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

Ratio & Proportion (R1)

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

72 questions · 267 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

72 questions · 267 marks · 3 sub-topics

SUB-TOPIC R1a

RATIO

Sub-topic R1a · 38 questions · 151 marks · lowest tariff first



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1** Make a the subject of the formula $p = 3a - 9$

(Total for Question 1 is 2 marks)

- 2** Rob has been asked to divide 120 in the ratio 3:5

Here is his working.

$$120 \div 3 = 40 \qquad 120 \div 5 = 24$$

Rob's working is not correct.

Describe what Rob has done wrong.

(Total for Question 2 is 1 mark)



- 2 Write 60 as a product of its prime factors.

(Total for Question 2 is 2 marks)

- 3 There are 48 counters in a bag.
There are only red counters and blue counters in the bag.

$$\text{number of red counters} : \text{number of blue counters} = 1 : 2$$

Helen has to work out how many red counters are in the bag.

She says,

“There are 24 red counters in the bag because 1 is half of 2 and 24 is half of 48”

Is Helen correct?

You must give a reason for your answer.

(Total for Question 3 is 1 mark)



- 11 Jeff is choosing a shrub and a rose tree for his garden.

At the garden centre there are 17 different types of shrubs and some rose trees.

Jeff says,

“There are 215 different ways to choose one shrub and one rose tree.”

Could Jeff be correct?

You must show how you get your answer.

(Total for Question 11 is 2 marks)

- 12 The points A , B , C and D lie in order on a straight line.

$$AB:BD = 1:5$$

$$AC:CD = 7:11$$

Work out $AB:BC:CD$

..... : :

(Total for Question 12 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)



2 In a village

the number of houses and the number of flats are in the ratio 7 : 4

the number of flats and the number of bungalows are in the ratio 8 : 5

There are 50 bungalows in the village.

How many houses are there in the village?

(Total for Question 2 is 3 marks)



10 Given that $\frac{a}{b} = \frac{2}{5}$ and $\frac{b}{c} = \frac{3}{4}$

find $a:b:c$

(Total for Question 10 is 3 marks)



5 Rosie, Matilda and Ibrahim collect stickers.

number of stickers : number of stickers : number of stickers
Rosie has : Matilda has : Ibrahim has = 4:7:15

Ibrahim has 24 more stickers than Matilda.

Ibrahim has more stickers than Rosie.

How many more?

(Total for Question 5 is 3 marks)



- 6 Last year a family recycled 800 kg of household waste.
57% of this waste was paper and glass.

weight of paper recycled : weight of glass recycled = 12 : 7

Calculate the weight of glass the family recycled.

..... kg

(Total for Question 6 is 3 marks)



18 $2a:5c = 6:25$
 $4b:7c = 20:21$

Show that $a + b : b + c = 17:20$

(Total for Question 18 is 3 marks)



- 2 Sid, Tam and Musa share £6900 in the ratio 2:3:5

Work out how much money each person receives.

Sid £.....

Tam £.....

Musa £.....

(Total for Question 2 is 3 marks)



14 White shapes and black shapes are used in a game.

Some of the shapes are circles.

All the other shapes are squares.

The ratio of the number of white shapes to the number of black shapes is $3:7$

The ratio of the number of white circles to the number of white squares is $4:5$

The ratio of the number of black circles to the number of black squares is $2:5$

Work out what fraction of all the shapes are circles.

(Total for Question 14 is 4 marks)



- 2 Kiaria is 7 years older than Jay.
Martha is twice as old as Kiaria.
The sum of their three ages is 77

Find the ratio of Jay's age to Kiaria's age to Martha's age.

(Total for Question 2 is 4 marks)



- 6 A shop sells packs of black pens, packs of red pens and packs of green pens.

There are

2 pens in each pack of black pens

5 pens in each pack of red pens

6 pens in each pack of green pens

On Monday,

number of packs of black pens sold : number of packs of red pens sold : number of packs of green pens sold = 7:3:4

A total of 212 pens were sold.

Work out the number of green pens sold.

(Total for Question 6 is 4 marks)



7 £360 is shared between Abby, Ben, Chloe and Denesh.

The ratio of the amount Abby gets to the amount Ben gets is 2 : 7

Chloe and Denesh each get 1.5 times the amount Abby gets.

