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

Rates, Growth & Compound Measures (R2)

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

52 questions · 187 marks · Mark schemes included

Past papers June 2017 - June 2025 · 2 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.

QUESTION	SOURCE	MARKS	PAGE
R2a SPEED, DENSITY, PRESSURE & RATES		33 Qs · 119 marks	3
1. Q7	GCSE Paper 1H November 2022	2	4
2. Q8	GCSE Paper 3H June 2023	2	5
3. Q3	GCSE Paper 3H November 2017	3	6
4. Q6	GCSE Paper 2H June 2018	3	7
5. Q8	GCSE Paper 1H November 2020	3	8
6. Q13	GCSE Paper 1H November 2020	3	9
7. Q2	GCSE Paper 3H November 2020	3	10
8. Q7	GCSE Paper 2H November 2021	3	11
9. Q7	GCSE Paper 1H June 2022	3	12
10. Q9	GCSE Paper 2H June 2022	3	13
11. Q8	GCSE Paper 1H June 2023	3	14
12. Q6	GCSE Paper 3H June 2023	3	15
13. Q7	GCSE Paper 3H November 2023	3	16
14. Q8	GCSE Paper 3H November 2023	3	17
15. Q8	GCSE Paper 1H November 2024	3	18
16. Q8	GCSE Paper 2H June 2025	3	19
17. Q6	GCSE Paper 3H June 2025	3	20
18. Q6	GCSE Paper 3H June 2017	4	21
19. Q4	GCSE Paper 1H June 2018	4	22
20. Q5	GCSE Paper 3H November 2018	4	23
21. Q13	GCSE Paper 3H June 2019	4	24
22. Q9	GCSE Paper 1H November 2019	4	25
23. Q6	GCSE Paper 3H November 2019	4	26
24. Q13	GCSE Paper 3H November 2019	4	27
25. Q4	GCSE Paper 3H November 2021	4	28
26. Q6	GCSE Paper 3H June 2022	4	29
27. Q5	GCSE Paper 3H June 2024	4	30
28. Q4	GCSE Paper 2H June 2017	5	31
29. Q9	GCSE Paper 1H November 2017	5	32
30. Q18	GCSE Paper 3H November 2018	5	33
31. Q3	GCSE Paper 2H November 2021	5	34
32. Q25	GCSE Paper 3H November 2022	5	35
33. Q12	GCSE Paper 2H November 2024	5	36



QUESTION	SOURCE	MARKS	PAGE
R2b	COMPOUND INTEREST, GROWTH & DECAY	19 Qs · 68 marks	37
34. Q18	GCSE Paper 2H November 2017	1	38
35. Q3	GCSE Paper 2H November 2023	2	39
36. Q6	GCSE Paper 2H June 2017	3	40
37. Q10	GCSE Paper 3H June 2017	3	41
38. Q2	GCSE Paper 3H June 2019	3	42
39. Q13	GCSE Paper 2H November 2019	3	43
40. Q6	GCSE Paper 2H June 2022	3	44
41. Q10	GCSE Paper 3H June 2022	3	45
42. Q6	GCSE Paper 2H November 2022	3	46
43. Q10	GCSE Paper 2H November 2022	3	47
44. Q9	GCSE Paper 2H June 2018	4	48
45. Q10	GCSE Paper 2H November 2021	4	49
46. Q8	GCSE Paper 2H June 2023	4	50
47. Q4	GCSE Paper 3H June 2024	4	51
48. Q14	GCSE Paper 3H June 2024	4	52
49. Q13	GCSE Paper 2H November 2017	5	53
50. Q9	GCSE Paper 3H November 2017	5	54
51. Q4	GCSE Paper 2H November 2018	5	55
52. Q12	GCSE Paper 3H November 2024	6	56



QUESTIONS

52 questions · 187 marks · 2 sub-topics

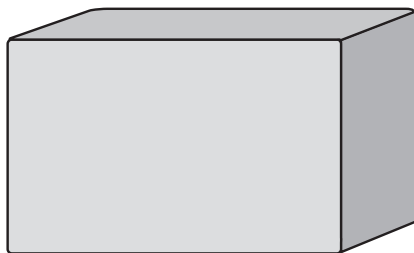
SUB-TOPIC R2a

SPEED, DENSITY, PRESSURE & RATES

Sub-topic R2a · 33 questions · 119 marks · lowest tariff first



7



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

A storage tank exerts a force of 10 000 newtons on the ground.

The base of the tank in contact with the ground is a 4 m by 2 m rectangle.

Work out the pressure on the ground due to the tank.

..... newtons/m²

(Total for Question 7 is 2 marks)



- 8 A solid cuboid is made of metal.

The metal has a density of 9 g/cm^3

The volume of the cuboid is 72 cm^3

Work out the mass of the cuboid.

..... g

(Total for Question 8 is 2 marks)

- 9 Some people were asked if they wanted a new television.

70% of the people said yes.

80% of the people who said yes wanted a television with a large screen.

What percentage of the people asked said they wanted a television with a large screen?

..... %

(Total for Question 9 is 2 marks)



- 2 In London, 1 litre of petrol costs 108.9p
In New York, 1 US gallon of petrol costs \$2.83

1 US gallon = 3.785 litres

£1 = \$1.46

In which city is petrol better value for money, London or New York?
You must show your working.

(Total for Question 2 is 3 marks)

- 3 A gold bar has a mass of 12.5 kg.

The density of gold is 19.3 g/cm^3

Work out the volume of the gold bar.

Give your answer correct to 3 significant figures.

..... cm^3

(Total for Question 3 is 3 marks)



(c) Use your graph to find estimates of the solutions to the equation $x^2 - x - 6 = -2$

.....
(2)

(Total for Question 5 is 6 marks)

6 A force of 70 newtons acts on an area of 20 cm^2

The force is increased by 10 newtons.

The area is increased by 10 cm^2

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

Helen says,

“The pressure decreases by less than 20%”

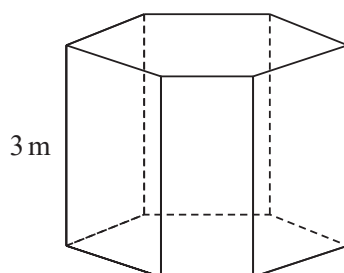
Is Helen correct?

You must show how you get your answer.

(Total for Question 6 is 3 marks)



- 8 The diagram shows a prism placed on a horizontal floor.



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

The prism has height 3 m

The volume of the prism is 18 m^3

The pressure on the floor due to the prism is 75 newtons/m^2

Work out the force exerted by the prism on the floor.

..... newtons

(Total for Question 8 is 3 marks)

- 9 Write these numbers in order of size.
Start with the smallest number.

6.72×10^5

67.2×10^{-4}

672×10^4

$0.000\,672$

.....

(Total for Question 9 is 2 marks)



13 Liquid **A** and liquid **B** are mixed to make liquid **C**.

Liquid **A** has a density of 70 kg/m^3

Liquid **A** has a mass of 1400 kg

Liquid **B** has a density of 280 kg/m^3

Liquid **B** has a volume of 30 m^3

Work out the density of liquid **C**.

..... kg/m^3

(Total for Question 13 is 3 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)



- 7 Liquid **A** has a density of 1.8 g/cm^3
Liquid **B** has a density of 1.2 g/cm^3

80 cm^3 of liquid **A** is mixed with 40 cm^3 of liquid **B** to make 120 cm^3 of liquid **C**.

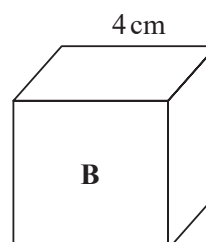
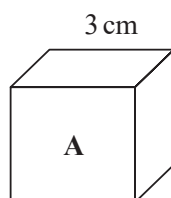
Work out the density of liquid **C**.

..... g/cm^3

(Total for Question 7 is 3 marks)



7 Here are two cubes, **A** and **B**.



Cube **A** has a mass of 81 g.

Cube **B** has a mass of 128 g.

Work out

the density of cube **A** : the density of cube **B**

Give your answer in the form $a : b$, where a and b are integers.

(Total for Question 7 is 3 marks)



- 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.

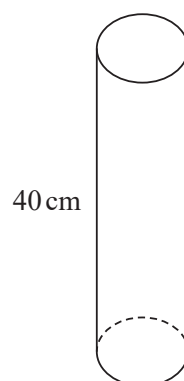
Work out the value of x .

$x =$

(Total for Question 9 is 3 marks)



- 8 The diagram shows a solid cylinder on a horizontal floor.



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

The cylinder has a

volume of 1200 cm^3
height of 40 cm.

The cylinder exerts a force of 90 newtons on the floor.

Work out the pressure on the floor due to the cylinder.

..... newtons/cm²

(Total for Question 8 is 3 marks)



- 6 Lava flows from a volcano at a constant rate of $11.9\text{ m}^3/\text{s}$

How many days does it take for $67\,205\,600\text{ m}^3$ of lava to flow from the volcano?
Give your answer correct to the nearest day.

..... days

(Total for Question 6 is 3 marks)



7 Riley travelled by car and by aeroplane.

He travelled 143 miles by car at an average speed of 55 miles per hour.

Riley then travelled for 5 hours and 20 minutes by aeroplane.

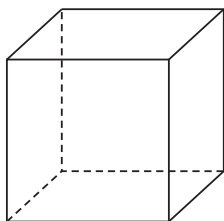
Work out, in hours and minutes, Riley's total travelling time.

..... hours minutes

(Total for Question 7 is 3 marks)



- 8 The diagram shows a solid cube placed on a horizontal table.



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

The pressure on the table due to the cube is 3.5 newtons/cm^2

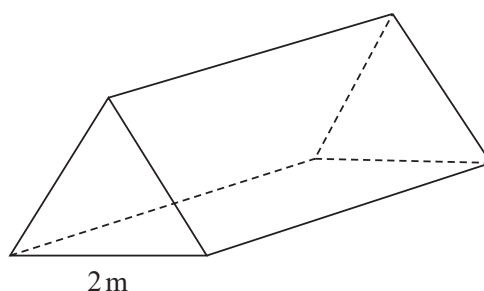
The force exerted by the cube on the table is 504 newtons.

Show that the total surface area of the cube is less than 900 cm^2

(Total for Question 8 is 3 marks)



- 8 The diagram shows a solid triangular prism on a horizontal floor.



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

The face in contact with the floor is a rectangle of width 2 m.

The pressure on the floor due to the prism is 80 newtons/m²

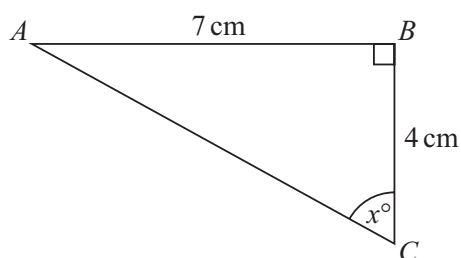
The force exerted by the prism on the floor is 720 newtons.

Work out the length of the prism.

..... m

(Total for Question 8 is 3 marks)

- 7 ABC is a right-angled triangle.



