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EDEXCEL GCSE (9-1) MATHS: QUESTIONS BY TOPIC

Measures, Accuracy & Estimation (N4)

GCSE (9-1) Mathematics (1MA1) · Higher tier

42 questions · 130 marks · Mark schemes included

Past papers June 2017 - June 2025 · 3 sub-topics

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HOW TO USE THIS BOOKLET

Questions are grouped by sub-topic and run from the lowest to the highest mark tariff, then oldest paper first.

Click any row below to jump straight to that sub-topic or question.

On every question page, click ANSWER in the top-right corner to jump to its mark scheme; < QUESTION brings you back.

A gold bar in the left margin marks exactly where the question sits on the original page.

Diagrams, graphs, grids and tables are printed exactly as they appear in the original papers.

Each question is filed under its main topic; longer questions may also test skills from other topics.

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QUESTIONS

42 questions · 130 marks · 3 sub-topics

SUB-TOPIC N4a

ROUNDING & ESTIMATION

Sub-topic N4a · 11 questions · 36 marks · lowest tariff first

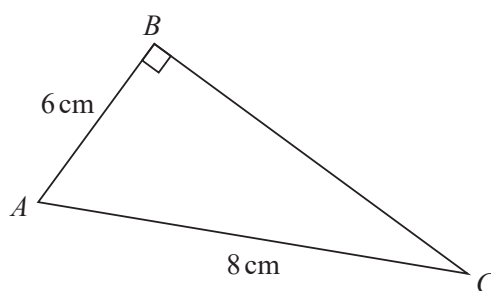


7 Work out

$$\sqrt{\frac{2.5 \times \sin 43^\circ}{8.2^2 - 50.5}}$$

Give your answer correct to 3 significant figures.

(Total for Question 7 is 2 marks)

8 ABC is a right-angled triangle.Here is Sarah's method to find the length of BC .

$$\begin{aligned} BC^2 &= AB^2 + AC^2 \\ &= 6^2 + 8^2 \\ &= 100 \\ BC &= 10 \end{aligned}$$

(a) What mistake has Sarah made in her method?

(1)



- 8 Use your calculator to work out

$$\frac{\sqrt[3]{1.57^4 + \tan 60^\circ}}{7.2^{\frac{1}{2}}}$$

Give your answer correct to 3 significant figures.

.....
(Total for Question 8 is 2 marks)

- 9 A box in the shape of a cuboid is placed on a horizontal floor.

The box exerts a force of 180 newtons on the floor.

The box exerts a pressure of 187.5 newtons/m² on the floor.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

The face in contact with the floor is a rectangle of length 1.2 metres and width x metres.

Work out the value of x .

$x =$

(Total for Question 9 is 3 marks)



- 9 (a) Write 5.73×10^6 as an ordinary number.

.....
(1)

- (b) Write 0.035 in standard form.

.....
(1)

(Total for Question 9 is 2 marks)

- 10 Use your calculator to work out $\frac{(1.8^3 \times \cos 35^\circ)^2}{\sqrt[3]{17.4 - \tan 85^\circ}}$

Give your answer correct to 3 significant figures.

.....
(Total for Question 10 is 2 marks)



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 (a) Write 7357 correct to 3 significant figures.

.....
(1)

(b) Work out $\frac{\sqrt{17 + 4^2}}{7.3^2}$

Write down all the figures on your calculator display.

.....
(2)

(Total for Question 1 is 3 marks)

- 2 Last year Jo paid £245 for her car insurance.
This year she has to pay £883 for her car insurance.

Work out the percentage increase in the cost of her car insurance.

.....%

(Total for Question 2 is 3 marks)



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** (a) Expand and simplify $(x + 5)(x - 9)$

.....
(2)

- (b) Factorise fully $9x^2 + 6x$

.....
(2)

(Total for Question 1 is 4 marks)

- 2** (a) Use your calculator to work out $\frac{29^2 - 4.6}{\sqrt{35 - 1.9^3}}$

Write down all the figures on your calculator display.

.....
(2)

- (b) Write your answer to part (a) correct to 4 significant figures.

.....
(1)

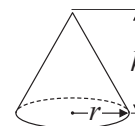
(Total for Question 2 is 3 marks)



- 15 A cone has a volume of 98 cm^3 .
The radius of the cone is 5.13 cm .

(a) Work out an estimate for the height of the cone.

$$\text{Volume of cone} = \frac{1}{3} \pi r^2 h$$



.....cm

(3)

John uses a calculator to work out the height of the cone to 2 decimal places.

- (b) Will your estimate be more than John's answer or less than John's answer?
Give reasons for your answer.

.....

.....

.....

(1)

(Total for Question 15 is 4 marks)

- 16 n is an integer greater than 1

Prove algebraically that $n^2 - 2 - (n - 2)^2$ is always an even number.

(Total for Question 16 is 4 marks)



4 It would take 120 minutes to fill a swimming pool using water from 5 taps.

(a) How many minutes will it take to fill the pool if only 3 of the taps are used?

..... minutes
(2)

(b) State one assumption you made in working out your answer to part (a).

.....
.....
(1)

(Total for Question 4 is 3 marks)

5 A plane travels at a speed of 213 miles per hour.

(a) Work out an estimate for the number of seconds the plane takes to travel 1 mile.

..... seconds
(3)

(b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

.....
.....
(1)

(Total for Question 5 is 4 marks)



8 (a) Work out an estimate for the value of $\sqrt{63.5 \times 101.7}$

.....
(2)

$(2.3)^6 = 148$ correct to 3 significant figures.

(b) Find the value of $(0.23)^6$ correct to 3 significant figures.

.....
(1)

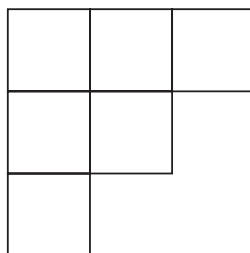
(c) Find the value of 5^{-2}

.....
(1)

(Total for Question 8 is 4 marks)



- 10 The diagram shows a shape made from 6 identical squares.



The total area of the shape is 5406 cm^2

- (a) Find an estimate for the length of one side of each square.
Give your answer correct to the nearest whole number.

..... cm
(3)

- (b) Is your answer to part (a) an underestimate or an overestimate?
You must give a reason for your answer.

.....
.....
.....
(1)

(Total for Question 10 is 4 marks)

- 5 Sophie drives a distance of 513 kilometres on a motorway in France.
She pays 0.81 euros for every 10 kilometres she drives.

(a) Work out an estimate for the total amount that Sophie pays.

..... euros
(3)

- (b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

.....
.....
.....
(1)

(Total for Question 5 is 4 marks)



5 A car travelled 4.96 miles at an average speed of 30.4 miles per hour.

- (a) Work out an estimate for the time taken by the car.
Give your answer in minutes.

..... minutes
(3)

- (b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

.....
.....
.....
(1)

(Total for Question 5 is 4 marks)



SUB-TOPIC N4b

BOUNDS & ERROR INTERVALS

Sub-topic N4b · 28 questions · 85 marks · lowest tariff first



- 6 Anil wants to invest £25 000 for 3 years in a bank.

Personal Bank

Compound Interest

2% for each year

Secure Bank

Compound Interest

4.3% for the first year
0.9% for each extra year

Which bank will give Anil the most interest at the end of 3 years?
You must show all your working.

(Total for Question 6 is 3 marks)

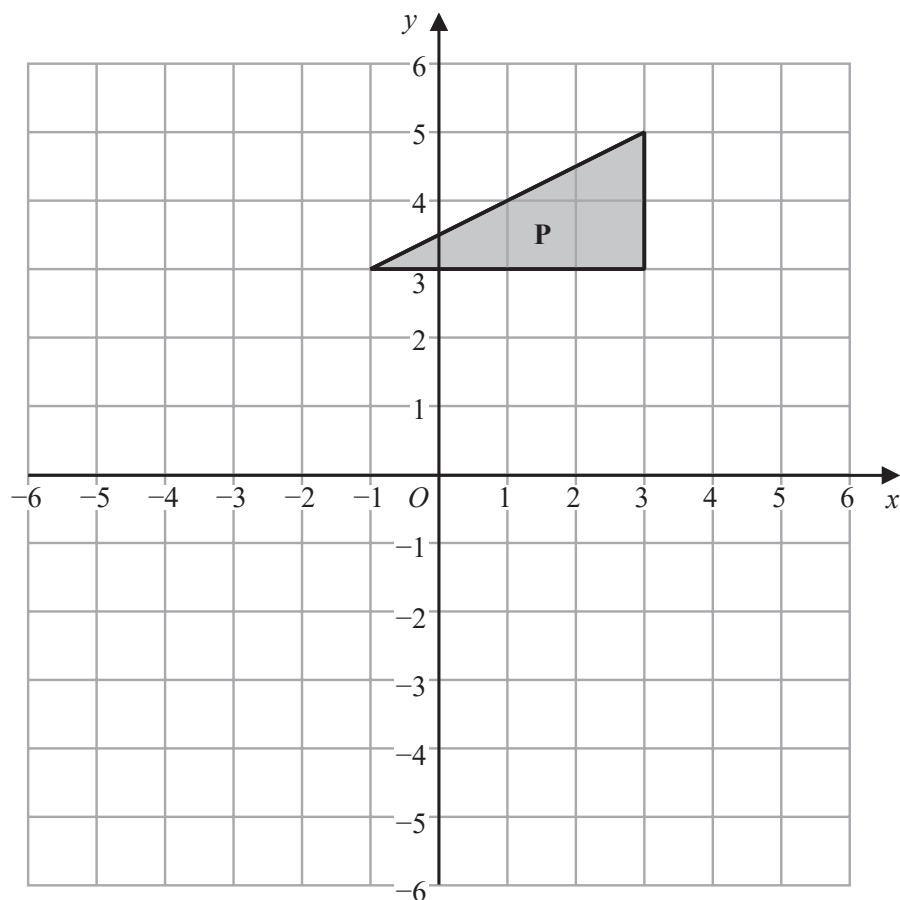
- 7 A number, n , is rounded to 2 decimal places.
The result is 4.76

Using inequalities, write down the error interval for n .

(Total for Question 7 is 2 marks)



8



Triangle **P** is reflected in the line $y = -x$ to give triangle **Q**.

Triangle **Q** is reflected in the line $x = -1$ to give triangle **R**.

Describe fully the single transformation that maps triangle **R** to triangle **P**.

(Total for Question 8 is 3 marks)

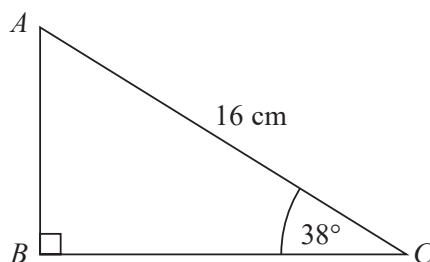
- 9 Martin truncates the number N to 1 digit.
The result is 7

Write down the error interval for N .