Work out the amount of money that Ben gets.

£.....

(Total for Question 7 is 4 marks)

8 (a) Write 0.00562 in standard form.

.....
(1)

(b) Write 1.452×10^3 as an ordinary number.

.....
(1)

(Total for Question 8 is 2 marks)



9 The circumference of circle **B** is 90% of the circumference of circle **A**.

(a) Find the ratio of the area of circle **A** to the area of circle **B**.

.....
(2)

Square **E** has sides of length e cm.

Square **F** has sides of length f cm.

The area of square **E** is 44% greater than the area of square **F**.

(b) Work out the ratio $e:f$

.....
(2)

.....
(Total for Question 9 is 4 marks)

- 17 There are some small cubes and some large cubes in a bag.
The cubes are red or the cubes are yellow.

The ratio of the number of small cubes to the number of large cubes is $4:7$

The ratio of the number of red cubes to the number of yellow cubes is $3:5$

- (a) Explain why the least possible number of cubes in the bag is 88

(1)

All the small cubes are yellow.

- (b) Work out the least possible number of large yellow cubes in the bag.

(3)

(Total for Question 17 is 4 marks)



- 2 There are 60 people in a choir.
Half of the people in the choir are women.

The number of women in the choir is 3 times the number of men in the choir.
The rest of the people in the choir are children.

the number of children in the choir : the number of men in the choir = $n : 1$

Work out the value of n .
You must show how you get your answer.

$n = \dots\dots\dots$

(Total for Question 2 is 4 marks)

- 3 Work out $1\frac{3}{4} \times 1\frac{1}{3}$

Give your answer as a mixed number.

(Total for Question 3 is 3 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)



- 14 A group of people went to a restaurant.
Each person chose one starter and one main course.

starter	main course
soup	lasagne
prawns	curry

the number of people who chose soup : the number of people who chose prawns = 2 : 3

Of those who chose soup,
the number of people who chose lasagne : the number of people who chose curry = 5 : 3

Of those who chose prawns,
the number of people who chose lasagne : the number of people who chose curry = 1 : 5

What fraction of the people chose curry?
You must show how you get your answer.

(Total for Question 14 is 4 marks)



- 2 Natalie makes potato cakes in a restaurant.

She mixes potato, cheese and onion so that

weight of potato : weight of cheese : weight of onion = 9 : 2 : 1

Natalie needs to make 6000 g of potato cakes.

Cheese costs £2.25 for 175 g.

Work out the cost of the cheese needed to make 6000 g of potato cakes.

£.....

(Total for Question 2 is 4 marks)



14 Olivia and Jessica have in total half as many sweets as Fran and Gary have in total.

Fran and Gary share their sweets in the ratio 2 : 3

Olivia and Jessica share their sweets in the ratio 9 : 1

Fran got w sweets.

Gary got x sweets.

Olivia got y sweets.

Jessica got z sweets.

Find, in its simplest form, $w : x : y : z$

(Total for Question 14 is 4 marks)



15 The ratio of Marta's hourly pay to Khalid's hourly pay is 6 : 5

Both Marta and Khalid get an increase of £1.50 in their hourly pay.

The ratio of Marta's hourly pay to Khalid's hourly pay after this increase is 13 : 11

Work out the hourly pay before the increase for Marta and for Khalid.

Marta £.....

Khalid £.....

(Total for Question 15 is 4 marks)



17 There are four boxes on a shelf, **A**, **B**, **C** and **D**.

The total weight of **A** and **B** is 3 times the total weight of **C** and **D**.

The weight of **A** is $\frac{2}{3}$ of the weight of **B**.

The weight of **C** is 75% of the weight of **D**.

Find the ratio

weight of **A** : weight of **B** : weight of **C** : weight of **D**

(Total for Question 17 is 4 marks)



17 Make x the subject of the formula $y = \frac{4(2x - 7)}{5x + 3}$

(Total for Question 17 is 4 marks)

18 7 kg of carrots and 5 kg of tomatoes cost a total of 480p

cost of 1 kg of carrots : cost of 1 kg of tomatoes = 5 : 9

Work out the cost of 1 kg of carrots and the cost of 1 kg of tomatoes.

carrots p

tomatoes p

(Total for Question 18 is 4 marks)



- 5 Chris, Debbie and Errol share some money in the ratio 3:4:2
Debbie gets £120

Chris then gives some of his share to Debbie and some of his share to Errol.
The money that Chris, Debbie and Errol each have is now in the ratio 2:5:3

How much money did Chris give to Errol?