Calculate the value of x .

Give your answer correct to 1 decimal place.

$x = \dots\dots\dots$

(Total for Question 7 is 2 marks)

- 8 Metal rods are made from steel with density 8 g/cm^3
Each metal rod has a volume of 1500 cm^3

The maximum mass of metal rods that can be put on a trolley is 300 kg .

Work out the greatest number of metal rods that can be put on the trolley.

$\dots\dots\dots$

(Total for Question 8 is 3 marks)



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

Complete the error interval for n .

..... $\leq n <$

(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)



- 6 The density of apple juice is 1.05 grams per cm^3 .

The density of fruit syrup is 1.4 grams per cm^3 .

The density of carbonated water is 0.99 grams per cm^3 .

25 cm^3 of apple juice are mixed with 15 cm^3 of fruit syrup and
280 cm^3 of carbonated water to make a drink with a volume of 320 cm^3 .

Work out the density of the drink.

Give your answer correct to 2 decimal places.

.....g/ cm^3

(Total for Question 6 is 4 marks)



- 4 A cycle race across America is 3069.25 miles in length.

Juan knows his average speed for his previous races is 15.12 miles per hour.
For the next race across America he will cycle for 8 hours per day.

- (a) Estimate how many days Juan will take to complete the race.

.....
(3)

Juan trains for the race.
The average speed he can cycle at increases.
It is now 16.27 miles per hour.

- (b) How does this affect your answer to part (a)?

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

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



5 Lara is a skier.

She completed a ski race in 1 minute 54 seconds.

The race was 475 m in length.

Lara assumes that her average speed is the same for each race.

- (a) Using this assumption, work out how long Lara should take to complete a 700 m race.
Give your answer in minutes and seconds.

..... minutes seconds
(3)

Lara's average speed actually increases the further she goes.

- (b) How does this affect your answer to part (a)?

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

(Total for Question 5 is 4 marks)



- 13** The density of ethanol is 1.09 g/cm^3
The density of propylene is 0.97 g/cm^3

60 litres of ethanol are mixed with 128 litres of propylene to make 188 litres of antifreeze.

Work out the density of the antifreeze.

Give your answer correct to 2 decimal places.

..... g/cm^3

(Total for Question 13 is 4 marks)



9 A car travels for 18 minutes at an average speed of 72 km/h.

(a) How far will the car travel in these 18 minutes?

..... km

(2)

David says,

“72 kilometres per hour is faster than 20 metres per second.”

(b) Is David correct?

You must show how you get your answer.

(2)

(Total for Question 9 is 4 marks)



- 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)



13 Liquid A and liquid B are mixed together in the ratio 2 : 13 by volume to make liquid C.

Liquid A has density 1.21 g/cm^3

Liquid B has density 1.02 g/cm^3

A cylindrical container is filled completely with liquid C.

The cylinder has radius 3 cm and height 25 cm.

Work out the mass of the liquid in the container.

Give your answer correct to 3 significant figures.

You must show all your working.

..... g

(Total for Question 13 is 4 marks)



- 4 A water tank is empty.
Anil needs to fill the tank with 2400 litres of water.

Company **A** supplies water at a rate of 8 litres in 1 minute 40 seconds.

Company **B** supplies water at a rate of 2.2 gallons per minute.

1 gallon = 4.54 litres

Company **A** would take more time to fill the tank than Company **B** would take to fill the tank.

How much more time?

Give your answer in minutes correct to the nearest minute.

..... minutes

(Total for Question 4 is 4 marks)



- 6 Jessica runs for 15 minutes at an average speed of 6 miles per hour.
She then runs for 40 minutes at an average speed of 9 miles per hour.

It takes Amy 45 minutes to run the same total distance that Jessica runs.

Work out Amy's average speed.

Give your answer in miles per hour.

..... miles per hour

(Total for Question 6 is 4 marks)



5 Habib has two identical tins.

He puts 600 grams of flour into one of the tins.

The flour fills the tin completely.

The density of the flour is 0.6 g/cm^3

Habib puts 600 grams of salt into the other tin.

The salt does **not** fill the tin completely.

The volume of the space in the tin that is **not** filled with salt is 700 cm^3

Work out the density of the salt.

You must show all your working.

..... g/cm^3

(Total for Question 5 is 4 marks)



- 4 Olly drove 56 km from Liverpool to Manchester.
He then drove 61 km from Manchester to Sheffield.

Olly's average speed from Liverpool to Manchester was 70 km/h.
Olly took 75 minutes to drive from Manchester to Sheffield.

- (a) Work out Olly's average speed for his total drive from Liverpool to Sheffield.

..... km/h
(4)

Janie drove from Barnsley to York.

Janie's average speed from Barnsley to Leeds was 80 km/h.
Her average speed from Leeds to York was 60 km/h.

Janie says that the average speed from Barnsley to York can be found by working out the mean of 80 km/h and 60 km/h.

- (b) If Janie is correct, what does this tell you about the two parts of Janie's journey?

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

(Total for Question 4 is 5 marks)



- 8 Write these numbers in order of size.
Start with the smallest number.

 $0.2\dot{4}\dot{6}$ $0.24\dot{6}$ $0.\dot{2}4\dot{6}$ 0.246

(Total for Question 8 is 2 marks)

- 9 James and Peter cycled along the same 50 km route.

James took $2\frac{1}{2}$ hours to cycle the 50 km.

Peter started to cycle 5 minutes after James started to cycle.

Peter caught up with James when they had both cycled 15 km.

James and Peter both cycled at constant speeds.

Work out Peter's speed.

..... km/h

(Total for Question 9 is 5 marks)



18 A high speed train travels a distance of 487 km in 3 hours.

The distance is measured correct to the nearest kilometre.

The time is measured correct to the nearest minute.

By considering bounds, work out the average speed, in km/minute, of the train to a suitable degree of accuracy.

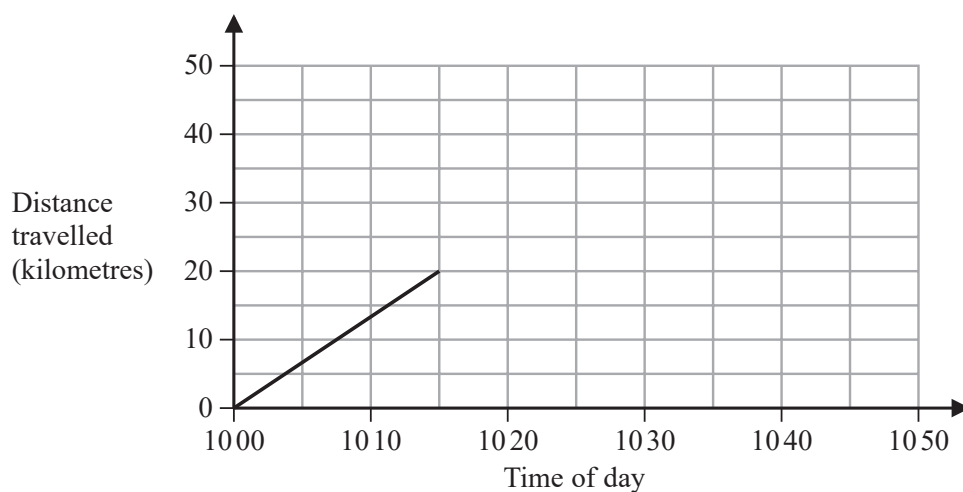
You must show all your working and give a reason for your answer.

.....km/minute

(Total for Question 18 is 5 marks)



- 3 Sam drives his car on a journey.
Here is the travel graph for the first 15 minutes of his journey.



- (a) Work out Sam's speed, in km/h, for the first 15 minutes of his journey.

..... km/h
(2)

At 1015 Sam stops for 10 minutes and then drives for 20 minutes at a speed of 75 km/h.

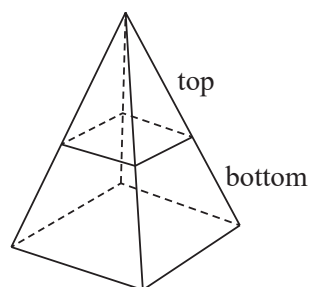
- (b) On the grid, complete the travel graph for Sam's journey.

(3)

(Total for Question 3 is 5 marks)



25 The pyramid **P** is formed from two parts made of different materials.



The top part of **P** has a mass of 92.8 g and is made from material with a density of 2.9 g/cm^3

The bottom part of **P** has a mass of 972.8 g

The average density of **P** is 4.7 g/cm^3

Calculate the volume of the top part of **P** as a percentage of the total volume of **P**.

Give your answer correct to 1 decimal place.

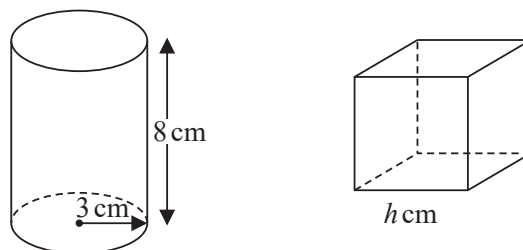
You must show all your working.

..... %

(Total for Question 25 is 5 marks)



- 12 The diagram shows a solid cylinder with base radius 3 cm and height 8 cm.
It also shows a solid cube with side length h cm.



The cylinder is made from steel with a density of 7.86 g/cm^3
The cube is made from brass with a density of 8.5 g/cm^3

The mass of the cylinder is equal to the mass of the cube.

Work out the value of h .

Give your answer correct to 1 decimal place.

$h = \dots\dots\dots$

(Total for Question 12 is 5 marks)

SUB-TOPIC R2b

COMPOUND INTEREST, GROWTH & DECAY

Sub-topic R2b · 19 questions · 68 marks · lowest tariff first



18 At time $t = 0$ hours a tank is full of water.

Water leaks from the tank.

At the end of every hour there is 2% less water in the tank than at the start of the hour.

The volume of water, in litres, in the tank at time t hours is V_t

Given that

$$\begin{aligned}V_0 &= 2000 \\V_{t+1} &= kV_t\end{aligned}$$

write down the value of k .

$$k = \dots\dots\dots$$

(Total for Question 18 is 1 mark)



- 3 Andrew invests £4500 in a savings account for 2 years.
The account pays compound interest at a rate of 3.4% per year.

Calculate how much Andrew has in this savings account at the end of the 2 years.

£.....

(Total for Question 3 is 2 marks)

- 4 Solve $5x - 14 = 52 - x$

$x =$

(Total for Question 4 is 3 marks)



- 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)



Chris says,

“The box plots show that the female students spent more money than the male students.”

(c) Is Chris correct?

Give a reason for your answer.

(1)

(Total for Question 9 is 5 marks)

10 Naoby invests £6000 for 5 years.

The investment gets compound interest of $x\%$ per annum.

At the end of 5 years the investment is worth £8029.35

Work out the value of x .

(Total for Question 10 is 3 marks)



- 2 Katy invests £200 000 in a savings account for 4 years.
The account pays compound interest at a rate of 1.5 % per annum.