(Total for Question 9 is 2 marks)



- 5 ABC is a right-angled triangle.



Calculate the length of AB .
Give your answer correct to 2 decimal places.

.....cm

(Total for Question 5 is 2 marks)

- 6 Sally used her calculator to work out the value of a number y .

The answer on her calculator display began

8.3

Complete the error interval for y .

..... $\leq y <$

(Total for Question 6 is 2 marks)



- 2 The length of a pencil is 128 mm correct to the nearest millimetre.

Complete the error interval for the length of the pencil.

..... mm $\leq$ length < mm

(Total for Question 2 is 2 marks)

- 3 Tom and Adam have a total of 240 stamps.

The ratio of the number of Tom's stamps to the number of Adam's stamps is 3 : 7

Tom buys some stamps from Adam.

The ratio of the number of Tom's stamps to the number of Adam's stamps is now 3 : 5

How many stamps does Tom buy from Adam?

You must show all your working.

(Total for Question 3 is 4 marks)



- 2 Andy cycles a distance of 30 km at an average speed of 24 km/h.
He then runs a distance of 12 km at an average speed of 8 km/h.

Work out the total time Andy takes.
Give your answer in hours and minutes.

..... hours minutes

(Total for Question 2 is 3 marks)

- 3 A number, m , is rounded to 1 decimal place.
The result is 9.4

Complete the error interval for m .

..... $\leq m <$

(Total for Question 3 is 2 marks)



11 Freya writes down the value of x , correct to 1 decimal place.

She writes $x = 6.4$

Complete the error interval for x .

..... $\leq x <$

(Total for Question 11 is 2 marks)

12 $(ax^6)^{\frac{1}{n}} = 7x^3$

Work out the value of a and the value of n .

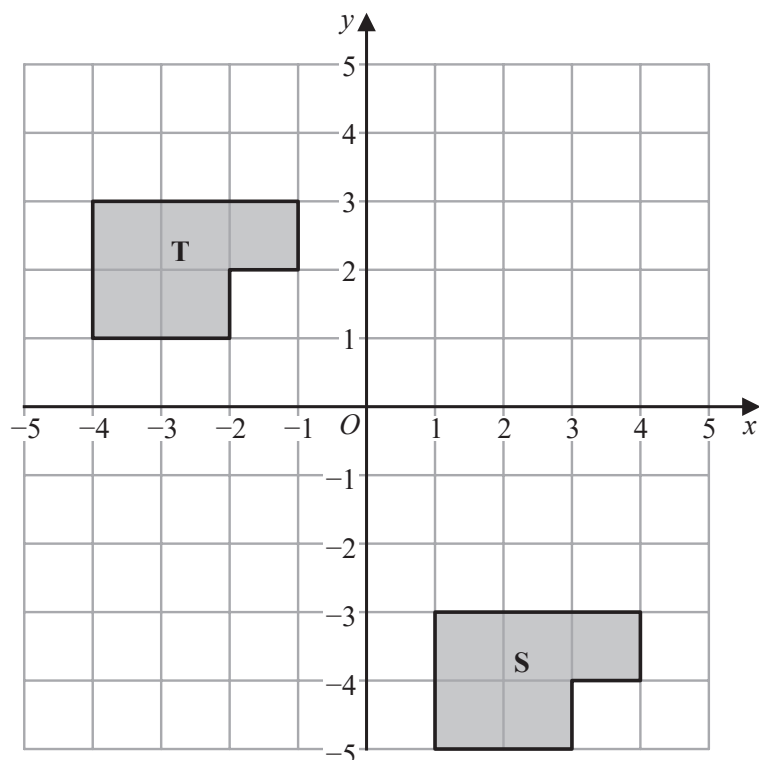
$a =$

$n =$

(Total for Question 12 is 2 marks)



2



Describe fully the single transformation that maps shape S onto shape T.

.....

.....

.....

(Total for Question 2 is 2 marks)

3 The length of a football pitch is 90 metres, correct to the nearest metre.

Complete the error interval for the length of the football pitch.

..... m $\leq$ length < m

(Total for Question 3 is 2 marks)



- 10 Peter has to subtract $(x^2 - 2x - 4)$ from $(x^2 + 3x + 5)$

Here is his working

$$\begin{aligned} & (x^2 + 3x + 5) - (x^2 - 2x - 4) \\ &= x^2 + 3x + 5 - x^2 - 2x - 4 \\ &= x + 1 \end{aligned}$$

Explain what is wrong with Peter's working.

.....

.....

.....

(Total for Question 10 is 1 mark)

- 11 x and y are integers such that

$$\begin{aligned} & 3 < x < 8 \\ & 4 < y < 10 \\ & \text{and } x + y = 14 \end{aligned}$$

Find all the possible values of x .

.....

(Total for Question 11 is 2 marks)

- 12 Martin used his calculator to work out the value of a number P .
He wrote down the first two digits of the answer on his calculator.

He wrote down 1.2

Complete the error interval for P .

$$\dots \leq P < \dots$$

(Total for Question 12 is 2 marks)



- 7 A number, d , is rounded to 1 decimal place.
The result is 12.7

Complete the error interval for d .

$$\dots\dots\dots \leq d < \dots\dots\dots$$

(Total for Question 7 is 2 marks)

- 8 Tamsin buys a house with a value of £150 000
The value of Tamsin's house increases by 4% each year.

Rachel buys a house with a value of £160 000
The value of Rachel's house increases by 1.5% each year.

At the end of 2 years, whose house has the greater value?
You must show how you get your answer.

(Total for Question 8 is 4 marks)



- 8 A number x is written correct to 2 significant figures.

The result is 1.9

Complete the error interval for x .

..... $\leq x <$

(Total for Question 8 is 2 marks)

- 9 Expand and simplify $(x + 7)(x - 2)(x + 3)$

.....

(Total for Question 9 is 3 marks)



- 9 A number N is rounded to 2 significant figures.
The result is 7.3

(a) Write down the least possible value of N .

.....
(1)

Leila says,

“The value of N cannot be greater than 7.349 because 7.350 would round up to 7.4”

(b) Is Leila correct?

You must give a reason for your answer.

.....
.....
.....
(1)

(Total for Question 9 is 2 marks)



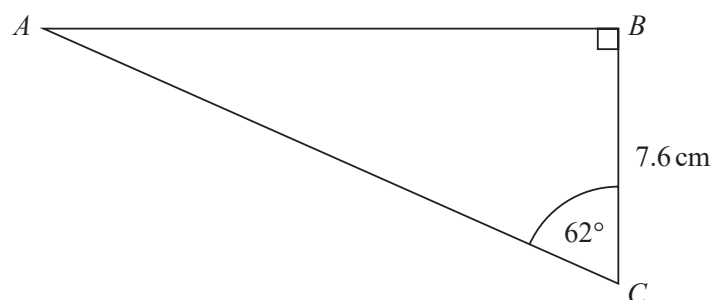
- 7 Jana used her calculator to find the value of a number t .
The answer on her calculator began 10.2

Complete the error interval for t .

..... $\leq t <$

(Total for Question 7 is 2 marks)

- 8 ABC is a right-angled triangle.



Calculate the length of AB .
Give your answer correct to 1 decimal place.

..... cm

(Total for Question 8 is 2 marks)

- 5 Karim rounds a number, n , to 1 decimal place.
The result is 23.8

Complete the error interval for n .

$$\dots\dots\dots \leq n < \dots\dots\dots$$

(Total for Question 5 is 2 marks)

- 6 A plane takes 2 hours 24 minutes to fly from Luton to Alicante.
The plane flies a distance of 1512 kilometres.

Work out the average speed of the plane.
Give your answer in kilometres per hour.

..... kilometres per hour

(Total for Question 6 is 3 marks)



- 4 There are only blue pens, green pens and red pens in a box.

The ratio of the number of blue pens to the number of green pens is 2 : 5

The ratio of the number of green pens to the number of red pens is 4 : 1

There are less than 100 pens in the box.

What is the greatest possible number of red pens in the box?

.....
(Total for Question 4 is 3 marks)

- 5 (a) Find the value of the reciprocal of 1.6
Give your answer as a decimal.

.....
(1)

Jess rounds a number, x , to one decimal place.
The result is 9.8

- (b) Write down the error interval for x .

.....
(2)

(Total for Question 5 is 3 marks)



- (d) By substituting your answer to part (c) into $x^3 + 7x - 5$,
comment on the accuracy of your estimate for the solution to $x^3 + 7x - 5 = 0$

(2)

(Total for Question 15 is 9 marks)

- 16 The petrol consumption of a car, in litres per 100 kilometres, is given by the formula

$$\text{Petrol consumption} = \frac{100 \times \text{Number of litres of petrol used}}{\text{Number of kilometres travelled}}$$

Nathan's car travelled 148 kilometres, correct to 3 significant figures.
The car used 11.8 litres of petrol, correct to 3 significant figures.

Nathan says,

“My car used less than 8 litres of petrol per 100 kilometres.”

Could Nathan be wrong?

You must show how you get your answer.

(Total for Question 16 is 3 marks)



16 $p = \sqrt{\frac{2e}{f}}$

$e = 6.8$ correct to 1 decimal place.

$f = 0.05$ correct to 1 significant figure.

Work out the upper bound for the value of p .

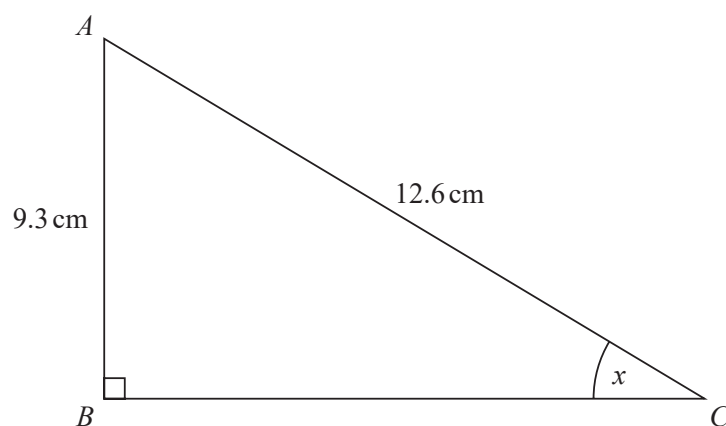
Give your answer correct to 3 significant figures.

You must show all your working.

.....
(Total for Question 16 is 3 marks)



19 ABC is a right-angled triangle.



$AB = 9.3\text{ cm}$ correct to the nearest mm.

$AC = 12.6\text{ cm}$ correct to the nearest mm.

Calculate the lower bound for the size of the angle marked x .

You must show all your working.