£.....

(Total for Question 5 is 4 marks)

- 6 The bearing of port B from port A is 147°
Work out the bearing of port A from port B .

o

(Total for Question 6 is 2 marks)



23 Given that $\frac{2x^2 + y^2}{4x^2 - y^2} = \frac{43}{11}$ where $x > 0$ and $y > 0$

find, in its simplest form, the ratio $x:y$

(Total for Question 23 is 4 marks)



6 Andy, Luke and Tina share some sweets in the ratio 1 : 6 : 14

Tina gives $\frac{3}{7}$ of her sweets to Andy.

Tina then gives $12\frac{1}{2}\%$ of the rest of her sweets to Luke.

Tina says,

“Now all three of us have the same number of sweets.”

Is Tina correct?

You must show how you get your answer.

(Total for Question 6 is 4 marks)



- 2 On Saturday, some adults and some children were in a theatre.
The ratio of the number of adults to the number of children was 5 : 2

Each person had a seat in the Circle or had a seat in the Stalls.

$\frac{3}{4}$ of the children had seats in the Stalls.

117 children had seats in the Circle.

There are exactly 2600 seats in the theatre.

On this Saturday, were there people on more than 60% of the seats?
You must show how you get your answer.

(Total for Question 2 is 5 marks)



4 Daniel bakes 420 cakes.

He bakes only vanilla cakes, banana cakes, lemon cakes and chocolate cakes.

$\frac{2}{7}$ of the cakes are vanilla cakes.

35% of the cakes are banana cakes.

The ratio of the number of lemon cakes to the number of chocolate cakes is 4:5

Work out the number of lemon cakes Daniel bakes.

.....
(Total for Question 4 is 5 marks)



- 4 Raya buys a van for £8500 plus VAT at 20%

Raya pays a deposit for the van.

She then pays the rest of the cost in 12 equal payments of £531.25 each month.

Find the ratio of the deposit Raya pays to the total of the 12 equal payments.

Give your answer in its simplest form.

(Total for Question 4 is 5 marks)



- 10** Robert makes 50 litres of green paint by mixing litres of yellow paint and litres of blue paint in the ratio 2:3

Yellow paint is sold in 5 litre tins.

Each tin of yellow paint costs £26

Blue paint is sold in 10 litre tins.

Each tin of blue paint costs £48

Robert sells all the green paint he makes in 10 litre tins.

He sells each tin of green paint for £66.96

Work out Robert's percentage profit on each tin of green paint he sells.

.....%

(Total for Question 10 is 5 marks)



17 p and q are two numbers such that $p > q$

When you subtract 5 from p and subtract 5 from q the answers are in the ratio 5 : 1

When you add 20 to p and add 20 to q the answers are in the ratio 5 : 2

Find the ratio $p : q$

Give your answer in its simplest form.

(Total for Question 17 is 5 marks)



3 Carlo puts tins into small boxes and into large boxes.

He puts 6 tins into each small box.

He puts 20 tins into each large box.

Carlo puts a total of 3000 tins into the boxes so that

$$\text{number of tins in small boxes} : \text{number of tins in large boxes} = 2 : 3$$

Carlo says that less than 30% of the boxes filled with tins are large boxes.

Is Carlo correct?

You must show all your working.

(Total for Question 3 is 5 marks)



21 $5c + d = c + 4d$

(a) Find the ratio $c : d$

.....
(2)

$6x^2 = 7xy + 20y^2$ where $x > 0$ and $y > 0$

(b) Find the ratio $x : y$

.....
(3)

.....
(Total for Question 21 is 5 marks)

.....
TOTAL FOR PAPER IS 80 MARKS



- 3 A delivery company has a total of 160 cars and vans.

the number of cars : the number of vans = 3 : 7

Each car and each van uses electricity or diesel or petrol.

$\frac{1}{8}$ of the cars use electricity.