Calculate the total amount of interest Katy will get at the end of 4 years.

£.....

(Total for Question 2 is 3 marks)



13 Sakira invested £3550 in a savings account for 3 years.

She was paid 2.6% per annum compound interest for each of the first 2 years.

She was paid $R\%$ interest for the third year.

Sakira had £3819.21 in her savings account at the end of the 3 years.

Work out the value of R .

Give your answer correct to 1 decimal place.

.....
(Total for Question 13 is 3 marks)



- 5 The points L , M and N are such that LMN is a straight line.

The coordinates of L are $(-3, 1)$

The coordinates of M are $(4, 9)$

Given that $LM : MN = 2 : 3$,

find the coordinates of N .

(....., ...)

(Total for Question 5 is 4 marks)

- 6 A new phone cost £679
The value of the phone decreases at a rate of 4% per year.
Work out the value of the phone at the end of 3 years.

£.....

(Total for Question 6 is 3 marks)



10 Jane bought a new car three years ago.

At the end of the first year the value of the car had decreased by 12.5%

The value of the car then decreased by 10% each year for the next two years.

At the end of the three years, the value of the car was £17010

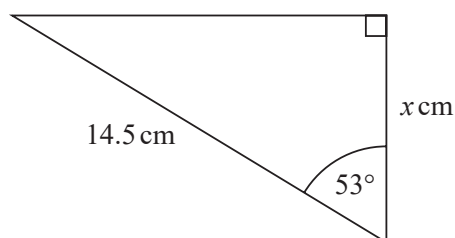
Work out the value of the car when Jane bought it three years ago.

£.....

(Total for Question 10 is 3 marks)



5



Work out the value of x .
Give your answer correct to 3 significant figures.

 $x = \dots\dots\dots$

(Total for Question 5 is 2 marks)

6 Ella invests £7000 for 2 years in an account paying compound interest.

In the first year, the rate of interest is 3%

In the second year, the rate of interest is 1.5%

Work out the value of Ella's investment at the end of 2 years.

 $\pounds \dots\dots\dots$

(Total for Question 6 is 3 marks)



10 Aaliyah bought a car.

In the first year after she bought the car, its value depreciated at a rate of 23% per annum.

In the second year after she bought the car, its value depreciated at a rate of 19% per annum.

At the end of the second year the car was worth £10914.75

What was the value of the car when Aaliyah bought it?

£.....

(Total for Question 10 is 3 marks)



- 9 Jean invests £12 000 in an account paying compound interest for 2 years.

In the first year the rate of interest is $x\%$

At the end of the first year the value of Jean's investment is £12 336

In the second year the rate of interest is $\frac{x}{2}\%$

What is the value of Jean's investment at the end of 2 years?

£.....

(Total for Question 9 is 4 marks)



- 10 Louise invests £ x in Better Investments for 3 years.
Sadiq invests £ x in County Bank for 3 years.

Better Investments

Compound Interest

2.5% per annum

County Bank

Compound Interest

2% per annum for the first two years

3.5% per annum for each extra year

At the end of the 3 years, the value of Louise's investment is £344 605

Work out the value of Sadiq's investment at the end of the 3 years.

£

(Total for Question 10 is 4 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)



(b) On the centimetre grid below, draw a plan of the solid prism.

(2)

(Total for Question 3 is 3 marks)

- 4 A company has 25 000 workers.
The number of workers increases at a rate of 6% per year for 3 years.
Calculate the total number of workers at the end of the 3 years.

(Total for Question 4 is 4 marks)



- 13** There are 30 students in a class.
A teacher is going to choose at random 2 of the students.

Work out the number of different pairs of students that the teacher can choose.

.....
(Total for Question 13 is 2 marks)

- 14** At the start of 2022 Kim invested some money in a savings account.
The account paid 3.5% compound interest each year.

At the end of 2022
interest was added to the account then Kim took £750 from the account.

At the end of 2023
interest was added to the account then Kim took £1000 from the account.

There was then £2937.14 in the account.

Work out how much money Kim invested at the start of 2022
You must show all your working.

£.....

(Total for Question 14 is 4 marks)



- 13 At the beginning of 2009, Mr Veale bought a company.
The value of the company was £50 000

Each year the value of the company increased by 2%.

- (a) Calculate the value of the company at the beginning of 2017
Give your answer correct to the nearest £100

£.....
(2)

At the beginning of 2009 the value of a different company was £250 000
In 6 years the value of this company increased to £325 000

This is equivalent to an increase of $x\%$ each year.

- (b) Find the value of x .
Give your answer correct to 2 significant figures.

.....
(3)

(Total for Question 13 is 5 marks)



- 9 Jack bought a new boat for £12 500

The value, £ V , of Jack's boat at the end of n years is given by the formula

$$V = 12\,500 \times (0.85)^n$$

- (a) At the end of how many years was the value of Jack's boat first less than 50% of the value of the boat when it was new?

.....
(2)

A savings account pays interest at a rate of $R\%$ per year.

Jack invests £5500 in the account for one year.

At the end of the year, Jack pays tax on the interest at a rate of 40%.

After paying tax, he gets £79.20

- (b) Work out the value of R .

.....
(3)

(Total for Question 9 is 5 marks)



- 4 Northern Bank has two types of account.
Both accounts pay compound interest.

Cash savings account
Interest
2.5% per annum

Shares account
Interest
3.5% per annum

Ali invests £2000 in the cash savings account.
Ben invests £1600 in the shares account.

- (a) Work out who will get the most interest by the end of 3 years.
You must show all your working.

(4)

In the 3rd year the rate of interest for the shares account is changed to 4% per annum.

- (b) Does this affect who will get the most interest by the end of 3 years?
Give a reason for your answer.

(1)

(Total for Question 4 is 5 marks)



12 Rudi invests £4500 in a savings account.

He gets compound interest at a rate of

2.4% for the first year

1.8% for each extra year.

(a) Work out the value of Rudi's investment at the end of 3 years.

£
(3)

Bruna buys a car for £7500

The value of the car depreciates by $x\%$ each year.

At the end of 2 years the value of the car is £4107

(b) Work out the value of x .

$x =$
(3)

(Total for Question 12 is 6 marks)



MARK SCHEMES

official mark schemes, in the same order as the questions



Paper: 1MA1/1H					
Question	Answer	Mark	Mark scheme	Additional guidance	
7	1250	P1	for process to use area of base in the formula, eg $\frac{10000}{2 \times 4}$		
		A1	cao		
8	Pair of values	P1	for at least 5 multiples of 5 (with no more than 1 incorrect) or for at least 5 multiples of 7 (with no more than 1 incorrect) or for m = a multiple of 35 and n = a multiple of 14 or for $m = 35$ or $n = 14$	$m = 35, n = 14, 28, 42, 56, 84, \dots$ $m = 105, n = 14, 28, 56, 98, \dots$	
		A1	for a correct pair of values, eg $m = 35$ and $n = 14$ or $m = 35$ and $n = 28$ or $m = 105$ and $n = 14$		
9	(a)	(9), -4, -5, 0, 5, (4), (-9)	B2	for all 4 values correct	Accept a freehand curve drawn that is not made of line segments Ignore anything outside the required range
			(B1	for 2 or 3 correct values)	
	(b)	Graph drawn	B2	for a fully correct graph	
			(B1	ft (dep on B1 in (a)) for plotting at least 5 of the points from their table correctly)	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
5 (a)	63	B1	for 63, accept $3 \times 3 \times 7$ or $3^2 \times 7$	(A =) $2^2 \times 3^4 \times 7$ scores 0 marks
		M1	for at least two of $2^2, 3^4, 7^2$ or shows at least 3 multiples of 2268, eg 2268, 4536, 6804 and at least 3 multiples of 441, eg 441, 882, 1323	
		A1	for 15876 or $2^2 \times 3^4 \times 7^2$ oe	
6	65	P1	for a correct process to find the number of seconds, eg $67\,205\,600 \div 11.9 (= 5\,647\,529.4\dots)$ or for a correct process to convert between seconds and days, eg $24 \times 60 \times 60 (= 86\,400)$ oe, may be seen in stages or $11.9 \times 60 \times 60 \times 24 (= 1\,028\,160)$	Note that this mark may be awarded at any stage in the working. If a correct answer within the range is shown in working but incorrectly rounded award full marks.
		P1	for a complete process, eg “5 647 529.4...” $\div$ “86 400” or $67\,205\,600 \div$ “1 028 160”	
		A1	accept answers in the range 65 to 65.4 or 66	
7 (a)	(1, -3)	B1	cao	
		B1	for an answer in the range -0.8 to -0.6 or 2.6 to 2.8	
8	648	M1	for substitution into density formula eg 9×72 or $9 = \frac{m}{72}$	
		A1	cao	

Paper: 1MA1/3H				
Question	Working	Answer	Mark	Notes
1 (a) (b)		$160 < h \leq 170$ Line segments joining the points (135, 4), (145, 11), (155, 24), (165, 22) and (175, 19)	B1 C2 [C1]	correct class interval for fully correct frequency polygon for points plotted correctly at midpoints of intervals OR joining points with line segments at the correct heights and consistent within the intervals (including end values) OR correct frequency polygon with one point incorrect OR correct frequency polygon with first and last point joined] NB: ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted
2		New York (supported)	P1 P1 C1	for changing between £ and \$, eg $1.089 \times 1.46 (= 1.58(9.))$ or $2.83 \div 1.46 (= 1.93(8.))$ or between litres and gallons, eg $1.089 \times 3.785 (= 4.12(1.))$ or $2.83 \div 3.785 (= 0.74(7.))$ for a complete process to give values that can be used for comparison, eg “ $1.938... \div 3.785 (= 0.51(2.))$ ” or “ $1.589... \times 3.785 (= 6.01(7.))$ ” or $1.089 \times 3.785 (= 4.12(1.))$ and $2.83 \div 1.46 (= 1.93(8.))$ for New York and correct comparative values
3		648	M2 [M1 A1]	a complete method, eg $12.5 \times 1000 \div 19.3$ for using volume = mass/density, eg $12500 \div 19.3$ (condone inconsistent units or incorrect conversions) may be implied by digits 647... or 648...] for answer in range 647 to 648



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	No (supported)	P1	For a process to calculate the initial or new pressure, eg $(70 + 10) \div (20 + 10)$ (=2.6 to 2.7) or $80 \div 30$ (=2.6 to 2.7) or $70 \div 20$ (=3.5)	Accept any value in the range 2.6 to 2.7 if unsupported by working
		P1	For a complete process to make a comparison eg. $0.8 \times "3.5"$ (=2.8) OR $\frac{"3.5" - "2.6"}{"3.5"} \times 100$ (=22 to 26) OR $"3.5" \times 0.2$ (=0.7) and $80 \div 30$ (=2.6 to 2.7) OR $\frac{"2.6"}{"3.5"} (\times 100)$ (=0.74 to 0.78 or 74 to 78)	
		A1	for a correct conclusion supported by accurate figures eg 2.8 and 2.6(6...) OR decrease is 24% (or 22% to 26%) OR 0.7 and 2.6 to 2.7 and 3.5 OR 0.7 and 0.9 OR 0.76 (or 0.74 to 0.78) OR 76% (or 74% to 78%)	
7	Enlargement	B2	for correct enlargement at (1,2) (2,3) (2,4) (1,4)	
		(B1	for correct size and orientation in the wrong position OR 3 of 4 vertices correct and joined OR 4 correct vertices not joined)	



