{ hours}$$

Time for whole journey ≈ 5 hours 30 minutes (including the break)

$$\text{Time of arrival is roughly } 2 \text{ pm } (8.30 \text{ am} + 5\frac{1}{2} \text{ hours}).$$

1 mark for rounding distance and speed to 1 sf; **1 mark** for finding the time taken; **1 mark** for correct answer. Total 3 marks.

$$6. \text{ a } \sqrt{36} < \sqrt{47} < \sqrt{49}, \text{ so } 6 < \sqrt{47} < 7$$

$$\sqrt{47} = 6.9 \text{ to 1 dp}$$

1 mark for an answer of 6.8 or 6.9

$$\text{b } \sqrt{196} < \sqrt{200} < \sqrt{225}, \text{ so } 14 < \sqrt{200} < 15$$

$$\sqrt{200} = 14.1 \text{ to 1 dp}$$

1 mark for an answer of 14.1 or 14.2

Page 4, Error intervals & bounds

1. **a** $105 \leq p < 115$ **b** $107.5 \leq p < 112.5$
1 mark for each correct minimum; **1 mark** for each correct maximum.
2. **a** $4.665 \leq x < 4.675$ **b** $4500 \leq x < 5500$
1 mark for each correct minimum; **1 mark** for each correct maximum.
3. **a** $9 \leq y < 10$ **b** $2.5 \leq y < 2.6$
1 mark for each correct minimum; **1 mark** for each correct maximum.
4. Sienna can see a truncation to 1 dp so the error interval is $1.8 \leq x < 1.9$
1 mark for correct minimum and maximum; **1 mark** for correct interval notation.
5. Lower bound for the length is 14.5 cm, so lower bound for the area is $14.5^2 = 210.25 \text{ cm}^2$.
Upper bound for the length is 15.5 cm, so upper bound for the area is $15.5^2 = 240.25 \text{ cm}^2$.
Error interval for the area, $x \text{ cm}^2$, is $210.25 \leq x < 240.25$
1 mark for 14.5²; **1 mark** for 15.5²; **1 mark** for correct error interval. Total 3 marks.
6. The error interval for the speed, $s \text{ km/h}$, is $109.5 \leq s < 110.5$
The error interval for the distance, $d \text{ km}$, is $44.5 \leq d < 45.5$
The lower bound for the time taken is $\frac{44.5}{110.5} = 0.4027\dots$ hours
The upper bound for the time taken is $\frac{45.5}{109.5} = 0.4155\dots$ hours
Both of these answers round to 0.4 hours to 1 dp, so this is an appropriate degree of accuracy.
1 mark for upper and lower bounds for speed;
1 mark for upper and lower bounds for distance;
1 mark for lower bound for time; **1 mark** for upper bound for time; **1 mark** for correct answer. Total 5 marks.

Page 5, Adding & subtracting fractions

1. **a** $\frac{2}{9} + \frac{5}{6} = \frac{4}{18} + \frac{15}{18} = \frac{19}{18}$ or $1\frac{1}{18}$
1 mark for finding a common denominator; **1 mark** for correct answer.
- b** $3\frac{1}{6} - 2\frac{3}{4} = \frac{19}{6} - \frac{11}{4} = \frac{38}{12} - \frac{33}{12} = \frac{5}{12}$
1 mark for converting mixed numbers to improper fractions; **1 mark** for finding a common denominator;
1 mark for correct answer. Total 3 marks.
2. $\frac{1}{8} + \frac{2}{3} = \frac{3+16}{24} = \frac{19}{24}$
 $1 - \frac{19}{24} = \frac{24}{24} - \frac{19}{24} = \frac{5}{24}$
1 mark for finding a common denominator of 24; **1 mark** for adding to get $\frac{19}{24}$; **1 mark** for correct answer. Total 3 marks.
3. $2\frac{4}{5} - \frac{7}{8} + 1\frac{1}{20} = \frac{14}{5} - \frac{7}{8} + \frac{21}{20} = \frac{112}{40} - \frac{35}{40} + \frac{42}{40} = \frac{119}{40} \text{ m}$ or $2\frac{39}{40} \text{ m}$
1 mark for converting mixed numbers to improper fractions;
1 mark for finding a common denominator; **1 mark** for correct answer. Total 3 marks.
4. $\frac{3}{4} - \frac{1}{3} = \frac{9-4}{12} = \frac{5}{12}$
1 mark for finding a common denominator; **1 mark** for correct answer.
5. Perimeter = $3\frac{1}{2} + 5\frac{2}{5} + 2\frac{1}{5}$
 $= 3 + 5 + 2 + \frac{1}{2} + \frac{2}{5} + \frac{1}{5}$

$$\begin{aligned} &= 10 + \frac{5}{10} + \frac{4}{10} + \frac{2}{10} \\ &= 10 + \frac{11}{10} \\ &= 10 + 1\frac{1}{10} = 11\frac{1}{10} \text{ cm} \end{aligned}$$