(Total for Question 19 is 3 marks)



19 $R = \frac{P}{Q}$

$P = 5.88 \times 10^8$ correct to 3 significant figures.

$Q = 3.6 \times 10^5$ correct to 2 significant figures.

Work out the lower bound for R .

Give your answer as an ordinary number correct to the nearest integer.

You must show all your working.

(Total for Question 19 is 3 marks)



19 There are some sheets of paper in a pile.

The height of the pile is 10.4 cm, correct to the nearest mm.

The thickness of each sheet of paper is 0.17 mm, correct to 2 significant figures.

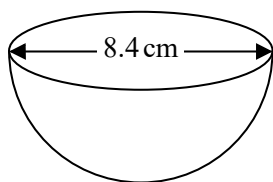
Calculate the upper bound for the number of sheets of paper in the pile.

You must show all your working.

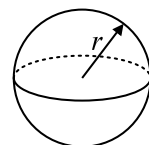
(Total for Question 19 is 3 marks)



- 19 The diagram shows a hemisphere with diameter 8.4 cm.



$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$



Work out the volume of the hemisphere.
Give your answer correct to 3 significant figures.

..... cm³

(Total for Question 19 is 2 marks)

20 $d = \frac{1}{8} c^3$

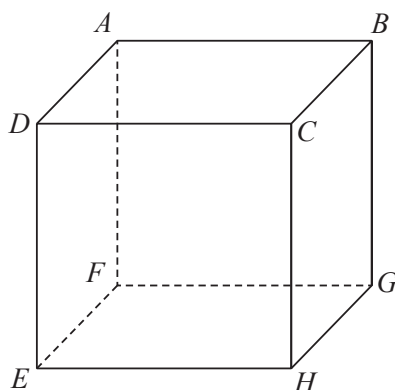
$c = 10.9$ correct to 3 significant figures.

By considering bounds, work out the value of d to a suitable degree of accuracy.
Give a reason for your answer.

(Total for Question 20 is 4 marks)



18 The diagram shows a cube.



$AH = 11.3$ cm correct to the nearest mm.

Calculate the lower bound for the length of an edge of the cube.
You must show all your working.

..... cm

(Total for Question 18 is 4 marks)



21 The time period, T seconds, of a simple pendulum of length l cm is given by the formula

$$T = 2\pi \sqrt{\frac{l}{g}}$$

Katie uses a simple pendulum in an experiment to find an estimate for the value of g .

Here are her results.

$l = 52.0$ correct to 3 significant figures.

$T = 1.45$ correct to 3 significant figures.

Work out the upper bound and the lower bound for the value of g .

Use $\pi = 3.142$

You must show all your working.

upper bound = ...

lower bound = ...

(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS



22 Ebony makes some bracelets to sell.

The materials to make all the bracelets cost £190, correct to the nearest £5

Ebony sells all the bracelets for a total of £875, correct to the nearest £5

The total time taken to make and sell all these bracelets was 72 hours, correct to the nearest hour.

Ebony uses this method to calculate her hourly rate of pay

$$\text{Hourly rate of pay} = \frac{\text{total selling price} - \text{total cost of materials}}{\text{total time taken}}$$

The minimum hourly rate of pay for someone of Ebony's age is £8.20

By considering bounds, determine if Ebony's hourly rate of pay was definitely more than £8.20

You must show all your working.

(Total for Question 22 is 4 marks)



17 A train travelled along a track in 110 minutes, correct to the nearest 5 minutes.

Jake finds out that the track is 270 km long.

He assumes that the track has been measured correct to the nearest 10 km.

(a) Could the average speed of the train have been greater than 160 km/h?

You must show how you get your answer.

(4)

Jake's assumption was wrong.

The track was measured correct to the nearest 5 km.

(b) Explain how this could affect your decision in part (a).

(1)

(Total for Question 17 is 5 marks)



- 21 Jackson is trying to find the density, in g/cm^3 , of a block of wood.
The block of wood is in the shape of a cuboid.

He measures

the length as 13.2 cm, correct to the nearest mm

the width as 16.0 cm, correct to the nearest mm

the height as 21.7 cm, correct to the nearest mm

He measures the mass as 1970 g, correct to the nearest 5 g.

By considering bounds, work out the density of the wood.

Give your answer to a suitable degree of accuracy.

You must show all your working and give a reason for your final answer.

(Total for Question 21 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS



19 $D = \frac{u^2}{2a}$

$u = 26.2$ correct to 3 significant figures

$a = 4.3$ correct to 2 significant figures

- (a) Calculate the upper bound for the value of D .
Give your answer correct to 6 significant figures.
You must show all your working.

.....
(3)

The lower bound for the value of D is 78.6003 correct to 6 significant figures.

- (b) By considering bounds, write down the value of D to a suitable degree of accuracy.
You must give a reason for your answer.

.....
.....
(2)

.....
(Total for Question 19 is 5 marks)



- 23** A race is measured to have a distance of 10.6 km, correct to the nearest 0.1 km.
Sam runs the race in a time of 31 minutes 48 seconds, correct to the nearest second.

Sam's average speed in this race is V km/hour.

By considering bounds, calculate the value of V to a suitable degree of accuracy.
You must show all your working and give a reason for your answer.

(Total for Question 23 is 5 marks)



19 $T = \frac{w}{a - c}$

$w = 435$ correct to the nearest 5

$a = 9.8$ correct to 2 significant figures.

$c = 2.5$ correct to 2 significant figures.

By considering bounds, calculate the value of T to a suitable degree of accuracy.
You must show all your working and give a reason for your final answer.

(Total for Question 19 is 5 marks)



SUB-TOPIC N4c

UNITS, TIME & MONEY

Sub-topic N4c · 3 questions · 9 marks · lowest tariff first



- 5 Write 37 cm^3 in mm^3

..... mm^3

(Total for Question 5 is 1 mark)

- 6 Nimer was driving to a hotel.
He looked at his Sat Nav at 13 30

Time	13 30
Distance to destination	65 miles

Nimer arrived at the hotel at 14 48

Work out the average speed of the car from 13 30 to 14 48
You must show all your working.

..... mph

(Total for Question 6 is 4 marks)



- 7 In Spain, Sam pays 27 euros for 18 litres of petrol.
In Wales, Leo pays £40.80 for 8 gallons of the same type of petrol.

$$1 \text{ euro} = \text{£}0.85$$
$$4.5 \text{ litres} = 1 \text{ gallon}$$

Sam thinks that petrol is cheaper in Spain than in Wales.

Is Sam correct?

You must show how you get your answer.

(Total for Question 7 is 4 marks)



- 7 (a) Change 8000 cm^3 to m^3

..... m^3
(1)

- (b) Change a speed of 180 km per hour to metres per second.

..... metres per second
(3)

(Total for Question 7 is 4 marks)

- 8 There are 30 women and 20 men at a gym.

The mean height of all 50 people is 167.6 cm

The mean height of the 20 men is 182 cm

Work out the mean height of the 30 women.

..... cm

(Total for Question 8 is 3 marks)



MARK SCHEMES

official mark schemes, in the same order as the questions



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
7	0.319	M1 A1	for partial method eg $1.70(499\dots)$ or 16.74 or $\frac{837}{50}$ or $0.101(8516\dots)$ or 0.102 or 0.32 for $0.319(1419\dots)$	Accept 0.319 or better. Condone incorrect digits after the 0.319; isw incorrect rounding if $0.319(1419\dots)$ is shown in working.
8 (a)	Mistake described	C1	for statement describing a mistake Acceptable eg should be $AC^2 - AB^2$ she should do $8^2 - 6^2$ she should be subtracting not adding the numbers she thought that BC was the hypoteneuse when it was actually AC should be $BC^2 + AB^2 = AC^2$ should be $8^2 = 6^2 + BC^2$ Not acceptable eg she has not used Pythagoras correctly $6^2 + 8^2$ is 120 the answer should be $\sqrt{28}$ or 5 or 5.3 or 5.2915 $BC + AB = AC$	
(b)	Explanation	C1	for explanation Acceptable examples the scale factor used is 2.5 $5 \div 2$ is not 1.5 $10 \div 4$ is more than 1.5 the scale factor is not 1.5 he has not used the correct scale factor has enlarged it by too much ZY should be 6 Not acceptable examples the grid is not large enough	Note that a diagram alone is insufficient.



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
8	0.739	M1 A1	for partial evaluation, eg $6.07(5732\dots)$ or $\sqrt{7.2}$ (= 2.68(328...)) or $7.80(778\dots)$ or $\sqrt[3]{7.80(7782818\dots)}$ (= 1.98(3851871...)) for an answer in the range 0.739 to 0.747	If an answer is given in the range in working and then rounded incorrectly award full marks.
9	0.8	P1 P1 A1	for process to find the area, eg $187.5 = \frac{180}{A}$ or $180 \div 187.5 (= 0.96)$ or $\frac{180}{1.2x} = 187.5$ or $1.2x = \frac{180}{187.5}$ for complete process to find width, eg “0.96” $\div 1.2$ or $180 \div 225$ cao	Ignore units for P marks only

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
9 (a)	5 730 000	B1	cao	
(b)	3.5×10^{-2}	B1	cao	
10	12.6	M1	for partial evaluation, eg $(4.777(294722))^2$ or $\sqrt[3]{5.969(47697)}$ or 22.822(54486) or 1.814(081699)	
		A1	for answer in the range 12.58 to 12.6	12.58077014 If an answer is shown in the range in working and then incorrectly rounded award full marks



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
1	(a) 7360	B1	cao	Answer must be given to at least 4 decimal places rounded or truncated Accept a clear indication of the decimal point. Check first four decimal places only
	(b) 0.1077981356	B2 (B1	for 0.1077(981...) for 5.74(45626...) or 53.29 or 0.11 or 0.107 or 0.108)	
2	260 to 260.5	M1	for $883 - 245 (=638)$ or $883 \div 245 (=3.60...)$ or $883 \div 245 \times 100 (=360(.408...))$ oe	
		M1	for a complete method to find the percentage increase eg " $638 \div 245 \times 100 (=260(.408...))$ " or $883 \div 245 \times 100 - 100 (=260(.408...))$ oe	
		A1	Accept answers in the range 260 to 260.5	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	$x^2 - 4x - 45$	M1	for 3 of 4 terms correct or 4 terms correct ignoring signs	3 terms correct can be implied, eg $x^2 - 4x + c$
		A1	cao	
(b)	$3x(3x + 2)$	B2	for $3x(3x + 2)$	
		(B1	for $3(3x^2 + 2x)$ or $x(9x + 6)$ or $3x(ax + b)$ where a and b are integers or $(3x + 2)$ as a factor)	
2 (a)	157.668(255)	M1	for 836.4 or 5.304(809139) or 28.141 or a truncated or rounded version of 157.668255 to no less than 3 sf	Answer must be given to at least 3 decimal places rounded or truncated Accept a clear indication of the decimal point. Check first 3 decimal places only
		A1	for 157.668(255)	
(b)	157.7	B1	ft from part (a) provided answer to (a) has at least 5 sf	
3	35 to 42	M1	for drawing a suitable line of best fit or for a line from $x = 34$ or for a point marked on the grid at $(34, y)$, y in the range 33 to 44	Line at $x = 34$ does not have to be full length of grid but should be in or reach the data set. Acceptable values for the data set are $y = 33$ to $y = 44$
		A1	answer in the range 35 to 42	