25% of the cars use diesel.

The rest of the cars use petrol.

Work out the number of cars that use petrol.

You must show all your working.

(Total for Question 3 is 5 marks)



- 7 Kasim has some small jars, some medium jars and some large jars.
He has a total of 400 jars.

$\frac{3}{8}$ of the 400 jars are empty.

For the empty jars,

number of small jars : number of medium jars = 3 : 4

number of medium jars : number of large jars = 1 : 2

Work out the percentage of Kasim's jars that are empty small jars.

..... %

(Total for Question 7 is 5 marks)



6 Rizwan writes down three numbers a , b and c

$$a:b = 1:3$$

$$b:c = 6:5$$

(a) (i) Find $a:b:c$

.....
(2)

(ii) Express a as a fraction of the total of the three numbers a , b and c

.....
(2)

Emma writes down three numbers m , n and p

$$n = 2m$$

$$p = 5n$$

(b) Find $m:p$

.....
(2)

(Total for Question 6 is 6 marks)



- 4 There are 280 chocolates in a box.
There are only dark chocolates, milk chocolates and white chocolates.

$\frac{1}{7}$ of the 280 chocolates are dark chocolates.

The number of milk chocolates : the number of white chocolates = 1 : 3

The number of white chocolates : the number of dark chocolates = n : 1

- (a) Work out the value of n .
You must show all your working.

$n = \dots\dots\dots$
(5)

10 milk chocolates from the box are eaten.

- (b) Does this affect your answer to part (a)?
Give a reason for your answer.

$\dots\dots\dots$
 $\dots\dots\dots$
 $\dots\dots\dots$
(1)

(Total for Question 4 is 6 marks)



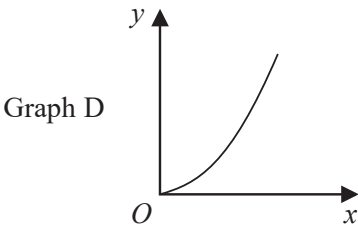
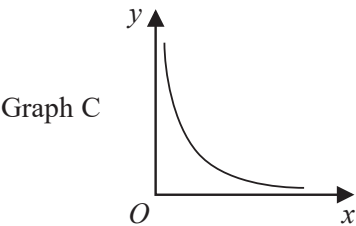
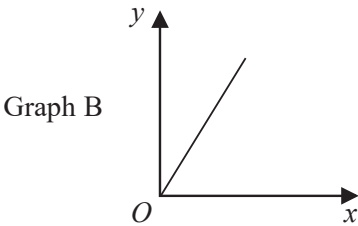
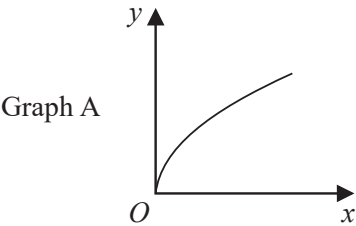
SUB-TOPIC R1b

DIRECT & INVERSE PROPORTION

Sub-topic R1b · 28 questions · 92 marks · lowest tariff first



12



The graphs of y against x represent four different types of proportionality.
Match each type of proportionality in the table to the correct graph.

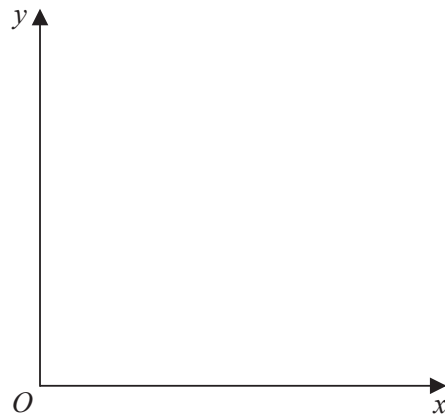
Type of proportionality	Graph letter
$y \propto x$	
$y \propto x^2$	
$y \propto \sqrt{x}$	
$y \propto \frac{1}{x}$	

(Total for Question 12 is 2 marks)