1 mark for summing the lengths; **1 mark** for finding common denominator; **1 mark** for correct answer or equivalent. Total 3 marks.

Page 6, Multiplying & dividing fractions

1. $16 \div \frac{2}{3} = \frac{16}{1} \times \frac{3}{2} = \frac{16 \times 3}{1 \times 2} = \frac{8 \times 3}{1 \times 1} = \frac{24}{1} = 24$ days
1 mark for writing a division and turning it into a correct multiplication; **1 mark** for correct answer.
2. **a** $1\frac{1}{2} \times 3\frac{5}{6} = \frac{3}{2} \times \frac{23}{6} = \frac{3 \times 23}{2 \times 6} = \frac{1 \times 23}{2 \times 2} = \frac{23}{4} = 5\frac{3}{4}$
1 mark for converting to improper fractions; **1 mark** for multiplying; **1 mark** for correct answer. Accept correct improper fraction or mixed number. Total 3 marks.
- b** $4\frac{4}{9} \div 2\frac{2}{3} = \frac{40}{9} \div \frac{8}{3} = \frac{40}{9} \times \frac{3}{8} = \frac{40 \times 3}{9 \times 8} = \frac{5 \times 1}{3 \times 1} = \frac{5}{3} = 1\frac{2}{3}$
1 mark for converting to improper fractions; **1 mark** for writing a correct multiplication; **1 mark** for correct, simplified answer (improper fraction or mixed number). Total 3 marks.
3. $\frac{1}{4}$ of $\frac{3}{10} = \frac{1}{4} \times \frac{3}{10} = \frac{3}{40}$
1 mark for multiplying; **1 mark** for correct answer.
4. Area of triangle = $\frac{1}{2} \times 1\frac{1}{5} \times \frac{6}{5} = \frac{1}{2} \times \frac{6}{5} \times \frac{6}{5} = \frac{18}{25} \text{ cm}^2$
This is the area of the rectangle.
Length of rectangle = $\frac{18}{25} \div \frac{2}{5} = \frac{18}{25} \times \frac{5}{2} = \frac{18 \times 5}{25 \times 2}$
 $= \frac{9 \times 1}{5 \times 1} = \frac{9}{5} \text{ cm}$ or $1\frac{4}{5} \text{ cm}$
1 mark for writing a correct multiplication; **1 mark** for writing a division and turning into a correct multiplication; **1 mark** for correct, simplified answer (improper fraction or mixed number). Total 3 marks.
5. $3\frac{3}{4} \div \frac{5}{6} = \frac{15}{4} \div \frac{5}{6} = \frac{15}{4} \times \frac{6}{5} = \frac{90}{20} = \frac{9}{2}$ or $4\frac{1}{2}$ or 4.5
Vasiliki can get 4 smaller pieces.
 $\frac{1}{2} \times \frac{5}{6} = \frac{5}{12} \text{ m}$ will be left over.
1 mark for converting to improper fraction and writing a correct multiplication; **1 mark** for correct answer to the multiplication and identifying correct number of smaller pieces; **1 mark** for correct fraction left over. Total 3 marks.

Page 7, Fractions, decimals & percentages

1. Lin's class: $\frac{6}{25} = \frac{24}{100} = 24\%$
Jay's class: $\frac{8}{32} = \frac{1}{4} = \frac{25}{100} = 25\%$
Lin is not correct. Jay's class has a (slightly) higher proportion of students who read fantasy books.
1 mark for finding either 24% or 25% or for giving both fractions a common denominator; **1 mark** for a complete, correct explanation.
2. Since $0.01 = \frac{1}{100}$, multiplying by 0.01 is the same as multiplying by $\frac{1}{100}$, which makes the answer 100 times smaller, so it is equivalent to dividing by 100. Sally is correct.
1 mark for a correct explanation.
3. $\frac{11}{28} = \frac{11}{2 \times 2 \times 7}$
If a fraction produces a terminating decimal, the prime factors in the denominator can only be 2s or 5s. This

fraction has a prime factor of 7 in the denominator, so it will produce a recurring decimal.