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
7	20 or 24 or 168	B1	for identification of the range of the girls (20) or the range (24) or the median (168) of the boys	
	Comparison	C2	for a correct comparison of medians and a correct comparison of ranges supported by correct figures eg the median height for girls (165) is less than the median height for boys (168) and the range for girls (20) is less than the range for boys (24) At least one comparison must be in context referring to height or quoting cm.	Simply quoting values for median, range is insufficient; they must be compared.
		(C1	for a correct comparison of medians or a correct comparison of ranges that could fit their incorrect figure(s))	Context not necessary for C1
8	450	M1	for $18 \div 3 (=6)$	Ignore units
		M1	for substitution eg. $75 = \frac{F}{"6"}$ or $75 \times "6"$	
		A1	cao	
9	0.000 672, 67.2×10^{-4} 6.72×10^5 672×10^4	B2	cao	Accept correct numbers in any form
		(B1	for correct conversions to same format, condoning one error or for 3 numbers in the correct order (ignoring one) or for all 4 numbers listed in reverse order)	



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)	5,15,35,55,70,80	B1	cao	
(b)	Graph drawn	M1 A1	for 5 or 6 of their points plotted correctly from a cf table for a fully correct graph SC B1 if 5 or 6 of their points plotted not at end but consistent within each interval and joined by a curve or line segments providing no gradient is negative	Ignore to the left of the first point and right of the last point If histograms drawn, points must be identified Accept a smooth curve or line segments
(c)	Correct decision and correct figures	M1 M1 C1	for $60 \div 100 \times 80 (=48)$ oe reading value from graph at cf = 48 (=380) ft for correct decision and correct figures, eg No with 48 and "380" or with "40" and "50" (%) or with "40" and 48 reading value from graph at wage = 360 (=40) or for $35 + \frac{1}{5} \times 20 (=39)$ for "40" $\div 80 \times 100 (=50(\%))$ or for $60 \div 100 \times 80 (=48)$	ft from a cum freq graph
13	196	P1 P1 A1	for vol A = $1400 \div 70 (=20)$ or for mass B = $280 \times 30 (=8400)$ for density C = $\frac{1400 + "8400"}{"20" + 30} (= \frac{9800}{50})$ or answer with digits 196 cao	An answer of 350 from $70 + 280$ gets no marks
14	0.42	P1 P1 A1	for appropriate multiplication eg $0.3 \times 0.7 (=0.21)$ or $0.3 \times 0.1 (=0.03)$ or $0.3 \times 0.6 (=0.18)$ (dep) for complete process eg $0.3 \times 0.7 + 0.7 \times 0.3$ or $0.3 \times 0.1 + 0.3 \times 0.6 + 0.6 \times 0.3 + 0.1 \times 0.3$ oe	Probabilities could also be given in fraction or percentage form Acceptable equivalents are 42% or $\frac{42}{100}$ oe



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: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
7	1.6	P1 P1 A1	for $1.8 \times 80 (= 144)$ or $1.2 \times 40 (= 48)$ or for 192 or for $80 : 40 = 2 : 1$ for $(("144" + "48") \div (80 + 40))$ or $192 \div 120$ or for $(1.8 \times 2 + 1.2) \div 3$ or $4.8 \div 3$ oe	
8	Error in inequalities	C1	for identifying incorrect inequalities Acceptable examples gives at least one correct inequality eg $(10 < t \leq 20)$ should be $0 < t \leq 20$ it should be $t \leq 20$ (all) inequalities should start with 0 should start with 0 Not acceptable examples $10 < t \leq 20$ is wrong the numbers have been added wrong	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	132	M1 M1 A1	for finding an exterior angle eg $360 \div 6 (= 60)$ or $360 \div 5 (= 72)$ or an interior angle eg $180 \times 4 \div 6 (= 120)$ or $180 \times 3 \div 5 (= 108)$ for a complete method eg $360 - "120" - "108"$ or $"60" + "72"$ cao	Angles may be shown on the diagram. Only award this mark for an angle that is not contradicted Answer only award no marks
6	(a) 5,(1),(-1),-1,1,5 (b) Graph drawn (c) 0.3 to 0.5 and 2.5 to 2.7	B2 (B1) B2 (B1) M1 A1	for all 4 values correct (B1 for 2 or 3 correct values) for a fully correct graph (B1 fit (dep on B1 in (a)) for plotting at least 5 of the points from their table correctly) for a correct method, eg marking intercepts with x -axis or one correct solution or both solutions given as a coordinates, eg (0.4, 2.6) or (0.4, 0) and (2.6, 0) for answers in the range 0.3 to 0.5 and 2.5 to 2.7 or fit their graph with at least 2 solutions	 Accept a freehand curve drawn that is not made of line segments Ignore anything drawn outside the required range fit their graph for this mark Accept these coordinates reversed
7	3 : 2	P1 P1 A1	for a process to find either volume eg $3^3 (= 27)$ or $4^3 (= 64)$ for showing density A = $81 \div "27" (= 3)$ or density B = $128 \div "64" (= 2)$ for 3 : 2 oe	 Ignore units quoted



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: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	(a) Description	C1	for a valid description of the relationship Acceptable examples As age increases, weight increases The older you are the greater the weight Positive correlation Not acceptable examples Positive (relationship) age and weight are in proportion strong correlation or correlation is increasing as the babies get older the heavier they get, negative correlation they are directly proportional, weight goes up as age goes up	Accept positive correlation Ignore any comment about strength
	(b) 2.5 to 4.5	B2 (B1	for an answer in the range 2.5 to 4.5 for a suitable line of best fit drawn or for a point on the grid at (x, 5.8) where x lies between 2.5 and 4.5 or a horizontal line drawn from 5.8 across to (x, 5.8) where x is in the range 2.5 to 4.5)	
7	1200	M1	for a fully correct method, eg $240 \div 0.2$ or 240×5 oe	
		A1	cao SC B1 for an answer of 960 or 1440 if M0 scored	
8	3	P1	for process to find area of base, eg $1200 \div 40 (= 30)$	
		P1	for process to find pressure, eg $90 \div "30"$	
		A1	cao	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	20	M1 A1	for $30 \times 4 \div 6$ oe cao	
7	7 hours 56 minutes	P1 P1 A1	for process to begin to work with speed, eg $143 \div 55 (= 2.6)$ for process to work in minutes, eg " 2.6 " $\times 60 (= 156 \text{ mins})$ and $5 \times 60 + 20 (= 320 \text{ mins})$ or for 476 (mins) or for process to work in hours eg " 2.6 " and $5\frac{20}{60} (= 5.33\ldots)$...or for 7.93... or for process to work in hours and minutes, eg " 2 " + (" 0.6 " $\times 60$) $(= 2 \text{ hrs } 36 \text{ mins})$ cao	May work in minutes or hours and minutes Accept 2 or more decimal places for this mark
8	Shown	M1 M1 C1	for substitution to find area of face, eg $3.5 = \frac{504}{\text{area}}$ or $3.5 \times \text{area} = 504$ or $\text{area} = 504 \div 3.5 (= 144)$ or for working from surface area eg $900 \div 6 (= 150)$ for method to find comparable figures, eg " 144 " $\times 6 (= 864)$ or " 150 " $\times 3.5 (= 525)$ or $504 \div "150" (= 3.36\ldots)$ or for $504 \div 3.5 (= 144)$ and $900 \div 6 (= 150)$ or for $900 \div 144 (= 6.25)$ and 6 for correct comparable figures, eg 864 (and 900) or 144 and 150 or 525 (and 504) or 3.36... (and 3.5) or 6.25 and 6	Other equivalent methods should be credited accordingly Condone incorrect units given.



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
8	4.5	P1 P1 A1	for process to find the area, eg $80 = \frac{720}{A}$ or (area =) $\frac{720}{80}$ (= 9) or $80 = \frac{720}{2x}$ or $2x = \frac{720}{80}$ for complete process to find the length, eg “9” $\div 2$ or $720 \div (2 \times 80)$ for 4.5 oe	
9 (a)	Box plot	B3 (B2) (B1)	for a fully correct box plot for a box drawn and at least three correctly plotted values from 8, 25, 34, 42, 74) for correctly identifying one of LQ (25), Median (34), UQ (42) from the cf graph)	Box can be any height. Accept ends that are marked (eg line, cross, dot) or defined by the ends of the whiskers if clear For LQ accept value in range 24 to 26 May be implied by one of these values being correctly plotted
(b)	Yes with supporting evidence	M1 M1 C1 M1 M1 C1	for $30 \div 100 \times 60$ (= 18) for reading from the graph at cf = 60 – “18” (= 40) for correct decision and correct figures Alternative for reading from the graph at mark = 40 (= 42) for $(60 - “42”) \div 60 \times 100$ (= 30) or for $60 - “42”$ (= 18) and $30 \div 100 \times 60$ (= 18) for correct decision and correct figures	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
7	60.3	M1	for a correct trig statement, eg $\tan x = \frac{7}{4}$	Other methods are possible but only award this mark at the point of an equation with x as the only unknown
		A1	60.2 to 60.42	
8	25	P1	for working with density eg $8 \times 1500 (= 12\,000)$ or [density] $\times 1500$	P marks can be awarded in either order [density] is 8×10^3 Condone $8 \times 1500 \times 300$ for this mark only P marks can be awarded in either order [mass] must be what they believe to be mass following a calculation that uses 8 and 1500 but not 300
		P1	for a conversion, eg “12 000” $\div 1000 (= 12)$ or $\frac{8}{1000} (= 0.008)$ or $300 \times 1000 (= 300\,000)$ or [mass] $\div 1000$	
		A1	cao	
9	12, – 3, 2	B2	all correct	12 – 3 x^2 seen in working space gets B2 unless contradicted May be seen in an expression of the correct form, eg $a + bx^n$
		(B1	for one or two correct)	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	630	M1	for converting time, eg $24 \text{ minutes} = \frac{24}{60}$ (= 0.4 (hours)) oe eg $\frac{2}{5}$ (hours) or $2 \text{ hours } 24 \text{ minutes} = 2 + \frac{24}{60}$ (= 2.4 (hours)) oe eg $2\frac{2}{5}$ (hours) or $2 \text{ hours } 24 \text{ minutes} = 2 \times 60 + 24$ (= 144 (minutes)) oe or $2 \text{ hours } 24 \text{ minutes} = 2 \times 60 \times 60 + 24 \times 60$ (= 8640 (seconds)) oe OR for using distance $\div$ time, eg $1512 \div [\text{time}]$ oe or $[\text{distance}] \div [\text{time}]$ oe	10.5 or 0.175 imply M1 [distance] can be 1512 or the result of an attempt to convert 1512 km to a different unit, it must have the digits 1512 eg 151.2 or 1 512 000 [time] can be any value they believe to be the time the plane takes to fly
		M1	for a complete method using distance $\div$ time, eg $1512 \div "2.4"$ or $1512 \div "2\frac{2}{5}"$ or $1512 \div "144" \times 60$ oe or $1512 \div "8640" \times 60 \times 60$ oe	
		A1	cao	