- 8 (a) Using the axes below, sketch a graph to represent the statement

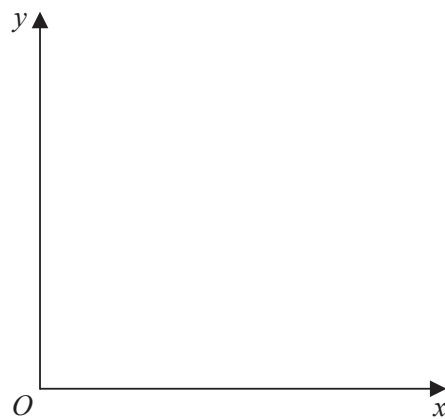
y is directly proportional to x



(1)

- (b) Using the axes below, sketch a graph to represent the statement

y is inversely proportional to x



(1)

(Total for Question 8 is 2 marks)

- 4 It takes 14 hours for 5 identical pumps to fill a water tank.

How many hours would it take 4 of these pumps to fill another water tank of the same size?

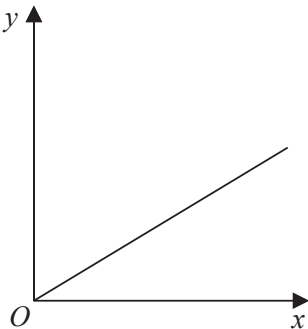
..... hours

(Total for Question 4 is 2 marks)

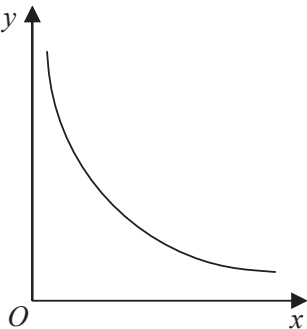


11

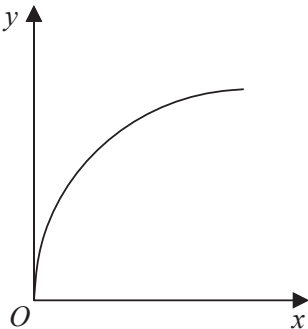
Graph A



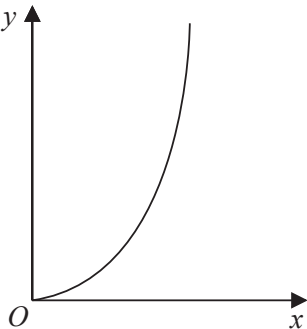
Graph B



Graph C



Graph D



The graphs of y against x represent four different types of proportionality.
Match each type of proportionality in the table to the correct graph.

Type of proportionality	Graph
$y \propto x^2$	
$y \propto x$	
$y \propto \frac{1}{x}$	
$y \propto \sqrt{x}$	

(Total for Question 11 is 2 marks)



- 5 Ali buys packs of balloons and boxes of pencils.

There are 30 balloons in each pack.

There are 24 pencils in each box.

Ali buys exactly the same number of balloons and pencils.

Work out how many packs of balloons and how many boxes of pencils she could have bought.

You must show all your working.

..... packs of balloons

..... boxes of pencils

(Total for Question 5 is 3 marks)

- 6 A company orders a large number of plates from a factory.

It would take 30 hours to make all the plates using 4 machines.

How many machines are needed to make all the plates in 6 hours?

.....
(Total for Question 6 is 2 marks)



- 3 The number of hours, H , that some machines take to make 5000 bottles is given by

$$H = \frac{72}{n} \quad \text{where } n \text{ is the number of machines.}$$

On Monday, 6 machines made 5000 bottles.

On Tuesday, 9 machines made 5000 bottles.

The machines took more time to make the bottles on Monday than on Tuesday.

How much more time?

..... hours

(Total for Question 3 is 2 marks)



16 y is directly proportional to $\sqrt[3]{x}$

$$y = 1\frac{1}{6} \text{ when } x = 8$$

Find the value of y when $x = 64$

(Total for Question 16 is 3 marks)

17 n is an integer.

Prove algebraically that the sum of $\frac{1}{2}n(n+1)$ and $\frac{1}{2}(n+1)(n+2)$ is always a square number.

(Total for Question 17 is 2 marks)



8 Use your calculator to work out $\sqrt{\frac{\sin 25^\circ + \sin 40^\circ}{\cos 25^\circ - \cos 40^\circ}}$

(a) Write down all the figures on your calculator display.