1 mark for the prime factor decomposition of 28; **1 mark** for a correct explanation.

4. $\frac{7}{10} = 70\%$; $70\% + 15\% = 85\%$; $100\% - 85\% = 15\%$

15% of the runs were half marathons.

Since 15% of 20 is 3, Jonathan ran 3 half marathons.

1 mark for adding $\frac{7}{10}$ and 15% (either as percentages or fractions) and subtracting from 100% (or 1); **1 mark** for attempting to find 15% of 20; **1 mark** for the correct answer.

Total 3 marks.

Note that there are alternative methods.

5. Area used for housing and services = $\frac{5.5}{22} = \frac{1}{4}$

Fraction of this area used for services = $1 - \frac{5}{8} = \frac{3}{8}$

Total area used for services = $\frac{3}{8} \times \frac{1}{4} = \frac{3}{32} = 9.375\%$

1 mark for $\frac{3}{8}$; **1 mark** for multiplying by $\frac{1}{4}$; **1 mark** for correct answer as a percentage. Total 3 marks.

Page 8, Recurring decimals

1. a $18 \overline{) 0.05555}$ $\frac{1}{18} = 0.0\dot{5}$

b $33 \overline{) 0.6060}$ $\frac{20}{33} = 0.6\dot{0}$

c $7 \overline{) 0.4285714}$ $\frac{3}{7} = 0.4\dot{2}857\dot{1}$

For each part, **1 mark** for division; **1 mark** for the correct answer.

2. Let $x = 0.5\dot{5}$

Then $10x = 5.5\dot{5}$

Subtracting x from $10x$, you have $9x = 5$, so $x = \frac{5}{9}$

1 mark for finding x and $10x$ and subtracting; **1 mark** for the correct answer.

3. Let $x = 0.8\dot{4}$

Then $100x = 84.8\dot{4}$

Subtracting x from $100x$, you have $99x = 84$, so $x = \frac{84}{99} = \frac{28}{33}$

1 mark for finding x and $100x$ and subtracting; **1 mark** for $\frac{84}{99}$; **1 mark** for the correct answer. Total 3 marks.

4. Let $x = 0.05\dot{6}$

Then $10x = 0.5\dot{6}$

Also $1000x = 56.5\dot{6}$

Subtracting $10x$ from $1000x$, you have $990x = 56$, so

$x = \frac{56}{990} = \frac{28}{495}$

1 mark for finding $10x$ and $1000x$ and subtracting; **1 mark** for $\frac{56}{990}$; **1 mark** for the correct answer. Total 3 marks.

Page 9, Surds

1. a $\sqrt{18} - \sqrt{8} = 3\sqrt{2} - 2\sqrt{2} = \sqrt{2}$ ($a = 1$)

1 mark for simplifying both surds; **1 mark** for correct answer.

b $\sqrt{200} + \sqrt{72} - \sqrt{98} = 10\sqrt{2} + 6\sqrt{2} - 7\sqrt{2} = 9\sqrt{2}$ ($a = 9$)

1 mark for simplifying the three surds; **1 mark** for correct answer.

c $3\sqrt{2} + 7\sqrt{32} = 3\sqrt{2} + 7 \times 4\sqrt{2} = 3\sqrt{2} + 28\sqrt{2} = 31\sqrt{2}$ ($a = 31$)

1 mark for simplifying $7\sqrt{32}$; **1 mark** for correct answer.

d $\frac{14}{\sqrt{2}} = \frac{14\sqrt{2}}{2} = 7\sqrt{2}$ ($a = 7$)

1 mark for rationalising the denominator (multiplying numerator and denominator by $\sqrt{2}$); **1 mark** for correct answer.