Paper: 1MA1/1H				
Question	Working	Answer	Mark	Notes
14		$\frac{1}{3}$	P1	process to solve the problem e.g. $\frac{3}{10} \times \frac{4}{9} (= \frac{12}{90} = \frac{2}{15})$ OR finds the number of white circles for their chosen number OR for 9 : 21 (or a multiple of 9 : 21)
			P1	second step of the process e.g. $\frac{7}{10} \times \frac{2}{7} (= \frac{14}{70} = \frac{2}{10} = \frac{1}{5})$ OR finds the number of black circles for their chosen number OR for a multiple of 2 : 5 where the ratio parts sum to "21"
			P1	for complete process e.g. " $\frac{2}{15}$ " + " $\frac{1}{5}$ " ($= \frac{4}{30} + \frac{6}{30}$) OR finds the total number of circles for their chosen number OR for 3 ratios that could be used to solve the problem eg 9 : 21 with 4 : 5 with 6 : 15
			A1	for $\frac{1}{3}$ oe
15 (a)		3.5 to 4.5	M1	substitution into formula $\frac{1}{3}\pi r^2 h$ of chosen values for r and V (accept $r = 5.13$ and $V = 98$) and starts rearrangement e.g. multiplies by 3, divides by π or divides by r^2 (both sides)
			M1	uses estimates in calculation e.g. $\frac{3 \times 100}{3 \times 25}$ (or in rearranged formula) or $\frac{12}{\pi}$
			A1	arrives at a single value from estimate in the range 3.5 to 4.5
(b)		more	C1	ft e.g. more since number in numerator goes up; numbers in denominator go down.
16		$2(2n-3)$	C1	correct expansion of brackets to give at least 3 terms from $n^2-2n-2n+4$
		even	C1	arrives at n^2-2-n^2+4n-4 oe
			C1	reduces to $2(2n-3)$ or $4n-6$
			C1	for conclusion e.g. $2(2n-3)$ always even, $4n-6$ is always even since both are even numbers, they are multiples of 2.



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
4 (a)	200	M1	for $120 \times 5 \div 3$ oe	Any statement referring to the same amount of water flowing from each tap is acceptable.
		A1	cao	
		C1	Statement that each tap fills at the same rate or that the rate does not change over time Examples Acceptable responses: Taps are running at the same speed They (clearly referring to taps) all fill the pool with the same volume of water The amount of water is the same in the same time (again referring to taps) Each tap is doing a fifth of the filling That all taps take equal time to fill the pool All taps produce the same amount of water That the water flow stays at the same rate over the whole time. Non acceptable responses It will take more time because there are less taps The less taps used the longer it takes to fill the pool That 1 tap can take up to 24 mins each 3 taps will take longer to fill the pool	
5 (a)	16 to 20	P1	for using time = $\frac{\text{distance}}{\text{speed}}$, eg $\frac{1}{200}$ or $\frac{1}{213}$ or for 1 hour = 60×60 (= 3600) seconds	Calculation could be done in stages.
		P1	complete process, eg $\frac{1}{200} \times 60 \times 60$ oe or $\frac{1}{213} \times 60 \times 60$ oe	
		A1	for answer in range 16 to 20	
(b)	decision with reason	C1	(dep on correct use of time = $\frac{\text{distance}}{\text{speed}}$) for reason related to their response to part(a), eg overestimate as speed rounded down	



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
8	(a)	75 to 81	B2	for answer in the range 75 to 81
			(B1	for 60 or 100 or 6000 or 6400 or $\sqrt{64 \times 100}$)
	(b)	0.000 148	B1	for 0.000 148 oe
	(c)	$\frac{1}{25}$	B1	for $\frac{1}{25}$ or 0.04
9	$5\frac{3}{5}$	M1	for writing as improper fractions with at least one correct, eg $\frac{7}{2} \times \frac{8}{5}$ oe	Can use standard form
		M1	(dep) for multiplying improper fractions, eg " $\frac{56}{10}$ " or $5\frac{6}{10}$ or $\frac{28}{5}$ oe	
		A1	cao	
10	$x = 2.2$ to 2.3 $y = -1.3$ to -1.4	M1	for recognition of use of intersection point, one of the solutions given, solutions reversed or solutions given as a coordinate.	
		A1	x given in the range 2.2 to 2.3, y given in the range -1.3 to -1.4	



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
8	8 and -3	M1	for rearranging to get $x^2 - 5x - 24 (= 0)$ or $-x^2 + 5x + 24 (= 0)$	Can be implied by $(x - 8)(x + 3)$ or $(-x + 8)(x + 3)$
		M1	for $(x \pm 8)(x \pm 3)$ or $(x + a)(x + b)$ where $ab = -24$ or $a + b = -5$ or substitution into formula, condoning one sign error eg $(x =) \frac{- -5 \pm \sqrt{(-5)^2 - 4 \times 1 \times -24}}{2 \times 1}$	
		A1	for 8 and -3	
9 (a)	1	B1	cao	
(b)	3	B1	cao	
(c)	$\frac{1}{16}$	B1	oe	
(d)	3	B1	cao	
10 (a)	30	P1	for a start to the process, eg $5406 \div 6 (= 901)$ or $5400 \div 6 (= 900)$ or $5000 \div 6 (= 833.33..)$ or $5410 \div 6 (= 901.66..)$	
		P1	for a process to find the length of one side, eg $\sqrt{901}$ or $\sqrt{900}$ or $\sqrt{833.33..}$ or $\sqrt{901.66..}$	
		A1	for 30	
(b)	Explanation	C1	for a correct explanation based on their working in (a), eg underestimate because I rounded the total area down	Must be based on the use of a rounded value in a calculation



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
5 (a)	Estimated value	P1	for using a value rounded to 1sf in a calculation eg $500 \div 10$ or 500×0.8 or 510×0.8 or 513×0.8 or 500×0.81	Their rounded value must be used in a calculation Rounding may occur after a correct process, eg $513 \div 10 = 51.3 \approx 50$ and 50×0.81 $513 \div 10 = 51.3 \approx 51$ and 51×0.8 scores P1P1 Accept 0.81 rounded to 0.80 for this mark Condone 0.81 rounded to 1 for this mark
		P1	for a full process to find the total amount eg $500 \div 10 \times 0.8$ oe (= 40) or $510 \div 10 \times 0.8$ oe (= 40.8) or $500 \div 10 \times 0.81$ (= 40.5) or [distance] $\div 10 \times$ [amount] oe	Where [distance] is their rounded 513 or 513 and [amount] is their rounded 0.81 or 0.81 Accept $513 \div 10 \times 0.81$ for this mark
		A1	for a correct answer following through their correct rounded value(s)	Do not award this mark if 0.81 is rounded to 1
	(b) underestimate with reason	C1	ft from (a) eg underestimate as numbers rounded down	Must relate to estimation and not rounding of their final answer and they must have a final answer to part (a)



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	180 – 4e and reason	M1 A1 C1	for angle $ACD = e$ or for angle $ADC + \text{angle } BAD = 180$ or for angle $BAX = 3e$ (where X lies on DA extended) for 180 – 4e oe (dep M1) for an appropriate reason relating to parallel lines from eg <u>alternate</u> angles are equal or <u>allied</u> angles / <u>co-interior</u> angles add up to 180 or for <u>corresponding</u> angles are equal	Angles must be clearly labelled on the diagram or otherwise identified May be unsimplified Underlined words need to be shown Reason needs to be linked to their method, which can be implied from correctly identified angles (stated or written on the diagram)
5 (a)	Estimated time	P1 P1 A1	for rounding of distance = 5 (miles) or speed = 30 (mph) (dep) for using time = distance/speed eg $5 \div 30$ or for a complete process, eg $30 \div 60 (= 0.5)$ and $5 \div "0.5"$ or $30 \div 5 (= 6)$ and $60 \div "6"$ or $4.96 \times \frac{60}{30}$	
(b)	Overestimate with reason	C1	for a correct answer following through their correct rounded distance and/or speed ft from (a) for decision with correct reasoning, eg overestimate as dividing a larger number by a smaller number or overestimate as miles rounded up and speed rounded down	Ft the rounding and process from (a) Must relate to estimation and not rounding of their final answer and they must have a final answer to part (a)



Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
6		Secure Bank (supported)	P1 P1 C1	for a process to work out the interest after one year e.g. $0.02 \times 25000 (=500)$ or $0.043 \times 25000 (=1075)$ or for 1.02 or 25500 or 1.043 or 26075 for process to find value of the investment after 3 years or the multiplicative factor for 3 years at one of the banks, e.g. $25000 \times 1.02 \times 1.02 \times 1.02$ oe ($= 26530\dots$) or $1.02^3 (= 1.0612\dots)$ or $25000 \times 1.043 \times 1.009 \times 1.009$ oe ($= 26546\dots$) or $1.043 \times 1.009 \times 1.009 (= 1.0618\dots)$ [accept total interest of 1530.. or 1546.. if final values of investment are not found] for Secure Bank from correct figures, eg. 26530.. and 26546.. or 1530... and 1546... or 1.0612... and 1.0618...
7		$4.755 \leq n < 4.765$	B2 [B1]	for $4.755 \leq n < 4.765$ for 4.755 or 4.765 or 4.7649]
8		12	M1 A1	for evidence of taking a reading from the graph from $h = 160$ for answer in the range 11.8 to 12.2
9		No (supported)	M2 [M1 C1 M2 C1]	for the correct position of C or E for a correct position of B or D] for No with correct supporting evidence, eg. showing C and E in the correct positions OR for C is a rotation of 90° anticlockwise about O or E is a rotation of 90° clockwise about O for No with supporting evidence, eg. C is a rotation of 90° anticlockwise about O and E is a rotation of 90° clockwise about O.