Paper 1MA1: 3H				
Question	Working	Answer	Mark	Notes
6		1.01	P1 P1 P1 A1	fruit syrup $15 \times 1.4 (= 21)$ or water $280 \times 0.99 (= 277.2)$ or apple juice $25 \times 1.05 (= 26.25)$ (dep P1) for complete process to find the total mass e.g. “277.2” + “26.25” + “21” (= 324.45) or a weighted density eg $15 \times 1.4 \div 320 (= 0.065625)$ or $280 \times 0.99 \div 320 (= 0.86625)$ or $25 \times 1.05 \div 320 (= 0.08203125)$ (dep P2) for complete process to find the density eg “324.45” $\div 320 (= 1.01\dots)$ or “0.065625” + “0.86625” + “0.08203125” (= 1.0139..) 1.01 to 1.014
7		5.86	M1 A1	for $\sin 23 = \frac{AB}{15}$ NB Allow any alternative equivalent method to form an equation in AB 5.8 to 5.9
8		5.59	M1 M1 M1 A1	For use of $\pi r^2 = 49$, where r is the radius or $r = 3.9(49\dots)$ or diameter = 7.8(9865...) For use of Pythagoras to set up an equation in x^2 e.g. $x^2 + x^2 = (d)^2$ or $x^2 = r^2 + r^2$ For use of trigonometry to set up an equation in x eg $\sin 45 = x \div d$ (dep on M2) Rearrange to $(x^2 =) 2 \times “3.949\dots”^2$ Rearrange to $(x =) “7.898\dots” \times \sin 45$ oe 5.5 to 5.6
9	(a) (b) 60,180,300,350,650 (c) Medians 250 and 300	180 Statement	M1 A1 B2 (B1) C1	for evidence of using the LQ (150) and UQ (330) eg 330 – 150 cao for fully correct box plot for showing a box and at least 3 correctly plotted values for a correct comparative statement relevant to the question e.g. Yes because the female students have a greater median than the male students

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
4 (a)	Estimated value	P1	for using a rounded value in a correct process eg $3000 \div 15$ or 15×8 or 20×8	Their rounded value must be used in a calculation Rounding may appear after a correct process eg $15.12 \times 8 = 120.96 \approx 100$ followed by eg $3069.25 \div 100$
		P1	for a full process to find the number of days eg " $3000 \div 15 \div 10$ " (= 20) or " $3000 \div 15 \div 8$ " (= 25)	Accept $3069.25 \div 15.12 \div 8$ oe
		A1	for a correct answer following through their rounded values	
(b)	Explanation	C1	eg less days required or it doesn't affect the answer because I would still round 16.27 down to 15 (or up to 20)	Refers to time taken



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
5 (a)	2 mins 48 secs	P1	for an appropriate first step eg $700 \div 475 (=1.47..)$ or $475 \div [\text{time}] (= 4.16.. \text{ m/s})$ or $[\text{time}] \div 475 (= 0.24 \text{ s/m})$	[time] what candidate indicates as time of first race Units are not needed and can be ignored if given Allow calculation in stages and appropriate rounding.
		P1	for a complete method to find the required time eg $700 \div 475 \times [\text{time}] (=168)$ or $700 \div (475 \div [\text{time}]) (=168)$ or $[\text{time}] \div 475 \times 700 (=168)$	
		A1	cao	
	(b) Statement	C1	eg takes less time Acceptable examples Quicker time Faster time Reduces my answer to part (a) Not acceptable examples It is an underestimate The amount of time could/may increase Laura goes faster	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	1.01	P1	for $1.09 \times 60 (= 65.4 \text{ or } \frac{327}{5})$ or $0.97 \times 128 (= 124.16 \text{ or } \frac{3104}{25})$	Note that the volumes may be converted to ml, eg $1.09 \times 60000 (= 65400)$ Candidates working in ml must use 188,000 If an answer within the range is seen in working but then rounded incorrectly award full marks. Accept 1 for 1.00 Note that the correct value is 1.008.....
		P1	for $1.09 \times 60 (= 65.4 \text{ or } \frac{327}{5})$ and $0.97 \times 128 (= 124.16 \text{ or } \frac{3104}{25})$ or “65.4” + “124.16” ($= 189.56 \text{ or } \frac{4739}{25}$)	
		P1	for a complete process to find the density of antifreeze eg “(65.4” + “124.16”) $\div 188$ or $189.56 \div 188$ or $\frac{4739}{25} \div 188$	
		A1	for answer in the range 1.00 to 1.01	
14	36	P1	for process to find an expression for the area of triangle eg $\frac{1}{2} \times 24 \times AE \times \sin 30 (= 6AE)$	Accept any correct expression, eg $\frac{1}{2} \times 24 \times y \times \sin 30$ May be shown on the diagram by labelling AE and AB with, for example, $3x$, x or x , $\frac{1}{3}x$ or $\frac{3}{4}x$, $\frac{1}{4}x$ Do not accept 3, 1 or $1, \frac{1}{3}$ or $\frac{3}{4}, \frac{1}{4}$ for this mark.
		P1	(dep P1) for process to link the area of rectangle with the area of the triangle eg $2 \times \frac{1}{2} \times 24 \times AE \times \sin 30 (= 12AE)$ or for $AB = 12$	
		P1	(indep) for use of given ratio eg $AE = 3AB$ or, eg area of rectangle $= AE \times AB = 3x \times x$	
		A1	cao	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
9 (a)	21.6	M1	for a method using distance = speed $\times$ time, eg. $72 \times \frac{18}{60}$ or 7.2 km in 6 minutes, so 7.2×3 oe partitioning method	Accept 72×18
		A1	for 21.6 oe	
	No (supported)	M1	for a method to convert 20 m/s to km/h or 72 km/h to m/s, eg. $20 \times \frac{3600}{1000}$ (= 72) or $72 \times \frac{1000}{3600}$ (= 20)	Accept methods to convert both speeds to km/s or m/h
		C1	for No since 72 km/h = 20 m/s oe	
10 (a)	cf graph through (40, 5), (60, 25), (80, 35), (100, 38) and (120, 40)	C2	for a complete and accurate cf graph	May be a cumulative frequency curve or a cumulative frequency polygon Ignore any graph drawn to the left of the first point If histograms drawn, plots must be identified
		(C1	for at least 4 or 5 cf values plotted correctly)	
	answer in range 21 to 28	SC: B1	for 4 or 5 points plotted not at end but consistently within each interval and joined provided no gradient is negative	
		M1	for UQ in the range 66 to 70 or LQ in the range 42 to 46 or ft their cf graph	
	answer in the range $\frac{19}{40}$ to $\frac{24}{40}$	A1	for answer in range 21 to 28 or ft their cf graph	Their graph must be a cf graph
		M1	for finding the difference between readings taken from the cf axis at points from a mark of 50 and a mark of 90 or ft their graph (if possible)	
(c)		A1	for an answer in the range $\frac{19}{40}$ to $\frac{24}{40}$ or ft their cf graph	Accept any equivalent fraction, decimal from 0.475 to 0.6 or percentage from 47.5% – 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: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
11	0.1709	M1 M1 A1	for one product, $0.07 \times 0.98 (=0.0686)$ or $0.93 \times 0.11 (=0.1023)$ or $0.07 \times 0.02 (=0.0014)$ or $0.93 \times 0.89 (=0.8277)$ for a fully correct method, eg $0.07 \times 0.98 + 0.93 \times 0.11$ or $1 - (0.07 \times 0.02) - (0.93 \times 0.89)$ oe	If all products shown, award this mark
12	Box plot	M1 M1 A1	for correctly identifying one of the LQ (188), median (197) or UQ (209) from the stem leaf for showing a box and at least 3 correctly plotted values from 173, 188, 197, 209, 219 for a fully correct box plot	May be implied by one of these values being correctly plotted.
13	739	P1 P1 P1 A1	process to find the volume of C, eg $\pi \times 3^2 \times 25 (=706.8583471)$ or 225π process to find the volume of A or the volume of B, eg “ $706.8\dots$ ” $\times \frac{2}{2+13} (=94.24777961)$ or 30π or “ $706.8\dots$ ” $\times \frac{13}{2+13} (=612.6105675)$ or 195π or process to work with density and ratio, eg $(2 \times 1.21 + 13 \times 1.02) (=15.68)$ process to find the mass of C, eg “ 30π ” $\times 1.21 (=114.0398133)$ + “ 195π ” $\times 1.02 (=624.8627788)$ or “ 225π ” $\times$ “ 15.68 ” $\div (2+13)$ for an answer in the range 738.5 to 739	For use of 3.14 Volume of C is 706.5 Volume of A is 94.2 Volume of B is 612.3 Mass of A is 113.982 Mass of B is 624.546 Do not award accuracy mark if the figure is from obvious incorrect working

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	260	P1	conversion to common units of capacity eg $2.2 \times 4.54 (= 9.988)$ or $8 \div 4.54 (= 1.76...)$ OR for Company A $2400 \div 4.54 (= 528.63...)$ OR $2400 \div 8 (= 300)$ OR a rate per minute $8 \div [\text{time for Company A}] (= 4.8...)$ or	Results of calculations may be truncated or rounded. [time for Company A] could be 1 min 40 sec or 1.66... or 1.6 or 1.40 etc as long as it is clear it relates to 1 min 40 sec
		P1	for a complete process to find the time for company A or company B in minutes. eg in litres Company A $2400 \div "4.8..." (= 500)$ or $"300" \times [1 \text{ min } 40 \text{ sec}] (= 500)$ or Company B $2400 \div "9.988" (= 240.28...)$ OR eg in gallons Company A $"528.63..." \div ("1.76..." \div [1 \text{ min } 40 \text{ sec}]) (= 500)$ or Company B $"528.63..." \div 2.2 (= 240.28...)$	
		P1	for complete processes to find the times for both company A and company B in minutes. Company A eg in litres $2400 \div "4.8..." (= 500)$ or $"300" \times [1 \text{ min } 40 \text{ sec}] (= 500)$ or in gallons $"528.63..." \div ("1.76..." \div [1 \text{ min } 40 \text{ sec}]) (= 500)$ AND Company B eg in litres $2400 \div "9.988" (= 240.28...)$ or in gallons $"528.63..." \div 2.2 (= 240.28...)$	
		A1	for an answer in the range 259 to 260	If the answer is given within the range but then rounded incorrectly award full marks.