2. a $(1 + \sqrt{3})^2 = (1 + \sqrt{3})(1 + \sqrt{3}) = 1 + \sqrt{3} + \sqrt{3} + 3 = 4 + 2\sqrt{3}$ ($a = 4$, $b = 2$)

1 mark for expanding the brackets; **1 mark** for simplifying expression to correct answer.

b $\frac{8}{2 - \sqrt{3}} = \frac{8(2 + \sqrt{3})}{(2 - \sqrt{3})(2 + \sqrt{3})} = \frac{16 + 8\sqrt{3}}{4 - 3} = \frac{16 + 8\sqrt{3}}{1} = 16 + 8\sqrt{3}$ ($a = 16$, $b = 8$)

1 mark for rationalising the denominator (multiplying numerator and denominator by $2 + \sqrt{3}$); **1 mark** for 1 in the denominator; **1 mark** for the correct answer. Total 3 marks.

c $\frac{\sqrt{3} - 1}{\sqrt{3} + 1} = \frac{(\sqrt{3} - 1)(\sqrt{3} - 1)}{(\sqrt{3} + 1)(\sqrt{3} - 1)} = \frac{3 - 2\sqrt{3} + 1}{3 - 1} = \frac{4 - 2\sqrt{3}}{2} = 2 - \sqrt{3}$ ($a = 2$, $b = -1$)

1 mark for rationalising the denominator (multiplying numerator and denominator by $\sqrt{3} - 1$); **1 mark** for 2 in the denominator; **1 mark** for the correct answer. Total 3 marks.

3. $(\sqrt{11} - \sqrt{8})(\sqrt{11} + \sqrt{8}) = 11 + \sqrt{11}\sqrt{8} - \sqrt{11}\sqrt{8} - 8 = 11 - 8 = 3$ as required

1 mark for attempt to expand brackets; **1 mark** for cancelling middle terms; **1 mark** for fully correct working. Total 3 marks.

Page 10, Index notation

1. Peter has multiplied the bases. Since the bases are different, this cannot be simplified as a simple power of 10
1 mark for a correct explanation.

2. $\frac{(2^7 \times 2^4)^{-1}}{2} = \frac{(2^{7+4})^{-1}}{2} = \frac{(2^{11})^{-1}}{2} = \frac{2^{11 \times (-1)}}{2} = 2^{-11-1} = 2^{-12}$

1 mark for 2^{11} in the brackets; **1 mark** for correct answer.

3. a $(3^4)^4 = 3^{4 \times 4} = 3^{16}$

1 mark for correct answer.

b $\sqrt[3]{5^2} = 5^{\frac{2}{3}}$

1 mark for a fractional index with 3 in the denominator;

1 mark for the correct answer.

4. a $\left(\frac{2}{5}\right)^3 = \frac{2^3}{5^3} = \frac{8}{125}$

1 mark for correct answer.

b $25^{\frac{1}{2}} = \sqrt{25} = 5$

1 mark for correct answer.

c $8^{\frac{2}{3}} = (\sqrt[3]{8})^2 = 2^2 = 4$

1 mark for 2; **1 mark** for correct answer.

d $\left(\frac{16}{9}\right)^{\frac{3}{2}} = \left(\frac{9}{16}\right)^{\frac{3}{2}} = \left(\frac{\sqrt{9}}{\sqrt{16}}\right)^3 = \left(\frac{3}{4}\right)^3 = \frac{27}{64}$

1 mark for $\frac{9}{16}$; **1 mark** for $\frac{3}{4}$; **1 mark** for correct answer. Total 3 marks.

5. $3 \times \sqrt{27} = 3 \times (27)^{\frac{1}{2}} = 3 \times (3^3)^{\frac{1}{2}} = 3^1 \times 3^{\frac{3}{2}} = 3^{1 + \frac{3}{2}} = 3^{\frac{5}{2}}$
 $n = \frac{5}{2}$ or $2\frac{1}{2}$ or 2.5

1 mark for attempting to rewrite 27 with base 3, **1 mark** for $3^{\frac{5}{2}}$; **1 mark** for correct answer. Total 3 marks.

6. $64 = 2^6$

$2^x \times 2^y = 2^6 \Rightarrow x + y = 6$ (1)

$4 = 2^2$

$2^x \div 2^y = 2^2 \Rightarrow x - y = 2$ (2)

(1) + (2): $2x = 8 \Rightarrow x = 4$

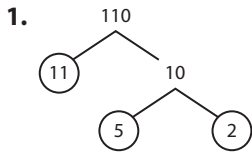
Substitute into (1): $4 + y = 6 \Rightarrow y = 2$

1 mark for attempting to rewrite 64 and 2 with base 2;

1 mark for either equation correct; **1 mark** for attempting to solve simultaneously; **1 mark** for correct values for x and y . Total 4 marks.