.....
(2)

(b) Write your answer to part (a) correct to 2 decimal places.

.....
(1)

(Total for Question 8 is 3 marks)

9 Yesterday it took 5 cleaners $4\frac{1}{2}$ hours to clean all the rooms in a hotel.

There are only 3 cleaners to clean all the rooms in the hotel today.

Each cleaner is paid £8.20 for each hour or part of an hour they work.

How much will each cleaner be paid today?

£

(Total for Question 9 is 3 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)



- 13 The number of animals in a population at the start of year t is P_t
The number of animals at the start of year 1 is 400

Given that

$$P_{t+1} = 1.01P_t$$

work out the number of animals at the start of year 3

(Total for Question 13 is 2 marks)

- 14 y is inversely proportional to x^3

$$y = 44 \text{ when } x = a$$

Show that $y = 5.5$ when $x = 2a$

(Total for Question 14 is 3 marks)



- 9 A company has to make a large number of boxes.

The company has 6 machines.

All the machines work at the same rate.

When all the machines are working, they can make all the boxes in 9 days.

The table gives the number of machines working each day.

	day 1	day 2	day 3	all other days
Number of machines working	3	4	5	6

Work out the total number of days taken to make all the boxes.

(Total for Question 9 is 3 marks)



- 8 The number of days, d , that it will take to build a house is given by

$$d = \frac{720}{n}$$

where n is the number of workers used each day.

Ali's company will take 40 days to build the house.

Hayley's company will take 30 days to build the house.

Hayley's company will have to use more workers each day than Ali's company.

How many more?

.....
(Total for Question 8 is 3 marks)



- 15** Prove algebraically that the sum of the squares of any two consecutive even numbers is always a multiple of 4

(Total for Question 15 is 3 marks)

- 16** y is inversely proportional to the square of x .

$y = 8$ when $x = 2.5$

Find the negative value of x when $y = \frac{8}{9}$

(Total for Question 16 is 3 marks)



17 Make f the subject of the formula $d = \frac{3(1-f)}{f-4}$

(Total for Question 17 is 4 marks)

18 x is proportional to $\sqrt{y}$ where $y > 0$

y is increased by 44%

Work out the percentage increase in x .

.....%

(Total for Question 18 is 3 marks)



- 9 On Monday, 12 people took 5 hours to clean a number of cars.
On Tuesday, 15 people cleaned the same number of cars.

Assuming that all the people worked at the same rate,

- (a) work out how many hours the 15 people took to clean the cars.

..... hours
(2)

The assumption is wrong.

- (b) How might this affect the time taken for the 15 people to clean the cars?

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

(Total for Question 9 is 3 marks)



- (c) Compare the distribution of the sales of the online store with the distribution of the sales in the shop.

(2)

(Total for Question 10 is 5 marks)

- 11 Kieron has 13 workers he can use for a job.

He knows that 6 workers would take $14\frac{1}{2}$ days to complete this job.

Show that Kieron has enough workers to finish this job in less than 7 days.

(Total for Question 11 is 3 marks)



13 p is inversely proportional to t

Complete the table of values.

t	100	25		2
p	1		5	

(Total for Question 13 is 3 marks)



13 y is directly proportional to x .

$$y = 24 \text{ when } x = 1.5$$

Work out the value of y when $x = 5$

$$y = \dots\dots\dots$$

(Total for Question 13 is 3 marks)

14 (a) Write $\frac{1}{16}$ in the form 4^n where n is an integer.

.....
(1)

(b) Work out the value of $8^{\frac{5}{3}} - 9^{\frac{3}{2}}$

.....
(3)

(Total for Question 14 is 4 marks)



12 (a) Find the value of $81^{-\frac{1}{2}}$

.....
(2)

(b) Find the value of $\left(\frac{64}{125}\right)^{\frac{2}{3}}$

.....
(2)

(Total for Question 12 is 4 marks)

13 The table shows a set of values for x and y .

x	1	2	3	4
y	9	$2\frac{1}{4}$	1	$\frac{9}{16}$

y is inversely proportional to the square of x .

(a) Find an equation for y in terms of x .