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	40 missing from frequency scale Incorrect point (50, 5)	C2	Two different statements Acceptable eg (50, 5) / the last point is incorrect the last point should be at (45,5) the last point plotted was placed incorrectly for his last point he has plotted by the end of the data and for the rest he has plotted by the middle he did not use the midpoint, he used 50 instead of 45 40 missing (from vertical axis) vertical scale is not linear the frequency doesn't increase in the same intervals the vertical axis is not right Not acceptable eg the last point should be at (40, 5) bottom of the polygon should be connected he didn't start the graph at the origin he did not draw a polygon he has plotted the first 4 points at midpoint (C1 One acceptable statement)	Ignore additional statements provided no contradiction
6	10	P1 P1 P1 A1	for a process to use distance = speed × time for either of the parts of Jessica's journey, eg. $6 \times \frac{15}{60}$ (= 1.5) or $9 \times \frac{40}{60}$ (= 6) or 6×15 (= 90) or 9×40 (= 360) for a process to add the 2 distances for Jessica, eg $6 \times \frac{15}{60} + 9 \times \frac{40}{60}$ (= 7.5) or $6 \times 15 + 9 \times 40$ (= 450) for complete process to find Amy's average speed, eg. "7.5" ÷ "0.75" oe or "450" ÷ 45 cao	Must be consistent units at this stage.



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	29 775	P1	for evidence of using a correct first step eg $25\,000 \times 0.06 (= 1500)$ or $25\,000 \times 1.06 (= 26\,500)$	P3A0 is implied by 4775 or 4776 or 4780 or 4800
		P1	for evidence of a "compound interest" process eg " $26\,500 \times 0.06 (= 1590)$ or " $26\,500 \times 1.06 (= 28\,090)$ or $25\,000 \times 1.06^t$, $t \geq 2$	
		P1	for a complete process eg $25\,000 \times 1.06^3 (= 29\,775.4)$	
		A1	for 29 775 or 29 776 or 29 780 or 29 800 SCB1 for 3000 or 4500 or 28000 or 29500 seen if P0 scored	
5	2	P1	for process to find volume of tin eg $600 \div 0.6 (= 1000)$	Award P1 for $600 \div 0.6 (= 1000)$ even if not used [volume] can be 700 or from a seen calculation using "1000", "300", 700 or identified as volume by label or formula or units A correct answer with no supportive working gets 0 marks
		P1	for process to find volume of salt eg " $1000 - 700 (= 300)$ "	
		P1	for a process to find density of the salt eg $600 \div "300"$ or $0.6 \times ("1000" \div "300")$ or $600 \div [\text{volume}]$	
		A1	cao	



Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
4 (a)		57.1	P1 P1 P1 A1	for a process to find time from Liverpool to Manchester, eg. $56 \div 70 (= 0.8 \text{ (hrs) or } 48 \text{ (mins)})$ for a process to find total distance, eg. $56 + 61 (= 117)$ or the total time, eg. “48” + 75 (= 123) or “0.8” + $\frac{75}{60} (= 2.05)$ with consistent units of time (dep P2) for a correct process to find average speed with consistent units of time, eg. “117” $\div$ “2.05” or “117” $\div$ “123” for answer in the range 57 to 57.1
(b)		explanation	C1	for explaining that the time taken for the two parts of the journey must be the same or the distance from Leeds to York is $\frac{3}{4}$ of the distance from Barnsley to Leeds
5 (a)		3.9	M1 A1	for a ratio of $\frac{8.1}{5.4} (= 1.5)$ oe or $\frac{5.4}{8.1} (= 0.66\ldots)$ oe or $\frac{2.6}{5.4} (= 0.48\ldots)$ oe or $\frac{5.4}{2.6} (= 2.07\ldots)$ oe
(b)		2.05	M1 A1	for $\frac{5.4}{8.1} \times 6.15$ oe (= 4.1) or $\frac{2.7}{8.1} \times 6.15$ oe or ft “scale factor” from (a) cao



Paper: 1MA1/1H				
Question	Working	Answer	Mark	Notes
7		Comment	B1	for correct mathematical comment eg line segments not a curve or should draw freehand or should not use a ruler, or should be a curve NB Do not accept statements about scale or plotting accuracy.
8		0.246, 0. $\dot{2}46$ 0. $\dot{2}4\dot{6}$, 0.24 $\dot{6}$	M1 A1	for correct use of recurring symbol eg $0.2\dot{4}6 = 0.24646\dots$ or 3 terms in the correct relative position cao
9		22.5	P1 P1 P1 P1 A1	for process to find James' speed eg $50 \div 2.5 (=20)$ or $50 \div 150 (= \frac{1}{3})$ for process to find James' time for 15 km eg $15 \div "20" (=0.75)$ or $15 \div \frac{1}{3} (=45)$ for process to find Peter's time for 15 km eg $"45" - 5 (=40)$ for process to find Peter's speed eg $15 \div "40"$ or $15 \div \frac{"40"}{60}$ oe
10 (a)		10	B1	accept ± 10
(b)		25	M1 A1	for $(\sqrt[3]{125})^2$ or $\sqrt[3]{125} = 5$ or $125^2 = 15625$ or $\sqrt[3]{125^2}$ cao



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
17 (a)	Histogram drawn	B3	for fully correct histogram eg relative heights 6, 3, 4, 2, 2	Just stating the interval is sufficient for this mark May be implied by the number on the answer line Median is at (approx.) 68.75 by a proportional method
		(B2	for 4 correct blocks or all 5 frequency ÷ class interval and 1 correct block)	
		(B1	for at least 2 correct blocks of different widths or for frequency ÷ class interval for at least 3 frequencies)	
	(b) 66 to 71	M1	indication of the median in the third interval or proportional method shown	
18	2.7 with statement	A1	ft answer between 66 and 71	Accept bounds truncated or rounded to at least 4 sig fig
		B1	for 179.5 or 180.5 or 180.4999...	
		B1	for 486.5 or 487.5 or 487.4999...	
		P1	for a correct process to find a bound for average speed, eg [upper bound of distance] ÷ [lower bound of time] where $487 < [\text{UB of distance}] \leq 487.5$ and $179.5 \leq [\text{LB of time}] < 180$ or for [lower bound of distance] ÷ [upper bound of time] where $486.5 \leq [\text{LB of distance}] < 487$ and $180 < [\text{UB of time}] \leq 180.5$	
		A1	(dep on all previous marks) for 2.695(2...) and 2.715(8 ...) with both values clearly coming from working with correct values	
		C1	for 2.7 from 2.695... and 2.715... and statement that both LB and UB round to 2.7	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
3 (a)	80	M1	for a complete method eg $\frac{20}{15} \times 60$ or 20×4 or $20 \div \frac{1}{4}$	
		A1	cao	
		M1	for method to find distance travelled in last 20 minutes, eg $75 \times \frac{20}{60}$ (= 25)	
		C2	for a fully correct travel graph	
(b)	Travel graph	(C1	for horizontal straight line from (10 15, 20) to (10 25, 20) or for a line of the correct length and gradient to indicate a speed of 75km/h eg a straight line from (10 25, 20) to (10 45, 45))	Can be implied by a distance of 25km drawn on the graph
4 (a)	(10), 5, (2), 1, 2, (5), 10	B2	for all 4 values correct	
		(B1	for 2 or 3 correct values)	
		M1	ft (dep on B1) for plotting at least 5 of their points correctly	
		A1	for a fully correct curve drawn	
(b)	Graph			Accept a freehand curve drawn that is not made of line segments
(c)	-0.65 to -0.8 and 2.65 to 2.8	M1	for $y = 4$ drawn or intersection with $y = 4$ or $y = x^2 - 2x - 2$ drawn or 1 correct value ft a quadratic graph	If answers stated as coordinates, award M1 for both coordinates and M0 for one coordinate
		A1	ft a quadratic graph or for answers in the range 2.65 to 2.8 and -0.65 to -0.8	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
24	Proof	C1	for $\overrightarrow{CE} = 2\mathbf{a} - \mathbf{b}$ oe	Vectors may be seen on diagram. Award marks provided not ambiguous. For the award of the first 3 marks, expressions for vectors $\overrightarrow{CE}$, $\overrightarrow{EP}$, $\overrightarrow{CP}$, $\overrightarrow{CF}$ and $\overrightarrow{DP}$ may not be simplified
		C1	for $\overrightarrow{EP} = 2\mathbf{a} - \mathbf{b}$ oe or for $\overrightarrow{CP} = 4\mathbf{a} - 2\mathbf{b}$ oe	
		C1	for $\overrightarrow{CF} = \mathbf{a} - \mathbf{b}$ oe or for $\overrightarrow{DP} = 2\mathbf{a} - 2\mathbf{b}$ oe	
		C1	for $\overrightarrow{CF} = \mathbf{a} - \mathbf{b}$ and $\overrightarrow{DP} = 2\mathbf{a} - 2\mathbf{b}$ (or $2(\mathbf{a} - \mathbf{b})$) leading to conclusion	
25	14.1	P1	for a process to find the volume of the top eg $92.8 \div 2.9 (= 32)$	Values can be truncated or rounded For this mark, [total volume] does not have to come from a correct process but is the value that the student believes is the total volume of the pyramid.
		P1	for finding total mass of P eg $92.8 + 972.8 (= 1065.6)$	
		P1	for finding total volume of P eg $\frac{1065.6}{4.7} (= 226.7234)$	
		P1	(dep P2) for $\frac{32}{[\text{total volume}]} \times 100$	
		A1	for answer in the range 14.1 to 14.2	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
11	enlargement scale factor $\frac{2}{3}$ centre $(-4, -2)$	C2 (C1)	for enlargement, scale factor $\frac{2}{3}$ oe , centre $(-4, -2)$ for 2 of the 3 aspects)	Award no marks if more than one transformation is given
12	5.9	P1 P1 P1 P1 A1	for a process to find the volume of the cylinder, eg $\pi \times 3^2 \times 8$ (= 226.19...) for process to find mass of cylinder, eg "226.19" $\times$ 7.86 (= 1777.89...) or [volume ₁] $\times$ 7.86 for process to find volume of cube, eg "1777.89" $\div$ 8.5 (= 209.16...) or [mass] $\div$ 8.5 for process to find side length, eg $\sqrt[3]{209.16...}$ or $\sqrt[3]{\text{[volume}_2]}$ for answer in range 5.9 to 5.94	Can be implied by 72π [volume ₁] must be unambiguously the volume of the cylinder but cannot be 3 or 8 [mass] must be unambiguously the mass of the cylinder [volume ₂] must be unambiguously the volume of the cube



Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
17 (a)	1.5, 6, 10.2, 7.2, 1.2	Histogram drawn	C1	for 2 correct bars of different widths or at least 3 correct frequency densities.
			C1	for all bars in correct proportions or 4 correct bars with axes scaled and labelled.
			C1	for fully correct histogram with axes scaled and labelled.
(b)		$\frac{123}{150}$	M1	for a method to find number of students in interval, eg $30 + 51 + 36 + \frac{1}{3} \times 18 (= 123)$ or $150 - 15 - \frac{2}{3} \times 18 (= 123)$
			A1	for $\frac{123}{150}$ oe or 0.82 or 82%
18		0.98	B1	cao