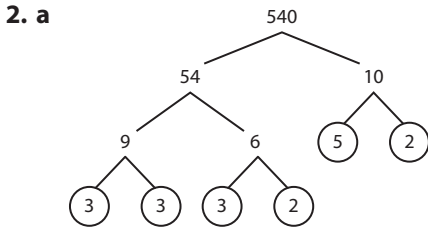
Page 11, Prime factor decomposition

You might use a factor tree in your working with the same start and end as shown here but with different middle branches.



$$110 = 2 \times 5 \times 11$$

1 mark for finding or listing the prime factors; **1 mark** for correct answer.

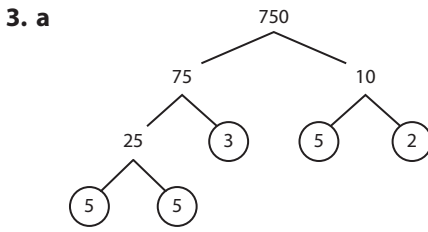


$$540 = 2^2 \times 3^3 \times 5$$

1 mark for finding or listing the prime factors; **1 mark** for correct answer.

b Since $15 = 3 \times 5$ and both 3 and 5 are prime factors of 540, then 540 must be divisible by 15

1 mark for a correct explanation.



$$750 = 2 \times 3 \times 5^3$$

1 mark for finding or listing the prime factors; **1 mark** for correct answer.

b Since $4 = 2 \times 2$, but 750 only contains the factor of 2 once, 750 is not divisible by 4

1 mark for a correct explanation.

4. a $2 \times 3^2 \times 7 \times 13$ is even since 2 is a prime factor.

1 mark for correct answer.

b To double a number, you multiply by 2, so the prime factor decomposition of a number twice as big will have another factor of 2. This is $2^2 \times 3^2 \times 7 \times 13$

1 mark for correct answer.

5. The prime factors of each number are:

$$4 = 2 \times 2; 5 = 5; 6 = 2 \times 3$$

Any number divisible by 4, 5 and 6 must have at least two 2s, one 5 and a 3, so the smallest such number is $2^2 \times 3 \times 5$

1 mark for listing the prime factors of 4 and 6; **1 mark** for correct answer.

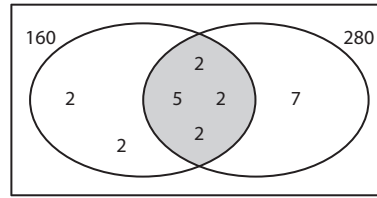
Page 12, Finding HCF and LCM

1. a $160 = 2^5 \times 5$

1 mark for finding or listing the prime factors; **1 mark** for correct answer.

b $280 = 2^3 \times 5 \times 7$

A Venn diagram to show the prime factors looks like this:



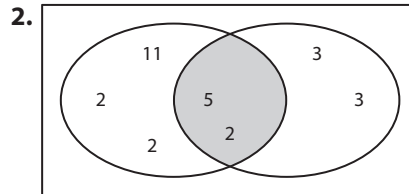
$$\text{HCF}(160, 280) = 2^3 \times 5 = 40$$

1 mark for multiplying the common factors; **1 mark** for correct answer.

c From the Venn diagram,

$$\text{LCM}(160, 280) = 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 7 = 1120$$

1 mark for multiplying all appropriate factors; **1 mark** for correct answer.



a $\text{HCF} = 2 \times 5 = 10$

b $\text{LCM} = 2 \times 2 \times 11 \times 2 \times 5 \times 3 \times 3 = 3960$

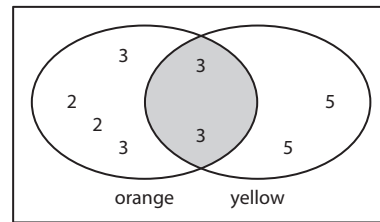
1 mark for correct Venn diagram or alternative method;

1 mark for HCF; **1 mark** for LCM. Total 3 marks.

3. $225 = 3^2 \times 5^2$

$$324 = 2^2 \times 3^4$$

A Venn diagram would look like this:



The HCF of the two numbers is 9, so Fran can sort her books into piles of a maximum of 9 if they are to be the same size.

1 mark for the prime factors of 225; **1 mark** for the prime factors of 324; **1 mark** for correct answer. Total 3 marks.