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
9	$7 \leq N < 8$	M1	for identifying the key numbers 7 and 8	Ignore any inequality symbols used at this stage Accept 7.9 (recurring) for 8 as shown by 7.999 or 7.9... or recurring notation (or words)
		A1	cao	
10	35	P1	use of ratio 2:3 and tin quantities to find overall ratio of litres eg 4:3 or 4 tins : 3 tins or 20 litres (Y) & 30 litres (B)	Could be multiples 4 & 3 (for an amount which is a multiple of 50 litres). "248" is the total cost for making 50 litres "248" $\div$ 5 = 49.6 for 10 litre (1 tin) green paint made Profit on 10 litres is $66.96 - 49.60 = 17.36$ Profit on 50 litres is $304.8 - 248 = 86.8$ 334.8 comes from 5×66.96 and is the selling price for 50 litres green paint
		P1	calculates total cost of making paint eg $4 \times 26 + 3 \times 48$ (50 litres) or $104 + 144 (=248)$	
		A1	calculates comparable cost eg 10 litres (1 tin) green paint made as 49.6 or differences (profit) for 1 tin as 17.36 or 5 tins as 86.8 or total comparable costs for 50 litres as 334.8 and 248, for 25 litres as 167.4 and 124 or 1 litres as 33.48 and 24.8	
		P1	for percentage calculation eg $\frac{1736}{4960} \times 100$, $\frac{"334.8" - "248"}{"248"} \times 100$	
		A1	cao	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	9.85	M1 A1	for $\sin(38) = \frac{AB}{16}$ oe or alternative method to find AB for an answer in the range 9.76 to 9.92	
6	8.3 and 8.4	B1 B1	for 8.3 in the correct position for 8.4 in the correct position	Accept 8.39 or 8.399...
7	168	P1 P1 P1 A1	for working with ratio to find the amount for C or D eg $1.5 \times 2 (=3)$ or (A, B, C, D =) 2, 7, 3, 3 oe OR for suitable expressions linking A with C or D, eg. $A = x$, $C = 1.5x$ for “2 + 3 + 3 + 7” (=15) OR adds 4 suitable expressions, eg. “ $x + 3.5x + 1.5x + 1.5x$ ” (= 7.5x) for a complete process to find the amount of money eg $360 \div “15” \times 7$ OR $360 \div “7.5” \times 3.5$ cao	
8	(a) 5.62×10^{-3}	B1	cao	
	(b) 1452	B1	cao	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
1	Two statements	C2 C1	Two different statements Acceptable There is no ‘frequency’ label / y-axis is not labelled / no title for the y-axis The polygon should not be closed / have a line at the bottom / have first and last points connected (15, 6) has been plotted incorrectly / at (15, 8) / (The first point is at) 8 rather than 6 / First point is on an incorrect frequency Not acceptable There is no title / Points should be joined with a curve / x-axis doesn’t start at 0 There is no label / The axes have not been labelled (x and y) The points haven’t (all) been plotted correctly 10 < w ≤ 20 and 30 < w ≤ 40 have been plotted wrong The first point is plotted incorrectly, its at (15, 7) not (15, 6) The points have been joined up wrong / Points should not be joined in the shape of a triangle / They’ve connected all the points Done the midpoints rather than the numbers on the right side / The points are in the middle for one statement eg from those above)	Ignore additional statements provided no contradiction
2	127.5 and 128.5	B1 B1	for 127.5 in the correct position for 128.5 in the correct position	Accept 128.49 or 128.499...
3	18	P1 P1 A1	for $240 \div 10 (= 24)$ or $240 \div 8 (= 30)$ for $3 \times "24" (= 72)$ or $7 \times "24" (= 168)$ or $3 \times "30" (= 90)$ or $5 \times "30" (= 150)$ for $3 \times "24" (= 72)$ and $3 \times "30" (= 90)$ or $7 \times "24" (= 168)$ and $5 \times "30" (= 150)$ Cao	Accept $3 + 7$ for 10, $3 + 5$ for 8



Paper: 1MA1/3H					
Question	Answer	Mark	Mark scheme	Additional guidance	
1	(a)	n^8	B1	cao	
	(b)	cd^3	M1	for partial simplification, eg c or d^3	May be seen as simplification in original fraction
			A1	for cd^3	Accept c^1d^3
	(c)	$x > \frac{14}{5}$	M1	for $5x > 14$ or $5x = 14$ or critical value, $\frac{14}{5}$ oe	Must see carried out correctly, ie at least $5x > 7 \times 2$ not just intention seen. Allow other signs for this mark.
		A1	$x > \frac{14}{5}$ or $x > 2\frac{4}{5}$ or $x > 2.8$		
2	2 hours 45 minutes	P1	for $30 \div 24$ (= 1.25) or $12 \div 8$ (= 1.5)	May be written in hours and/or minutes	
		P1	for finding the sum of their two times eg “1.25” + “1.5” (= 2.75) or 165 (minutes)	or 3 h 15 min or 2 h 75 min	
		A1	cao		
3	9.35, 9.45	B1	for 9.35 in the correct position		
		B1	for 9.45 in the correct position	Accept 9.449 oe or 9.4499...oe	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
11	6.35, 6.45	B1	for 6.35 in the correct position	Accept 6.449 oe or 6.4499... oe
		B1	for 6.45 in the correct position	
12	49, 2	P1	for setting up $6 \div n = 3$ oe or $7^n = a$ oe or one correct answer	Accept the figures written as a complete statement eg $(49x^6)^{\frac{1}{2}}$
		A1	cao	
13	(9, 8)	P1	for setting up an equation for one dimension (width) of the pattern eg $2b - a = 8$ oe or $2x + y = 8$ oe	a and b are the width and length x is the difference between the length and width, y is the width of the rectangle Both values correct implies this mark Award 0 marks for a correct answer with no supportive working.
		P1	for setting up an equation for the other dimension (height) of the pattern eg $2b + a = 16$ oe or $2x + 3y = 16$ oe	
		P1	(dep P2) for a full process to solve for both variables eg $4b = 24$, $b = 6$ and $12 - a = 8$, $a = 4$ or $8 = 2y$, $y = 4$ and $8 = 2x + y$, $x = 2$	
		P1	(dep P3) for a full process to find one of the coordinates of C eg $3 + 6 (= 9)$ or $4 + 4 (= 8)$ or $3 + 2 + 4 (= 9)$ or $4 + 4 (= 8)$	
		A1	cao	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	x^{15}	B1	cao	Where $a \geq 1$ and $b \geq 1$
		M1	for method to expand one bracket, or collect like terms eg $4 \times x + 4 \times 3 (= 4x + 12)$ or $7 \times 4 - 7 \times 2x (= 28 - 14x)$ or $4 \times x - 7 \times 2x (= 4x - 14x)$ and $4 \times 3 + 7 \times 4 (= 12 + 28)$	
	$40 - 10x$	A1	oe	
		M1	for $3(5x^3 + x^2y)$ or $x(15x^2 + 3xy)$ or $3x(5x^2 + xy)$ or $x^2(15x + 3y)$ or $3x^2(ax + by)$	
		A1	cao	
2	translation $\begin{pmatrix} -5 \\ 6 \end{pmatrix}$	B1	for translation	Award no marks if more than one transformation is given
		B1	for vector $\begin{pmatrix} -5 \\ 6 \end{pmatrix}$	Do not accept as a coordinate $(-5, 6)$
3	89.5 and 90.5	B1	for 89.5 in the correct position	Accept 90.49 or 90.499(...)
		B1	for 90.5 in the correct position	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
9	(a)	B1	cao	If the answer (for 2 marks) is seen in working and then rounded or truncated, award full marks.
	(b)	M1	for 10.5472×10^3 oe or 1.6×10^8 oe or 2.575×10^{-1} oe or for 6.592×10^n where $n \neq 5$ or for 6.59×10^5 or for 6.6×10^5 or for 659200 oe	
		A1	cao	
10	Explanation	C1	for full explanation indicating the problem with the negative signs Acceptable examples He should have $+2x + 4$ on the second line He should have done -4 and $-2x$ $3x - -2x = 5x$, not $1x$ Two minuses make a plus which he didn't account for Not acceptable examples He has not expanded the brackets Peter has to factorise first He did not collect the terms He didn't include the x^2	
11	5, 6, 7	M1	for identification of possible values of x (4,5,6,7) or of y (5,6,7,8,9)	Could be shown on a number line or using a Venn diagram This mark can be awarded for an answer of 4, 5, 6, 7 Answers may be given in any order.
		A1	cao	
12	1.2, 1.3	B1	for 1.2 in the correct position	Accept $1.2\dot{9}$ or 1.299... must be 9 recurring.
		B1	for 1.3 in the correct position	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
7	12.65, 12.75	B1	for 12.65 in correct position	Accept 12.749 or 12.7499(...)
		B1	for 12.75 in correct position	
8	Rachel supported	P1	for process to begin to work with percentage for year 1 for Tamsin or Rachel, eg $150000 \times 0.04 (= 6000)$ oe or $150000 \times 1.04 (= 156000)$ oe or $160000 \times 0.015 (= 2400)$ oe or $160000 \times 1.015 (= 162400)$ oe	May be implied by 12000 or 4800 or 162000 or 164800
		P1	for process to use compound interest for Tamsin or Rachel, eg " $156000 \times 0.04 (= 6240)$ oe or " $156000 \times 1.04 (= 162240)$ oe or " $162400 \times 0.015 (= 2436)$ oe or " $162400 \times 1.015 (= 164836)$ oe or $1.04^2 (= 1.0816)$ or $1.015^2 (= 1.030225)$ OR for process to begin to work with percentage increase for Tamsin and Rachel for one year, eg $150000 \times 1.04 (= 156000)$ oe and $160000 \times 1.015 (= 162400)$ oe	values may be rounded or truncated to 3 sf May be implied by 162000 and 164800
		P1	for full process to find figures to compare, eg Tamsin for 2 years and Rachel for 2 years eg $150000 \times 1.04^2 (= 162240)$ oe and $160000 \times 1.015^2 (= 164836)$ oe OR Tamsin for 2 years and Rachel for 1 year eg $150000 \times 1.04^2 (= 162240)$ oe and $160000 \times 1.015 (= 162400)$ oe	Other comparisons are possible
		C1	for Rachel with supporting figures, eg 162240 and 164836 or 162240 and 162400 or other valid conclusion with supporting comparable figures	Note that the figure used to compare for Rachel can be the figure after 2 years or after 1 year