.....
(2)

(b) Find the positive value of x when $y = 16$

.....
(2)

(Total for Question 13 is 4 marks)



- 20 h is inversely proportional to p
 p is directly proportional to $\sqrt{t}$

Given that $h = 10$ and $t = 144$ when $p = 6$
find a formula for h in terms of t

.....
(Total for Question 20 is 4 marks)



- 17 x is directly proportional to the square of y .
 y is directly proportional to the cube of z .

$$z = 2 \text{ when } x = 32$$

Find a formula for x in terms of z .

(Total for Question 17 is 4 marks)



17 y is directly proportional to the square root of t .
 $y = 15$ when $t = 9$

t is inversely proportional to the cube of x .
 $t = 8$ when $x = 2$

Find a formula for y in terms of x .
Give your answer in its simplest form.

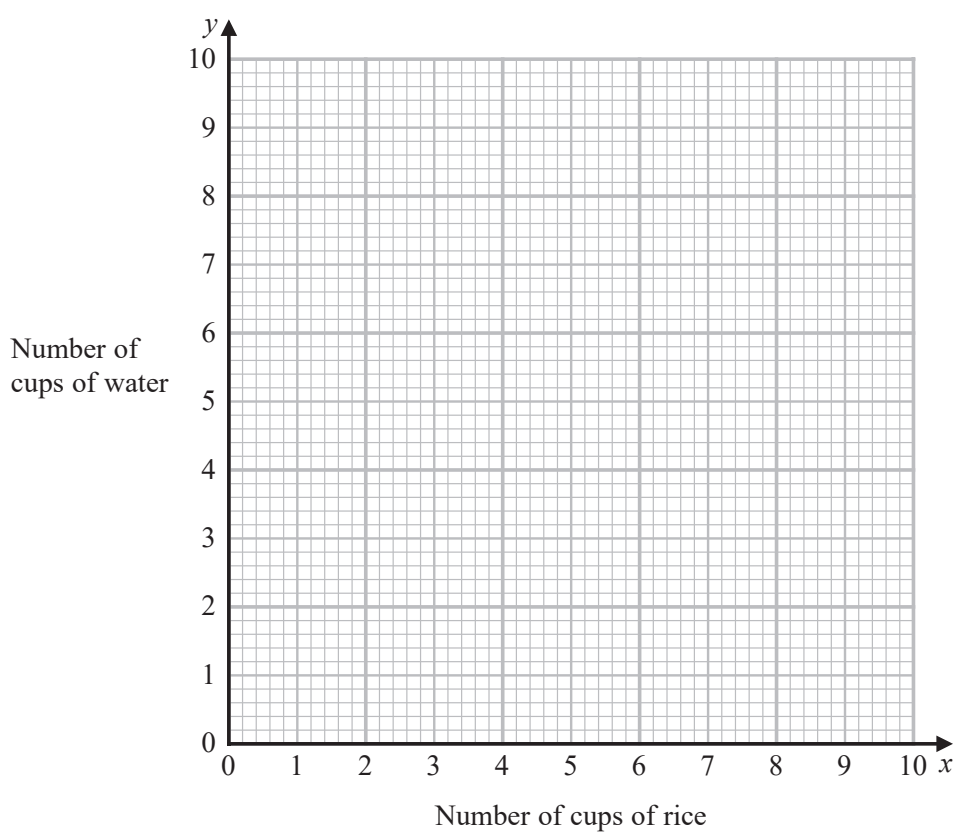
(Total for Question 17 is 4 marks)



9 To cook rice

the number of cups of rice (x): the number of cups of water (y) = 4 : 5

- (a) Use this information to draw a graph to show the relationship between the number of cups of rice and the number of cups of water needed to cook rice.



(2)

- (b) (i) Find the gradient of the line drawn in part (a).

(1)

- (ii) Explain what this gradient represents.

(1)

(Total for Question 9 is 4 marks)



12 f is inversely proportional to d^2

$$f = 3.5 \text{ when } d = 8$$

(a) Find an equation for f in terms of d .

.....
(2)

(b) Find the positive value of d when $f = 10$
Give your answer correct to 3 significant figures.

$d =$
(2)

(Total for Question 12 is 4 marks)



14 y is inversely proportional to d^2
When $d = 10$, $y = 4$

d is directly proportional to x^2
When $x = 2$, $d = 24$

Find a formula for y in terms of x .
Give your answer in its simplest form.