4. **a** You know that $4 = 2^2$ must divide into A , but $2 \times 3 \times 7$ only has one 2

Therefore, $x = 2$

b $A = 2 \times 2 \times 3 \times 7 = 84$

1 mark for each correct answer.

Page 13, Standard form

1. **a** $1.56 \times 10^8 = 156\,000\,000$ **b** $8.02 \times 10^{-3} = 0.008\,02$

1 mark for each correct answer.

2. **a** $48\,000\,000\,000 = 4.8 \times 10^{10}$ **b** $0.000\,0703 = 7.03 \times 10^{-5}$

c $95 \times 10^6 = 9.5 \times 10^7$ **d** $0.68 \times 10^{-4} = 6.8 \times 10^{-5}$

1 mark for each correct answer.

3. $150\,000\,000 \text{ km} = 1.5 \times 10^8 \text{ km}$

1 mark for each correct answer.

4. Putting all the numbers in either standard or ordinary form:

$$2.1 \times 10^4 = 21\,000; 2.3 \times 10^5 = 230\,000;$$

$$0.21 \times 10^4 = 2.1 \times 10^3 = 2100; 2200 = 2.2 \times 10^3$$

The order, starting with the biggest, is $2.3 \times 10^5, 2.1 \times 10^4, 2200, 0.21 \times 10^4$

1 mark for converting at least two of the numbers correctly to an alternative form; **1 mark** for any three in the correct order; **1 mark** for all in the correct order. Total 3 marks.

5. Virus: $0.000\ 000\ 05 = 5 \times 10^{-8}$ m
 Bacteria cell: $4 \times 10^{-7} = 0.000\ 0004$ m
 The virus is smaller.
1 mark for getting both numbers in the same form; **1 mark** for correct conclusion.
6. Put all the populations in the same form.
 If you put them all in standard form, you have:
 Angola: 3.18×10^7 ; Uzbekistan: 3.29×10^7 ;
 Malaysia: 3.19×10^7 ; Mongolia: 3.2×10^6
 Uzbekistan has the biggest population.
1 mark for putting all numbers in the same form;
1 mark for correct answer.

Page 14, Calculating with standard form

1. a $(5 \times 10^4) + (6 \times 10^5) = 50\ 000 + 600\ 000$
 $= 650\ 000 = 6.5 \times 10^5$
1 mark for converting to ordinary numbers or the same power of 10; **1 mark** for correct answer.
- b $(9 \times 10^{-3}) - (3 \times 10^{-4}) = 0.009 - 0.0003$
 $= 0.0087 = 8.7 \times 10^{-3}$
1 mark for converting to ordinary numbers or the same power of 10; **1 mark** for correct answer.
- c $(2.1 \times 10^8) \times (3 \times 10^{-5}) = 6.3 \times 10^{8+(-5)} = 6.3 \times 10^3$
1 mark for 10^3 ; **1 mark** for correct answer.
- d $(8.2 \times 10^3) \div (4.1 \times 10^7) = 2 \times 10^{3-7} = 2 \times 10^{-4}$
1 mark for 10^{-4} ; **1 mark** for correct answer.
2. Using time = $\frac{\text{distance}}{\text{speed}}$,
 time = $\frac{3000}{4 \times 10^3} = \frac{3 \times 10^3}{4 \times 10^3} = \frac{3}{4}$ hour = 45 minutes
1 mark for dividing distance by speed; **1 mark** for $\frac{3}{4}$ hour;
1 mark for correct answer in minutes. Total 3 marks.
3. Area = $(1.2 \times 10^2) \times (7 \times 10^3) = 8.4 \times 10^{2+3} = 8.4 \times 10^5$ km²
1 mark for multiplying; **1 mark** for 10^5 ; **1 mark** for correct answer. Total 3 marks.
4. a Circumference $\approx 4 \times 10^9 \times 0.2 = 0.8 \times 10^9 = 8 \times 10^8$ cm
1 mark for rounding 4.0075; **1 mark** for multiplication;
1 mark for correct answer in standard form. Total 3 marks.
- b It is an underestimate because 4.0075 is rounded down.
1 mark for correct answer with explanation.