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
3	4811.20	M1	for a full method for one year, eg 4500×1.034 (= 4653) oe OR for a full method for 2 years, eg 4500×1.034^2 oe	Can be implied by 4806 or 9306
		A1	for 4811.2(0)	Accept 4811.202 and 4811.21
4	11	M1	for one correct step to isolate x term or constant term on one side, eg adds x to both sides to get $5x - 14 + x = 52 - x + x$ or adds 14 to both sides to get $5x - 14 + 14 = 52 - x + 14$ oe	May be seen in different equivalent forms but must be carried out, not just intention seen. Can be implied by eg $4x = 66$ or $6x = 38$
		M1	for both correct steps to isolate terms in x on one side and constant term on one side, eg " $6x$ " - 14 + 14 = 52 + 14, or $5x + x =$ "66" + $x - x$	
		A1	cao	
5	21	P1	for process to work correctly with initial ratio, eg $120 \div 4 \times 9$ (= 270) or $90 + 120 + 60$ (= 270)	Can be implied by 90 : 120 : 60 or by a second ratio that totals 270
		P1	for process to find the value of 1 part in the new ratio, eg " 270 " $\div$ (2 + 5 + 3) (= 27)	
		P1	for complete process to find both values for Errol, eg " 27 " $\times$ 3 (= 81) and $120 \div 4 \times 2$ (= 60)	
		A1	cao	
6	327	M1	for $147 + 180$ or for $360 - (180 - 147)$, or for drawing a suitable diagram with 147 in the correct position and with the bearing of A from B indicated	Diagram can be a sketch
		A1	cao	

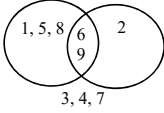


Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
6		Secure Bank (supported)	P1 P1 C1	for a process to work out the interest after one year e.g. $0.02 \times 25000 (=500)$ or $0.043 \times 25000 (=1075)$ or for 1.02 or 25500 or 1.043 or 26075 for process to find value of the investment after 3 years 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: 3H				
Question	Working	Answer	Mark	Notes
10		6 (%)	P1 P1 A1	for y^5 oe or $8029.35 \div 6000$ for a process to find $1+x$ e.g. $\sqrt[5]{(8029.35 \div 6000)}$ or 1.06 or 1.0599.. 5.99 to 6
11		No (supported)	P1 C1	Process to find number of rose trees e.g. $215 \div 17 (=12.647\dots)$ or show number of choices with 12 and 13 eg $17 \times 12 = 204$ and $17 \times 13 = 221$ No with interpretation that 12.6.. is not a whole number or a whole number of plants must be bought or number of plants would have to be between 12 and 13 which is not possible
12		3 : 4 : 11	P1 P1 A1	Makes a start e.g. by using multipliers e.g. $1 + 5 = 6$ and $7 + 11 = 18$ and $6 \times 3 = 18$ or $AB:BD = 3:15$ or $x=3y$ (appropriate x and y shown) or $\frac{1}{6} = \frac{3}{18}$ Complete process to find ratios e.g. $(7 + 11) \div (1 + 5) = 3$ and $1 \times "3" : 7 - ("3" \times 1) : 11$ oe
13		$y \geq -2, y \geq x$ and $y \leq 0.5x + 1$	M1 M1 M1 A1	$y = -2$ indicated; accept any inequality for " $\geq$ " $y = x$ oe indicated; accept any inequality for " $\geq$ " $y = 0.5x + 1$ oe indicated; accept any inequality for " $\geq$ " $y \geq -2, y \geq x$ and $y \leq 0.5x + 1$
14 (a)		$\frac{x+4}{2x+3}$	M1 M1 A1	Factorising the denominator $(2x \pm 3)(x \pm 4)$ or $2(x \pm 1\frac{1}{2})(x \pm 4)$ Factorising the numerator $(x - 4)(x + 4)$ oe
(b)		$v = \frac{15t}{w+30}$	M1 M1 A1	A correct step towards solution e.g. expanding brackets to get $15t - 30v$ or multiply both sides by v For a method to rearrange the formula to isolate terms in v eg $vw + 30v = 15t$ oe



Paper: IMA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	6, 9	M1	for 6, 9 in the intersection only	Ignore all entries except the region you are marking for each method mark 
	1, 5, 8	M1	for 1, 5, 8 in set A only or 2 in set B only or 3, 4, 7 in set $(A \cup B)'$ only	
	2			
	3, 4, 7	C1	for all numbers correctly placed in the Venn Diagram	
(b)	$\frac{2}{9}$	M1	ft for identification of 2 or 9 or ft diagram	Need not be written in correct form at this stage eg could be a ratio 2 : 9 Repeated digits in the diagram should be counted as 2 elements Accept any equivalent fraction, decimal form 0.22(22...) or percentage form 22(22...) %
		A1	$\frac{2}{9}$ oe or ft diagram	
2	12272.70 12272.71 or 12272.72	M1	for evidence of using a correct first step eg $200000 \times 0.015 (= 3000)$ or $200000 \times 1.015 (= 203000)$	values may be rounded or truncated to 2 dp
		M1	for evidence of a compound interest method eg $203000 \times 0.015 (= 3045)$ or $203000 \times 1.015 (= 206045)$ or $206045 \times 0.015 (= 3090.675)$ or $206045 \times 1.015 (= 209135.675)$ or $209135.675 \times 0.015 (= 3137.035...)$ or $209135.675 \times 1.015 (= 212272.710...)$ or $200000 \times 1.015^t, t \geq 2$	
		A1	for 12272.7(0) or 12272.71 or 12272.72	
			SC B2 for 212272.7(0) or 212272.71 or 212272.72	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	2.2	P1 P1 A1	works out interest for one year, eg $3550 \times 0.026 (= 92.3(0))$ or $3550 \times 1.026 (= 3642.3(0))$ for compound interest calculation, eg $3550 \times 1.026^2 (= 3736.9\dots)$ or for an answer given as 0.0219... or 1.0219... answer in range 2.19 to 2.2	If an answer in the range is seen in working and then incorrectly rounded award full marks
14	7	M1 A1	method to find number of combinations, eg 19×25 oe ($= 475$) or for $3325 \div 19 (= 175)$ or $3325 \div 25 (= 133)$ cao	
15	$6x^3 - 23x^2 - 33x - 10$	M1 M1 A1	for method to find the product of any two linear expressions (3 out of no more than 4 terms correct with correct signs or 4 correct terms ignoring signs) for method of multiplying out remaining products, half of which are correct (ft their first product) cao	Note that, for example, $6x^2 + 7x$ or $7x + 2$ are regarded as three terms in the expansion of $(3x + 2)(2x + 1)$ First product must be quadratic but need not be simplified or may be simplified incorrectly



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
10	24000	P1 P1 A1	for use of either 0.9 or 0.875 or for 18900 (after 2 years) for using $0.9^2 \times 0.875 (= 0.70875)$ oe or for 21000 (after 1 year) cao	
11	240	M1 A1	for $16 \times 5 \times 3$ cao	
12	23.4	M1 M1 A1 M1 M1 A1	for stating that $AC = 8$ or for a relationship that may be used to find AC eg $(AC =) 8 \times \tan 45$ or $\tan 45 = \frac{AC}{8}$ for relationship that may be used to find AB, eg $\sin(20) = \frac{8}{AB}$ or $(AB =) \frac{8}{\sin 20}$ for answer in the range 23.3 to 23.4 Alternative for a relationship that may be used to find AD eg $\cos(45) = \frac{8}{AD}$ oe or $(AD =) 11.3(13\dots)$ for a relationship that may be used to find AB, eg $\frac{AB}{\sin 45} = \frac{11.3}{\sin 20}$ for answer in the range 23.3 to 23.4	May be seen on diagram May use the sine rule If an answer is given in the range in working and then rounded incorrectly award full marks. May be seen on diagram If an answer is given in the range in working and then rounded incorrectly award full marks.

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	186.15	P1	for correctly finding the area of at least three sections, eg 3 of $11 \times 7 (= 77)$, or $9 \times 7 (= 63)$, or $\frac{1}{2} \times 11 \times 9 (= 49.5)$, or $\frac{1}{4} \times \pi \times 7^2 (= 38.4845\dots)$	Note a trapezium for the rectangle and triangle should be classed as two areas. Accept figures rounded or truncated to 1 dp or better throughout. This mark is dependent upon correct processes seen for all four sections. integer number of bags must come from area $\div$ 14 rounded up
		P1	for a method to find the number of bags required for one area or a combination of areas eg $"77" \div 14 (= 5.5)$ or $"227.9845\dots" \div 14 (= 16.2846\dots)$	
		P1	for method to work out the total area for all four sections eg $"77" + "63" + "49.5" + "38.4845\dots" (= 227.9845\dots)$ or adding the exact number of bags per section for all four sections eg $"5.5" + "4.5" + "3.53\dots" + "2.74\dots" (= 16.28\dots)$	
		P1	for method to find the cost, eg integer number of bags $\times 10.95$	
		A1	cao	
5	8.73	M1	for a correct trig statement, eg $14.5 \times \cos 53$ or $\cos 53 = x \div 14.5$	Can use a combination of skills but must have only one unknown in x to score this mark If an answer is given in the range in working and then rounded incorrectly award full marks.
		A1	answer in the range 8.726 to 8.73	
6	7318.15	M1	for a correct first step eg working out increase for one year $7000 \times (100 + 3) \div 100 (= 7210)$ oe or $7000 \times 3 \div 100 (= 210)$ oe or find the multiplier for both years eg $(100 + 3) \div 100 \times (100 + 1.5) \div 100 (= 1.04545)$	7315 or 315 implies M1
		M1	for a compound method, eg $7000 \times (100 + 3) \div 100 \times (100 + 1.5) \div 100$ oe or $"7210" \times 1.5 \div 100$ or $(= 108.15)$ oe	318.15 implies M1M1A0
		A1	cao	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
10	17500	P1 P1 A1	for a process to find the value at the end of year 1, eg $10914.75 \div 0.81 (= 13475)$ or $10914.75 \div 0.77 (= 14175)$ or for finding the combined multiplier, eg $0.77 \times 0.81 (= 0.6237)$ for a complete process to find the initial value, eg “ $13475 \div 0.77$ ” or “ $14175 \div 0.81$ ” or $10914.75 \div “0.6237”$ cao	
11	Box plot	B3 (B2) (B1	for fully correct box plot for box plot showing a box and at least 3 correctly plotted values from 24, 42, 54, 64, 96) for correctly identifying one of the LQ (42) Median (54) or UQ (64) from the CF graph)	Box can be of any height. Accept ends that are marked (eg line, cross, dot) or defined by the end of the whiskers if clear May be implied by one of these correct on the box plot
12 (a)	6	M1 A1	for an attempt to evaluate 1.13^n for at least one value of n (with $n > 1$) 6 years coming from finding n such that $1.13^n > 2$	1.13, 1.27..., 1.44..., 1.63..., 1.84..., 2.08... May be used with a value Values rounded or truncated to 2dp or better
(b)	Explanation	C1	for explanation Acceptable examples it will decrease the number of years will go down we can't tell (as we don't know how much it is increasing by) it will be an overestimate Not acceptable examples it will increase it will be an underestimate	