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
7	65	P1	for a full process to find the volume of the container, eg $\pi \times 15^2 \times 43$ (= 30 394.9...)	These steps may be completed in a different order Accept 9675π
		P1	for a process to convert between cm^3 and litres, eg "30 394.9..." $\div 1000$ (= 30.39...) or [volume] $\div 1000$ or 0.47×1000 (= 470)	Accept 9.675π or $\frac{387}{40}\pi$
		P1	for a process to find the time taken, eg [volume] $\div 0.47$ or [volume] $\div$ "470"	[volume] can be any value they believe to be the volume that might have been incorrectly converted (or not at all)
		A1	answer in the range 64.6 to 65	If an answer is given in the range in working and then rounded incorrectly award full marks.
8	$1.85 \leq x < 1.95$	B1	for 1.85 in correct position	Accept 1.949 or 1.9499(...)
		B1	for 1.95 in correct position	
9	$x^3 + 8x^2 + x - 42$	M1	for a method to find the product of two linear expression (3 out of 4 terms correct or 4 correct terms ignoring signs), eg $x^2 - 2x + 7x - 14$ or $x^2 + 3x - 2x - 6$ or $x^2 + 3x + 7x + 21$	Note that (eg) $5x - 14$ in expansion of $(x + 7)(x - 2)$ is to be regarded as 3 correct terms.
		M1	for a complete method to obtain all terms, half of which are correct (ft their first product), eg $x^3 + 3x^2 - 2x^2 + 7x^2 - 6x + 21x - 14x - 42$	First product must be quadratic with at least 3 terms but need not be simplified or may be simplified incorrectly
		A1	cao	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
8	35	P1 P1 A1	for one correct use of the given scale, eg $40 \div 5 (= 8)$ or $28 \times 5^2 (= 700)$ for process to use area of triangle, eg $28 = \frac{1}{2} \times PQ \times [QR]$ or $[area] = \frac{1}{2} \times PQ \times 40$ cao	Can award these marks in either order [QR] must be clearly identified as the drawing length, and cannot be 40 [area] must be clearly identified as the real area, and cannot be 28
9 (a)	7.25	B1	oe	
(b)	No with supporting reason	C1	No with supporting reason Acceptable reasons: No, the 9 should be recurring No, 7.3491 is greater No, there are numbers between 7.349 and 7.350 Not acceptable reasons: Yes with any reason given Leila is correct ... 7.350 would round down She has rounded to 3sf and should only round to 2sf 7.349 rounds to 7.4	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	Comparison	B1	for correctly identifying the median of (School) A as 57	If median for school B is stated in the comparison it must be correct If range for school B is stated in the comparison it must be correct
		C1	(ft, dep on value for the median being stated) for making a correct comparison of <u>median</u> eg 'the median of (School) A is higher than the median of (School) B'	
		B1	for correctly identifying the range of (School) A as 49	
		C1	(ft, dep on value for the range being stated) for making a correct comparison of <u>range</u> eg 'the range of (School) A is higher than the range of (School) B'	
7	10.2 and 10.3	B1	for 10.2 in the correct place	Accept 10.29 or 10.299(99...)
		B1	for 10.3 in the correct place	
8	14.3	M1	for a correct statement for AB using trigonometry, eg $\tan 62 = \frac{AB}{7.6}$ or $(AB =) 7.6 \times \tan 62$	If an answer is given in the range in working and then rounded incorrectly award full marks
		A1	answer in the range 14.28 to 14.3	
9	(a) $14x^5y^6$	B2	cao	Where a , x^b , y^c can be made up of two products Condone inclusion of multiplication signs for B1
		(B1)	for correct simplification of two terms ax^5y^6 or $14x^by^6$ or $14x^5y^c$ where $a \neq 14$, $b \neq 5$, $c \neq 6$)	
	(b) m^{-6}	B1	for m^{-6} or $\frac{1}{m^6}$	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	New York (supported)	P1	for a conversion between kg and lbs, eg $2 \times 2.2 (= 4.4)$ or $5 \div 2.2 (= 2.27...)$	See page at end of mark scheme £ per lb US dollars per kg lbs per £ kg per US dollar Condone the incorrect assignment of units for all 3 P marks Final comparable values can be rounded or truncated, they just need to be accurate enough to allow a comparison.
		P1	for a conversion between pounds and US dollars, eg $3.75 \times 1.2(0) (= 4.50)$ or $4.9(0) \div 1.2(0) (= 4.08...)$	
		P1	for a process to find figures to compare, eg $3.75 \div "4.4" (= 0.85...)$ and $"4.08..." \div 5 (= 0.81(6...))$ or $"4.50" \div 2 (= 2.25)$ and $4.9(0) \div "2.27..." (= 2.15(6...))$ or $"4.4" \div 3.75 (= 1.17...)$ and $5 \div "4.08" (= 1.22...)$ or $2 \div "4.5" (= 0.44...)$ and $"2.27" \div 4.9(0) (= 0.46 ...)$	
		C1	for New York with correct comparable figures, eg 0.85... and 0.81(6...) OR 2.25 and 2.15(6...)	
5	23.75 and 23.85	B1	for 23.75 in the correct position	Accept 23.849 or 23.8499(9...)
		B1	for 23.85 in the correct position	



Paper: 1MA1/3H				
Question	Working	Answer	Mark	Notes
4		15	P1	strategy to start the problem, eg 8:20 and 20:5
			P1	process to solve the problem, eg $\frac{5}{33} \times 100$ or 24:60:15
			A1	cao
5 (a) (b)		0.625 $9.75 \leq x < 9.85$	B1	cao
			B2	for $9.75 \leq x < 9.85$
			[B1	for 9.75 or 9.85 (or 9.849)]
6		147	P1	starts process, eg uses x and $x + 7$
			P1	starts to work with at least 6 correct sides, may be on the diagram or in an expression
			P1	(dep on previous P1) gives a correct expression for the perimeter, eg $x + x + 7 + x + 7 + x + 7 + x + x + 7 + x + 7 + x + 7$ or adds at least 6 correct sides and equates to 70
			A1	for width = 3.5 oe and length = 10.5 oe
			B1	ft (dep P2) for correct area for their x
7		0.0007452	M1	digits 7452 seen
			A1	cao

Paper: 1MA1/3H				
Question	Working	Answer	Mark	Notes
15 (a)		Shown	M1 C1	for method to establish at least one root between $x = 0$ and $x = 1$, eg $f(0) = -5$ and $f(1) = 3$ for correct values and a deduction about the roots eg as there is a sign change there must be at least one root between $x = 0$ and $x = 1$ (as f is continuous)
(b)		Shown	C1 C1	for a correct first step in rearrangement, eg $x(x^2 + 7) - 5 = 0$ or $x^3 + 7x = 5$ for clear and correct steps showing complete rearrangement
(c)	$x_1 = 0.625$ $x_2 = 0.6765327696$ $x_3 = 0.6704483001$	0.6704(483001)	M1 M1 A1	for substitution of 1 into the formula (to get 0.625) for substitution of " $x_1 = 0.625$ " and " $x_2 = 0.6765327696$ " to give x_2 and x_3 0.6704(483001)
(d)		Comment	M1 C1	substitutes answer to (c) into expression (to get $-0.00549\dots$) appropriate comment, eg accurate as answer is close to 0
16		Yes and correct working	B1 P1 A1	for 147.5 or 148.5 or 148.4999... or 11.75 or 11.85 or 11.84999... substitutes $11.8 < UB \leq 11.85$ and $147.5 \leq LB < 148$ in the formula to work out petrol consumption for 'Yes' and 8.03(3898305...) from correct working
17		14.4	P1 P1 P1 P1 A1	for start of process, eg $0.5 \times 11 \times CD \times \sin 105 = 56$ for complete process to find CD , eg $(CD =) \frac{56}{0.5 \times 11 \times \sin 105}$ oe (= 10.54) for process to find AC , eg $(AC^2 =) 11^2 + [CD]^2 - 2 \times 11 \times [CD] \times \cos 105$ ($AC = 17.09$) for process to find AB , eg $\frac{AB}{\sin 48} = \frac{[AC]}{\sin 118}$ answer in range 14.3 to 14.4



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
15	Proof	C1	for angle PQX = angle SRX as <u>angles in the same segment</u> are equal (or <u>angles</u> at the circumference <u>subtended</u> from the same <u>arc/chord</u> of a circle are equal) or angle QPX = angle RSX as <u>angles in the same segment</u> are equal (or <u>angles</u> at the circumference <u>subtended</u> from the same <u>arc/chord</u> of a circle are equal) or angle PXQ = angle SXR as <u>vertically opposite angles</u> / <u>vertically opposite angles</u> are equal or for identifying two pairs of corresponding equal angles with no reason given	Underlined words need to be shown; reasons need to be linked to their method. Could be shown on the diagram
		C1	for identifying two pairs of corresponding equal angles with correct reasons given	
		C1	for stating that the triangles are similar because all three pairs of corresponding angles are equal with complete reasons given.	Note that the students third/final reason may be: <u>Angles in a triangle add up to 180</u>
16	17.4	B1	for stating any correct bound, eg. 6.75 or 6.85 or 0.045 or 0.055	Accept 6.849 or 6.8499... for 6.85 and 0.0549 or 0.05499.. for 0.055
		M1	using both UB of e and LB of f to work out value of $2e \div f$, eg $2[\text{UB of } e] \div [\text{LB of } f]$ or $\frac{2 \times 6.85}{0.045}$	$6.8 < \text{UB}(e) \leq 6.85$ $0.045 \leq \text{LB}(f) < 0.05$
		A1	for answer in the range 17.4 to 17.5 from correct working	If an answer is given in the range in working and then rounded incorrectly award full marks. Award 0 marks for a correct answer with no (or incorrect) supportive working