Page 15, Simplifying expressions

1. a $3p - 5q + 3p^2 + 2q + 2q^2 - 9p^2 = 3p - 3q - 6p^2 + 2q^2$
1 mark for $-3q$ and $-6p^2$; **1 mark** for the correct answer.
- b $5x^3 - 2xy - 6 + 6x^3 - 2 - 7xy + 8 = 11x^3 - 9xy$
1 mark for $11x^3$ or $9xy$; **1 mark** for the correct answer.
2. a Perimeter = $3x + 3x + 7y + 7y = 6x + 14y$
1 mark for an unsimplified expression; **1 mark** for the correct answer.
- b Area = $3x \times 1.5x = 4.5x^2$
1 mark for an unsimplified expression; **1 mark** for the correct answer.
3. a $(2a)^3 = 8a^3$
1 mark for 8; **1 mark** for a^3 .
- b $(5a^2b^3)^2 = 25a^4b^6$
1 mark for 25; **1 mark** for $a^4 b^6$.

c $\frac{6x^2y^{-3}}{18yx^{-1}} = \frac{1}{3}x^3y^{-4}$ or $\frac{x^3}{3y^4}$
1 mark for $\frac{1}{3}$; **1 mark** for x^3y^{-4} or $\frac{x^3}{y^4}$.

d $\sqrt{x^4y^6} = (x^4y^6)^{\frac{1}{2}} = x^2y^3$
1 mark for x^2 ; **1 mark** for y^3 .

4. a $\frac{3^{-2} \times 3^8}{3^7} = \frac{3^6}{3^7} = 3^{-1}$
 $3^{-1} = 3^x$, so $x = -1$

1 mark for 3^6 in the numerator; **1 mark** for 3^{-1} ; **1 mark** for identifying that $x = -1$. Total 3 marks.

b $2^5 \times 4^2 = 8^x$
 $2^5 \times (2^2)^2 = (2^3)^x$
 $2^5 \times 2^4 = 2^{3x}$
 $2^9 = 2^{3x}$
 $3x = 9$, so $x = 3$

1 mark for writing 4 as 2^2 or 8 as 2^3 ; **1 mark** for 2^9 on the left-hand side; **1 mark** for the correct answer. Total 3 marks.

Page 16, Solving linear equations

1. a $\frac{5-x}{2} = 12$; $5 - x = 24$; $5 = 24 + x$; $x = -19$
1 mark for $5 - x = 24$; **1 mark** for the correct answer.
- b $\frac{2}{y} = 5$; $2 = 5y$; $y = \frac{2}{5}$
1 mark for $2 = 5y$; **1 mark** for the correct answer.
- c $3 + p = 4p - 6$; $3 + 6 = 4p - p$; $9 = 3p$; $p = 3$
1 mark for $9 = 3p$; **1 mark** for correct answer.
- d $3(3 - 2p) = 4 - 11p$
 $9 - 6p = 4 - 11p$
 $-6p + 11p = 4 - 9$
 $5p = -5$
 $p = \frac{-5}{5} = -1$
1 mark for $5p = -5$; **1 mark** for correct answer.
2. Sarah: n , Ewan: $n - 5$, Cameron: $2n$
 Total: $n + (n - 5) + 2n = 35$
 $4n - 5 = 35$
 $4n = 40$
 $n = 10$, so Sarah plays 10 holes.
1 mark for $n - 5$ and $2n$; **1 mark** for adding and writing equal to 35; **1 mark** for correct answer. Total 3 marks.
3. $2x + 3 = 3x - 4$; $3 + 4 = 3x - 2x$; $7 = x$
 Rosalind's number is 7
1 mark for a correct equation; **1 mark** for a correct rearrangement; **1 mark** for correct answer. Total 3 marks.
4. a $2x - 1 = x + 3$; $2x - x = 3 + 1$; $x = 4$
1 mark for a correct equation; **1 mark** for a correct rearrangement; **1 mark** for correct answer. Total 3 marks.
- b If $x = 4$, the shorter side is $x + 3 = 4 + 3 = 7$ cm
 (or $2x - 1 = 2 \times 4 - 1 = 7$ cm).
 The perimeter is $7 + 7 + y + y = 14 + 2y$.
 Since $14 + 2y = 34$, $2y = 20$, $y = 10$
 This means the area of the rectangle is $10 \times 7 = 70$ cm².
1 mark for finding the length of the shorter side (7 cm);
1 mark for setting up an equation to find y ; **1 mark** for $y = 10$; **1 mark** for correct answer. Total 4 marks.