Paper: 1MA1/2H									
Question	Answer	Mark	Mark scheme	Additional guidance					
8	$\frac{3}{22}$	P1	for a process to find a first value eg male/Britain = $32 - 11$ (=21) or Italy/total = $60 - (32+12)$ (=16) or female/total = $60 - 38$ (=22)		Br	Sp	It	Tot	
			M	21	9	8	38		
			F	11	3	8	22		
			Tot	32	12	16	60		
		P1	for process to find a secondary value, eg male/Spain = $38 - ("21" + 8)$ (=9) or female/Italy = $"16" - 8$ (=8)	May be seen in a frequency tree Values attributed to a category or from method seen					
		P1	complete process to find female/Spain, eg $12 - "9"$ or $"22" - (11 + "8")$ (=3)						
		A1	oe accept 0.136 to 0.14 SC B3 for $\frac{3}{60}$						
9	12 508.7(0)	P1	for start of process to find interest rate for year 1 eg $12336 \div 12000$ (=1.028) or $(12336 - 12000) \div 12000$ (=0.028) OR forms a suitable equation, eg $12000 \times (1 + \frac{x}{100}) = 12336$						
		P1	for complete process to find the interest rate for year 1 eg $("1.028" - 1) \times 100$ (=2.8) or $"0.028" \times 100$ (=2.8) OR correct process to solve correct equation eg $(12336 - 12000) \div 120$ (=2.8)		Rate of interest = 2.8, or $x = 2.8$ implies P2				
		P1	for complete process to find the value at the end of 2 years eg $("2.8" \div 2 + 100) \div 100 \times 12336$						
		A1	accept 12508.7 to 12508.71 or 12509		12509 must come from correct working				



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
10	344 580.48	P1 P1 P1 A1	for a start to the process to find the initial investment eg $344\,605 \div 1.025$ oe (= 336 200) or for 1.025^3 (= 1.07689....) for complete process to find original investment, eg $344\,605 \div 1.025^3$ oe (= 319 078 to 320 265) for [initial investment] $\times 1.02^2 \times 1.035$ oe for answer in the range 343 587 to 344 581	[initial investment] must be clearly what they believe to be that and cannot be 344605
11 (a)	(9, 7.5)	M1 A1	for x coordinate = $PO(6) \times \frac{3}{2}$ (=9) or y coordinate = $OQ(3) \times \frac{5}{2}$ (= 7.5) or $PO(6) \times \frac{5}{2}$ (=15) or $OQ(3) \times \frac{3}{2}$ (= 4.5) cao	
(b)	$y = -2x + 3$	P1 P1 A1	for process to find the gradient of the line, eg $3 \div 6$ (=0.5) or $y = mx + 3$ for process to find gradient of perpendicular eg $-1 \div [\text{gradient of } PQ]$ (= -2) for $y = -2x + 3$ oe	Could use P and R or Q and R as fit from (a)



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: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	435	M1	for start to method of finding the number of pairs, eg $30 \times 29 (= 870)$ or $\frac{30 \times 29}{2}$ or clear intention to sum the integers from 1 to 29 eg $29 + 28 + \dots + 2 + 1$	M1 for $\frac{1}{30} \times \frac{1}{29}$
		A1	cao	
14	4400	P1	for start to processes needed to find the investment, eg $2937.14 + 1000 (= 3937.14)$ OR starts to work with algebra, eg $P \times 1.035 - 750$	
		P1	for process to find amount of money at the beginning of 2023 after the first withdrawal, eg " $3937.14 \div 1.035 (= 3804)$ or $[\text{value}] \div 1.035$ " OR writes down complete equation, eg $(P \times 1.035 - 750) \times 1.035 - 1000 = 2937.14$	[value] can be 2937.14 or 2937.14 + 750 or 2937.14 + 1750
		P1	for complete process, eg " $(3804 + 750) \div 1.035$ " OR for a start to the process to solve the equation to find $1.035P - 750$ eg $P \times 1.035 - 750 = \frac{2937.14 + 1000}{1.035}$ or $1.035P - 750 = 3804$ or for a start to the process to solve the complete equation eg $1.035^2P - 776.25 = 2937.14 + 1000$ or $1.035^2P - 1000 = 2937.14 + 776.25$ or $1.035^2P = 2937.14 + 776.25 + 1000$	
		A1	cao	A correct answer with no supportive working gets 0 marks

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
12		15	P1 P1 A1	for a process to find the interior or exterior angle of a regular 12 sided polygon e.g. $\frac{10 \times 180}{12}$ (= 150) or $\frac{360}{12}$ (= 30), must be no contradictions for process to find angle <i>STR</i> , eg $\frac{180 - "150"}{2}$ or $\frac{"30"}{2}$ cao
13 (a)		58600	M1 A1	for a complete method, eg 50000×1.02^8 (= 58582(.969...)) or for finding the increase in value of the company after 8 years, eg 8582(.969...) or 8600 cao
(b)		4.5	P1 P1 A1	for a process to find multiplier for 6 year period, eg $325 \div 250$ oe (= 1.3) or 130(%) or for $250000 \times y^6 = 325000$ for a process to find multiplier for one year, eg $("1.3")^{\frac{1}{6}}$ or 1.044... or 1.045 4.4 – 4.5



Paper: 1MA1/3H				
Question	Working	Answer	Mark	Notes
8 (a) (b)		Mel (supported) $\frac{2}{9}$	B1	Mel with reference to greatest number of throws
			M1	selects overall total and multiplies P(point up)×P(point down) eg $\frac{50}{150} \times \frac{100}{150}$ oe (accept $\frac{14}{45} \times \frac{31}{45}$ or $\frac{27}{80} \times \frac{53}{80}$ or $\frac{9}{25} \times \frac{16}{25}$)
			A1	for $\frac{2}{9}$ oe
9 (a) (b)		5	M1	evaluates $(0.85)^n$ or $12\,500 \times (0.85)^n$ for at least one value of n
			A1	cao
		2.4	P1	for a process to find the amount of interest before tax, eg $79.20 \div 0.6 (= 132)$
			P1	for a process to find value of R , eg “132”÷5500×100
10 (a) (b)		0.05	B1	for 0.05 oe
		20	C1	for stating that at least 20 required
		Reason	C1	for reason eg explains that number of each colour must be a whole number or that there must be (at least) 1 red counter or shows that $0.05 = \frac{1}{20}$



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
3	60	M1	use of parallel lines to find an angle eg $ABE=70$ or $EBG=75$ or $EBC = 110$ or shows parts of x as 35 or 25	Parts of x should be identified on the diagram by the insertion of a dividing line through angle x (need not be identified or drawn parallel).
		M1	for a complete method to find angle x ; could be in working or on the diagram	Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		A1	for $x = 60$	
		C1	(dep on M1) for one reason linked to parallel lines and one other reason, supported by working taken from: <u>alternate</u> angles are equal, <u>allied</u> angles / <u>co-interior</u> angles add up to 180, <u>angles</u> on a straight <u>line</u> add up to 180, <u>angles</u> in a <u>triangle</u> add up to 180°	Underlined words need to be shown; reasons need to be linked to their method; any reasons not linked do not credit. There should be no incorrect reasons given.
4 (a)	Ben (supported)	P1	shows how to work interest out for one year eg $2000 \times 0.025 (= 50)$ or $1600 \times 0.035 (= 56)$ or 150 or 168 or $2000 \times 1.025 (= 2050)$ or $1600 \times 1.035 (= 1656)$	Throughout accept figures ± 1 pence which do not need to be presented in money notation (to 2dp) or with monetary symbols.
		P1	shows compound interest calculation for one account eg $2050 \rightarrow 51.25$ or $2101.25 \rightarrow 52.53$ or $1656 \rightarrow 57.96$ or $1713.96 \rightarrow 59.99$ eg $2000 \times 1.025^3 (= 2153.78)$ or $1600 \times 1.035^3 (= 1773.95)$	Award mark for a correct process shown, for which these figures can be taken as implying the process.
		P1	shows complete compound interest calculation for both accounts eg $2000 \times 1.025^3 (= 2153.78)$ and $1600 \times 1.035^3 (= 1773.95)$ OR one interest stated correctly eg 153.78 or 173.95	As above, award mark for both correct processes shown for both accounts, which these figures can be taken as implying the process.
		C1	Ben (shares) supported by 153.78 and 173.95	Accept an answer of "shares".



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
4 (b)	conclusion	C1	conclusion (ft) eg no change, shares now 182.5... Acceptable examples no since shares/Ben now 182.5 Still Ben since $182.5 > \text{Ali}$ No; he only gets 8.57 more No; he gets 68.56 instead of 59.98 (3rd yr) No; Ben already gets more interest, he would just get even more Not acceptable examples no shares now 182.5 Still Ben since less than Ali $182.5 > 153.78$ no; he needs 20.17 more	Conclusion needs to be supported. ft is from part (a); calculations carried out as part of (b) need to be correct for the comparison to be valid.
5	No (supported)	P1 P1 P1 P1 C1	calculates area of trapezium eg $\frac{1}{2} \times 7 \times (10+16) (=91)$ for division by coverage eg $\div 2$ or [area of trapezium] $\div 2 (=45.5)$ or process to find coverage per tin eg $5 \times 2 (=10)$ for division to find the number of tins eg $\div 5$ or "45.5" $\div 5 (=9.1)$ or [area of trapezium] $\div "10" (=9.1)$ (dep on at least P2) for a process to multiply a whole number of tins (rounded up) by 16.99 for 'No' supported by correct figures eg 169.9 or 90 and 91 for process to find number of tins bought eg $160 \div 16.99 = 9$ tins for using whole no. of tins to find total litres eg $9 \times 5 (=45)$ (dep on at least P2) for a process to find the total coverage eg "45" $\times 2 (=90)$	[area of trapezium] needs to be clearly stated if the process of finding the area is not clear There must be a conclusion ("No" or equivalent wording) including the figure 169.9 and working showing processes followed.

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)	4775.38	M1	for a method to find the value after 1 year, eg $4500 \times 1.024 (= 4608)$ oe	Award of this mark implies the first M1 May be seen in more than 1 calculation M2A0 is implied by 275.37 or 275.38 Correct answer not rounded to 2dp gains M2A0
		M1	for a complete method to find the value after 3 years, eg $"4608" \times 1.018^2$ or $"4608" \times 1.018 (= 4690.944)$ and $"4690.944" \times 1.018$ oe	
		A1	accept 4775.37 SCB1 for 4770 or 4824 if M0 scored	
	26	P1	for a start to the process, eg $4107 \div 7500 (= 0.5476)$	0.74 implies P1
		P1	for a process to find percentage change eg $\sqrt{0.5476} \times 100 (= 74)$ or $(\sqrt{0.5476} - 1) \times 100 (= -26)$ or $1 - \sqrt{0.5476} (= 0.26)$	
		A1	cao	
(b)				