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
17 (a)	Shows re-arrangement	C1	for showing rearrangement, must see $x^4 = x^2 + 5$ leading to $x = \sqrt[4]{x^2 + 5}$	Can work backwards
		M1	for substitution to find x_1 eg $\sqrt[4]{1.5^2 + 5}$ (= 1.64...)	
		M1	for substitution to find x_2 eg $\sqrt[4]{1.64...^2 + 5}$ (= 1.66...)	
		A1	for answer in the range 1.6697 to 1.6698 or 1.67(0)	
18	Shown	M1	for start to method to find a ratio connecting 2 of a , b and c , eg $a : c = 3 : 5$ oe or $b : c = 5 : 3$ oe or for start to method to combine ratios, eg $14a : 35c$ (= 126 : 525) and $20b : 35c$ (= 500 : 525)	May be expressed in fractional form Any ratios must be clearly assigned to variables
		M1	for method to find $a : b : c$, eg 9 : 25 : 15 oe or for method to write $a + b : b + c$ in terms of one variable eg $\frac{3c}{5} + \frac{5c}{3} : \frac{5c}{3} + c$	
		A1	for $a + b : b + c = 34 : 40$ oe leading to result	
19	46.989...	B1	for stating at least one bound, 9.25 or 9.35 or 12.55 or 12.65	Accept 9.349 or 9.3499(...) or 12.649 or 12.6499(...) $9.25 \leq \text{LB} < 9.3$ $12.6 < \text{UB} \leq 12.65$ $\sin(x) = 0.731(\dots)$
		P1	for correct use of LB and UB, eg $\sin x = \frac{[\text{LB of AB}]}{[\text{UB of AC}]}$	
		A1	for answer in the range 46.98 to 47 from correct working	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
19	1610	B1	for 5.875×10^8 or 5.885×10^8 or 3.55×10^5 or 3.65×10^5 or the digits 5875 or 5885 or 355 or 365	Accept 5.8849 for 5.885 Accept 3.649 for 3.65
		M1	for method to find lower bound, $\frac{[LB]}{[UB]}$ eg $(5.875 \times 10^8) \div (3.65 \times 10^5)$ oe	$5.875 \times 10^8 \leq [LB] < 5.88 \times 10^8$ $3.6 \times 10^5 < [UB] \leq 3.65 \times 10^5$
		A1	for answer in range 1609 – 1610 from correct working	If an answer is shown in the range in working and then incorrectly rounded award full marks
20 (a)	3.5	P1	for process to find the common difference between the first and second and the common difference between the third and second term eg $(3x + 1) - (x + 2) (= 2x - 1)$ and $(x + 2) - (x - 4) (= 6)$ or for process to write a correct equation in x , eg $(3x + 1) - (x + 2) = (x + 2) - (x - 4)$ or $2x - 1 = 6$ oe	
		A1	for 3.5 oe eg $\frac{7}{2}$	
(b)	-0.5, 8	P1	for process to write a correct equation in terms of the common ratio and y eg $r(y - 4) = y + 2$ or $r(y + 2) = 3y + 1$	r can be any letter apart from y
		P1	for process to write a correct equation in y eg $\frac{3y+1}{y+2} = \frac{y+2}{y-4}$ oe	
		P1	for process to write a correct equation without fractions eg $(3y + 1)(y - 4) = (y + 2)(y + 2)$ oe	
		P1	for process of writing a correct simplified equation eg $2y^2 - 15y - 8 (= 0)$	The quadratic does not have to equal 0, ie accept $2y^2 - 15y = 8$
		A1	cao	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
19	633	B1	for stating any correct bound, eg 10.35 or 10.45 or 103.5 or 104.5 or 0.165 or 0.175 or 0.0165 or 0.0175	Accept 10.449 or 10.4499(9...) for 10.45 Accept 0.1749 or 0.17499(9...) for 0.175
		P1	for process to find the upper bound, eg [UB of height] ÷ [LB of thickness] or $104.5 \div 0.165$ or $10.45 \div 0.0165$ or eg [UB of height] ÷ [LB of thickness] × 10 or $10.45 \div 0.165 \times 10$	$104 < [\text{UB of height}] \leq 104.5$ and $0.165 \leq [\text{LB of thickness}] < 0.17$ or $10.4 < [\text{UB of height}] \leq 10.45$ and $0.0165 \leq [\text{LB of thickness}] < 0.017$ or $10.4 < [\text{UB of height}] \leq 10.45$ and $0.165 \leq [\text{LB of thickness}] < 0.17$
		A1	(dep on all previous marks) for an answer of 633 or 633(.33...) clearly coming from working with correct values eg $104.5 \div 0.165 = 633$	Condone 630 from a correct calculation If correct answer is seen and then incorrectly rounded award full marks Award 0 marks for a correct answer with no (or incorrect) supportive working

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
19	155	M1	for a complete method to find the volume of the hemisphere, eg $\frac{1}{2} \times \frac{4}{3} \times \pi \times 4.2^3$ oe	If an answer in the range is seen in working and then incorrectly rounded award full marks
		A1	answer in range 155 to 155.2	
20	160 (supported)	B1	stating bound of 10.85 or 10.95	Accept 10.949 or 10.9499... for 10.95
		M1	using both UB and LB to work out value of d eg [UB of c] ³ ÷ 8 and [LB of c] ³ ÷ 8 or gives a bound of 159.66... from correct working or gives a bound of 164.11... from correct working	10.9 < UB ≤ 10.98 10.85 ≤ LB < 10.9
		A1	for 159.66... and 164.11... from correct working	Accept bounds rounded or truncated to at least 4 sig fig
		C1	for 160 from 159.66... and 164.11... with a supporting reason eg "since both UB and LB round to 160"	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
18	6.495190528	B1	for 11.25 or 11.35	If the answer is given in the range 6.49 to 6.5 without supportive evidence award 0 marks.
		M1	use $a^2 + a^2 + a^2$ oe for the square of the length of a diagonal	
		M1	for writing an equation to find the length of a side, eg $a^2 + a^2 + a^2 = [\text{LB}]^2$ where $11.25 \leq \text{LB} < 11.3$ oe	
		A1	for an answer in the range 6.49 to 6.50	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
21	984.(3677853) and 969.(0181643)	B1	stating bound of 51.95 or 52.05 or 1.445 or 1.455	Accept 52.049 or 52.0499... for 52.05 Accept 1.4549 or 1.4549... for 1.455
		P1	for process to rearrange formula to give g as the subject, eg $g = \frac{4\pi^2 l}{T^2}$ oe	Rearrangement may occur after substitution, in this case correct bounds are not needed for this mark
		P1	for process to use LB of l and UB of T in formula for g or T or process to use UB of l and LB of T in formula for g or T eg $\frac{4\pi^2[\text{LB of } l]}{[\text{UB of } T]^2}$ or $\frac{4\pi^2[\text{UB of } l]}{[\text{LB of } T]^2}$	51.95 ≤ [LB of l] < 52.0 1.45 < [UB of T] ≤ 1.455 52.0 < [UB of l] ≤ 52.05 1.445 ≤ [LB of T] < 1.45 Rearrangement may not be correct
		A1	for upper bound = 984.(3677853) or 984.(1125639..) and lower bound = 969.(0181643) or 968.(7669227..)	NB: correct answer without supportive working gets 0 marks Accept answers rounded or truncated to 3sf or better



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
22	(£)9.37(9...) and conclusion	B1	for stating at least one bound 187.5 or 192.5 or 192.499... or 872.5 or 877.5 or 877.499... or 71.5 or 72.5 or 72.499...	May be seen in calculations Accept 192.499... or 192.49 or 877.499... or 877.49 or 72.499... or 72.49
		P1	for correct use of LB and UB find the lower bound for profit, eg [LB of selling price] – [UB of costs] (= 872.5 – 192.5 (= 680))	$872.5 \leq [\text{LB selling price}] < 875$ $190 < [\text{UB costs}] \leq 192.5$
		P1	(dep P1) for correct use of LB and UB to find the lower bound for hourly rate, eg [LB of profit] ÷ [UB of hours]	LB profit = “680” $72 < [\text{UB hours}] \leq 72.5$
		C1	for (£)9.37(9...) and conclusion that Ebony does earn more than minimum wage with value from working with correct bounds	$\frac{872.5 - 192.5}{72.5}$ Accept bounds truncated or rounded to at least 2 dp
23	3 : 5	P1	for process to eliminate fractions, eg $11(2x^2 + y^2) = 43(4x^2 - y^2)$ or $22x^2 + 11y^2 = 172x^2 - 43y^2$	Alternative methods are acceptable
		P1	for process to isolate terms in x^2 and y^2 , eg $54y^2 = 150x^2$ or $y^2 = \frac{25x^2}{9}$	
		P1	for full process to find a correct relationship between x and y eg $y = \frac{5x}{3}$ or $y = \frac{5x}{3}$	Accept square roots, eg $\sqrt{54}$ but not decimal approximations.
		A1	cao	

Paper 1MA1: 3H				
Question	Working	Answer	Mark	Notes
15		2.63	P1 P1 P1 P1 A1	for setting up the expression $\frac{1}{2}(x+3)(2x-1)\sin 45$ (may be seen in an equation) (dep) for expanding the brackets in the expression or for the equation $\frac{1}{2}(x+3)(2x-1)\sin 45 = 6\sqrt{2}$ oe (dep) for the process to set up the equation and rearrange to the form $ax^2 + bx + c = d$ e.g. to $2x^2 + 5x - 27 = 0$ or $24 = 2x^2 + 5x - 3$ (dep) for substitution into the quadratic formula e.g. $\frac{-5 \pm \sqrt{5^2 - 4 \times 2 \times -27}}{4}$ for 2.63(10436...)
16 (a)		$x_1 = -2.64$ $x_2 = -2.57392$ $x_3 = -2.603767255$	M1 M1 A1	for substitution of -2.5 into the equation (to get $x_1 = -2.64$) for substitution of " $x_1 = -2.64$ " and " $x_2 = -2.57392$ " to give x_2 and x_3 for $x_1 = -2.64$ oe, $x_2 = -2.57(392)$ and $x_3 = -2.6(03767255)$ Condone $x_3 = -2.61$ if $x_2 = -2.57$ is used in the substitution
(b)		Statements	C1 C1	Connection between equation and iterative form in (a) e.g. rearrangement Statement e.g. iteration is an estimation of a solution
17 (a)		No (supported)	P1 P1 P1 C1	for 265 or 275 or 274.999... or 107.5 or 112.5 or 112.4999... process to find $\frac{d}{t}$ where $270 < d \leq 275$ and $107.5 \leq t < 110$ oe for process to work in consistent units of time eg $\frac{d}{t} \times 60$ or $t \div 60$ where $265 \leq d \leq 275$ and $107.5 \leq t < 110$ oe or $160 \div 60 (= 2.666...)$ Conclusion supported with correct figure(s) given eg No and 153(.488...) or No and 2.66 to 2.7 and 2.5(581...) from correct working
(b)		Statement	C1	e.g. Less distance in the same time so (max) speed would drop



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
21	0.43	B1	for one correct bound for mass or length eg 1967.5 or 1972.5 or 13.15 or 15.95 or 21.65 or 13.25 or 16.05 or 21.75	Can work in any units
		P1	for a correct process to find a bound for the volume, eg $13.15 \times 15.95 \times 21.65$ ($\approx 454(0.925125)$) or $13.25 \times 16.05 \times 21.75$ ($\approx 462(5.409375)$)	Accept volumes truncated or rounded to at least 3 sig fig
		P1	for a correct process to find a bound for density, eg [mass LB] $\div$ "462(5.409375)" ($\approx 0.425(367755)$) where $1965 \leq \text{mass LB} < 1970$ or [mass UB] $\div$ "454(0.925125)" ($\approx 0.434(3828506)$) where $1970 < \text{mass UB} \leq 1975$	Accept densities truncated or rounded to at least 3 sig fig
		A1	for both correct bounds, 0.425(367755) and 0.434(3828506)	Accept bounds truncated or rounded to at least 3 sig fig At this point correct units must be used
		C1	(dep on A1) for a correct statement on degree of accuracy e.g. UB and LB both round to 0.43 to 2 decimal places or 2 significant figures	Must be 0.43 not 0.4



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
19 (a)	81.0662	M1	for one of 26.15 or 26.25 or 4.25 or 4.35	Accept 26.249 for 26.25 and 4.349 for 4.35
		M1	for a correct process to find the upper bound for D [UB of u] ² ÷ [2 × LB of a] eg $\frac{26.25^2}{2 \times 4.25}$ where $26.2 < \text{UB of } u \leq 26.25$ and $4.25 \leq \text{LB of } a < 4.3$	Award for $\frac{26.25^2}{4.25}$
		A1	for answer given in the range 81.0661 to 81.0662 from correct working	
	(b)	B1	for 80 ft answer to (a) with 78.6003	
	80	C1	for explanation relating to the upper bound found in (a)	
	explanation		Acceptable examples bounds agree when rounded to 80 bounds agree to nearest 10 Not acceptable examples 80 79.83325 rounded to nearest tenth	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
23	20	B1	stating bound, eg 10.65 or 10.55 or 31 min 48.5sec or 31 min 47.5sec or 1908.5sec or 1907.5sec	
		P1	(dep on B1) for a correct bound for time in hours, eg 0.5301(38...) or 0.5298(61...) Or a correct process to find one bound for speed in km per minute eg [UB of S] = [UB of D] ÷ [LB of T] or [LB of S] = [LB of D] ÷ [UB of T] or a correct process to find one bound for speed in km per second eg [UB of S] = [UB of D] ÷ [LB of T] or [LB of S] = [LB of D] ÷ [UB of T]	Bound rounded or truncated to 4 dp Where $10.6 < [\text{UB of D}] \leq 10.65$ and $31 \text{ min } 47.5 \text{ sec} \leq [\text{LB of T}] < 31 \text{ min } 48 \text{ sec}$ Or $10.55 \leq [\text{LB of D}] < 10.6$ and $31 \text{ min } 48 \text{ sec} < [\text{UB of T}] \leq 31 \text{ min } 48.5 \text{ sec}$ Where $10.6 < [\text{UB of D}] \leq 10.65$ and $1907.5 \text{ sec} \leq [\text{LB of T}] < 1908 \text{ sec}$ Or $10.55 \leq [\text{LB of D}] < 10.6$ and $1908 \text{ sec} < [\text{UB of T}] \leq 1908.5 \text{ sec}$
		P1	(dep on P1) for correct process to find one bound for speed in km per hour, eg [UB of S] = [UB of D] ÷ 0.5298(61...) or [LB of S] = [LB of D] ÷ 0.5301(38...) OR Correct process to convert a bound for speed in km per minute to km per hour eg [UB of S] = [UB of D] ÷ [LB of T] × 60 or [LB of S] = [LB of D] ÷ [UB of T] × 60 OR Correct process to convert a bound for speed in km per second to km per hour eg [UB of S] = [UB of D] ÷ [LB of T] × 60 × 60 or [LB of S] = [LB of D] ÷ [UB of T] × 60 × 60	Time used in hours Where $10.6 < [\text{UB of D}] \leq 10.65$ and $31 \text{ min } 47.5 \text{ sec} \leq [\text{LB of T}] < 31 \text{ min } 48 \text{ sec}$ Or $10.55 \leq [\text{LB of D}] < 10.6$ and $31 \text{ min } 48 \text{ sec} < [\text{UB of T}] \leq 31 \text{ min } 48.5 \text{ sec}$ Where $10.6 < [\text{UB of D}] \leq 10.65$ and $1907.5 \text{ sec} \leq [\text{LB of T}] < 1908 \text{ sec}$ Or $10.55 \leq [\text{LB of D}] < 10.6$ and $1908 \text{ sec} < [\text{UB of T}] \leq 1908.5 \text{ sec}$
		A1	for both correct bounds from correct working, 20.099... and 19.900...	Figures rounded or truncated to 3 sf or better
		C1	for 20 correct to 2 significant figures as both bounds agree.	



Paper: 1MA1/2H																																																				
Question	Answer	Mark	Mark scheme	Additional guidance																																																
19	60 and reason	B1	for 432.5 or 437.5 or 9.75 or 9.85 or 2.45 or 2.55																																																	
		M1	for a correct process to find a bound for T eg [LB of w] $\div$ [UB of $a - \text{LB of } c$] where 432.5 $\leq$ [LB of w] $<$ 435 and $9.8 <$ [UB of a] $\leq$ 9.85 and 2.45 $\leq$ [LB of c] $<$ 2.5 or [UB of w] $\div$ [LB of $a - \text{UB of } c$] where 435 $<$ [UB of w] $\leq$ 437.5 and $9.75 \leq$ [LB of a] $<$ 9.8 and 2.5 $<$ [UB of c] $\leq$ 2.55	<table><tr><th>Lette r</th><th>Given</th><th>LB</th><th>UB</th></tr><tr><td>w</td><td>435</td><td>432.5</td><td>437.5</td></tr><tr><td>a</td><td>9.8</td><td>9.75</td><td>9.85</td></tr><tr><td>c</td><td>2.5</td><td>2.45</td><td>2.55</td></tr></table> UB <table><tr><th>Lette r</th><th>Given</th><th>LB</th><th>UB</th></tr><tr><td>w</td><td>435</td><td>432.5</td><td>437.5</td></tr><tr><td>a</td><td>9.8</td><td>9.75</td><td>9.85</td></tr><tr><td>c</td><td>2.5</td><td>2.45</td><td>2.55</td></tr></table> LB <table><tr><th>Lette r</th><th>Given</th><th>LB</th><th>UB</th></tr><tr><td>w</td><td>435</td><td>432.5</td><td>437.5</td></tr><tr><td>a</td><td>9.8</td><td>9.75</td><td>9.85</td></tr><tr><td>c</td><td>2.5</td><td>2.45</td><td>2.55</td></tr></table>	Lette r	Given	LB	UB	w	435	432.5	437.5	a	9.8	9.75	9.85	c	2.5	2.45	2.55	Lette r	Given	LB	UB	w	435	432.5	437.5	a	9.8	9.75	9.85	c	2.5	2.45	2.55	Lette r	Given	LB	UB	w	435	432.5	437.5	a	9.8	9.75	9.85	c	2.5	2.45	2.55
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		M1	for a correct process to find both LB and UB bound for T eg [LB of w] $\div$ [UB of $a - \text{LB of } c$] where 432.5 $\leq$ [LB of w] $<$ 435 and $9.8 <$ [UB of a] $\leq$ 9.85 and 2.45 $\leq$ [LB of c] $<$ 2.5 and [UB of w] $\div$ [LB of $a - \text{UB of } c$] where 435 $<$ [UB of w] $\leq$ 437.5 and $9.75 \leq$ [LB of a] $<$ 9.8 and 2.5 $<$ [UB of c] $\leq$ 2.55																																																	
		A1	(dep on all previous marks) for 58.44(5...) and 60.76(3...) with both values clearly coming from working with correct values	Accept bounds rounded or truncated to at least 4 sf																																																
		C1	for 60 from 58.44... and 60.76... and statement that both LB and UB round to 60																																																	



Paper: 1MA1/3H														
Question	Answer	Mark	Mark scheme	Additional guidance										
4	18.6	M1	for finding 4 products within intervals (including end points)	<table><tr><td>Min fx</td><td>Max fx</td></tr><tr><td>5</td><td>10</td></tr><tr><td>20</td><td>30</td></tr><tr><td>105</td><td>140</td></tr><tr><td>160</td><td>200</td></tr></table>	Min fx	Max fx	5	10	20	30	105	140	160	200
		Min fx	Max fx											
		5	10											
20	30													
105	140													
160	200													
M1	for $\Sigma "fx" \div (1 + 2 + 7 + 8)$ or $(7.5 \times 1 + 12.5 \times 2 + 17.5 \times 7 + 22.5 \times 8) \div (1 + 2 + 7 + 8)$ or $("7.5" + "25" + "122.5" + "180") \div "18"$ or $"335" \div "18"$	$\Sigma "fx"$ must come from 4 products fx within intervals (including end points)												
A1	for 18.6(111...)													
5	37 000	B1	cao											
6	50	B1	for finding the time difference, eg, 1hr 18 mins or 78 mins oe	Allow 1.18 for this mark 118 scores B0										
		P1	for correct process to convert minutes to hours, eg $18 \div 60$ (=0.3) or $78 \div 60$ (=1.3) or for a correct process to convert speed in miles per minute to mph eg $"0.833.." \times 60$	For a conversion of time or speed										
		P1	for using speed = distance $\div$ time eg, $65 \div [\text{time}]$ or $65 \div 78$ (=0.833..)	[time] is what the candidate clearly indicates as time difference										
		A1	cao SCB2 for 83(.333...) seen as the answer											

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	600.74	M1	works out decrease for one year eg $679 \times 4 \div 100$ (= 27.16) oe or $679 \times (100 - 4) \div 100$ (= 651.84) oe	Implied by 679×0.12 (= 81.48) or 679×0.88 (= 597.52)
		M1	for compound method, eg $679 \times "0.96"$, $t \geq 2$ or $"651.84" \times "0.96"$ (= 625.76..) or $"651.84" \times 0.04$ (= 26.07) or for answers in the range 600.71 to 600.74	Values may be rounded or truncated
		A1	for 600.71 or 600.72 or 600.73 or 600.74	If correct answer seen, and then difference found award M1M1A0
7	No (supported)	P1	for a conversion with litres and gallons, eg $18 \div 4.5$ (= 4) or 8×4.5 (= 36)	See page at end of mark scheme
		P1	for a conversion with £ and euros, eg 27×0.85 (= 22.95) or $40.8 \div 0.85$ (= 48)	
		P1	for finding the unit price, eg $27 \div 18$ (= 1.5) OR finding proportionality for fuel eg $("36" \div 18)$ (= 2)	May compare cost per gallon or cost in euros May be seen in a calculation or given in a description
		C1	for No with comparative figures, eg No with 20.4 and 22.95 OR No with 1.275 and 1.133...	Accept comparative figures rounded or truncated No is implied by eg Wales is cheaper



Paper: 1MA1/3H						
Question	Answer	Mark	Mark scheme	Additional guidance		
6	(a)	0.7	B1	for 0.7 on the first branch	Accept equivalent fractions or percentages for probabilities	
		0.65, 0.65	B1	for 0.65, 0.65 on the second branches		
	(b)	0.105	M1	for 0.3×0.35		
			A1	oe		
7	(a)	0.008	B1	for 0.008 or 8×10^{-3}	May be awarded at any stage	
	(b)	50	M1	for conversion from km to m eg $180 \div 1000$ (= 180 000) or for conversion from hours to seconds eg $180 \div (60 \times 60)$ (= 0.05) or for conversion from km per hour to metres per second, eg $1000 \div (60 \times 60)$ (= 0.277...) (Accept $(60 \times 60) \div 1000$ (= 3.6))		
				M1		for a complete process eg $180 \times 1000 \div 3600$
				A1		cao
8		158	P1	for a first step in the process eg 50×167.6 (= 8380) or 20×182 (= 3640)		
			P1	for a complete process eg $(50 \times 167.6 - 20 \times 182) \div 30$ or $\frac{8380 - 3640}{30}$ or $4740 \div 30$		
			A1	cao		