.....
(Total for Question 14 is 5 marks)



13 Prove algebraically that $0.\dot{0}7\dot{2}\dot{3}$ can be written as $\frac{241}{3330}$

(Total for Question 13 is 3 marks)

14 y is proportional to x^2
 $y = 3$ when $x = 0.5$

x is inversely proportional to w
 $x = 2$ when $w = 0.2$

Find the value of y when $w = 2$

$y = \dots\dots\dots$

(Total for Question 14 is 5 marks)



13 Here is a table of values of x and y .

x	2	4	6	8
y	0	4	8	12

Nadia says that y is directly proportional to x because the value of y increases by 4 as the value of x increases by 2

(a) Is Nadia correct?

You must give a reason for your answer.

.....

.....

.....

(1)

w is directly proportional to the square root of t .

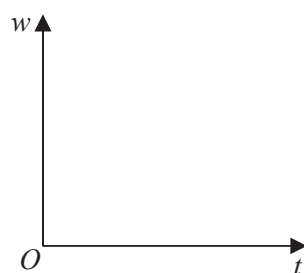
$w = 140$ when $t = 64$

(b) (i) Calculate the value of w when $t = 7.84$

$w =$

(3)

(ii) On the axes below, sketch a graph to show the relationship between w and t .



(1)

(Total for Question 13 is 5 marks)



11 T is inversely proportional to w .

w is directly proportional to the cube root of d .

When $w = 6$, $T = 20$

When $w = 1$, $d = 8$

Find the value of d when $T = 48$

$d = \dots\dots\dots$

(Total for Question 11 is 5 marks)



SUB-TOPIC R1c

BEST BUYS, RECIPES & SCALING

Sub-topic R1c · 6 questions · 24 marks · lowest tariff first



- 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)



3

Choci bar

200 g

£3.50

London**Choci bar**

360 g

7.20 Swiss francs

Zurich

In London, a 200 g Choci bar costs £3.50

In Zurich, a 360 g Choci bar costs 7.20 Swiss francs.

The exchange rate is £1 = 1.25 Swiss francs.

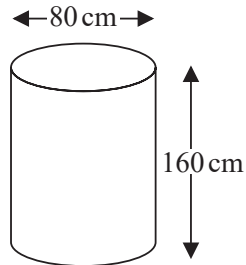
In which city is the Choci bar the better value for money, in London or in Zurich?

You must show how you get your answer.

(Total for Question 3 is 3 marks)



- 4 Karina has 4 tanks on her tractor.
Each tank is a cylinder with diameter 80 cm and height 160 cm.



The 4 tanks are to be filled completely with a mixture of fertiliser and water.

The fertiliser has to be mixed with water in the ratio 1 : 100 by volume.
Karina has 32 litres of fertiliser.

$$1 \text{ litre} = 1000 \text{ cm}^3$$

Has Karina enough fertiliser for the 4 tanks?
You must show how you get your answer.

(Total for Question 4 is 4 marks)

- 4 In London, 2 kg of carrots cost £3.75
In New York, 5 lbs of carrots cost 4.90 US dollars.

£1 = 1.20 US dollars

1 kg = 2.2 lbs

In which city are carrots better value for money, London or New York?
You must show how you get your answer.

(Total for Question 4 is 4 marks)



- 2 Deon needs 50 g of sugar to make 15 biscuits.

She also needs

three times as much flour as sugar

two times as much butter as sugar

Deon is going to make 60 biscuits.

- (a) Work out the amount of flour she needs.

..... g
(3)

Deon has to buy all the butter she needs to make 60 biscuits.
She buys the butter in 250 g packs.

- (b) How many packs of butter does Deon need to buy?

.....
(2)

(Total for Question 2 is 5 marks)



- 4 Maisie knows that she needs 3 kg of grass seed to make a rectangular lawn 5 m by 9 m.

Grass seed is sold in 2 kg boxes.

Maisie wants to make a rectangular lawn 10 m by 14 m.

She has 5 boxes of grass seed.

- (a) Has Maisie got enough grass seed to make a lawn 10 m by 14 m?
You must show all your working.

(4)

Maisie opens the 5 boxes of grass seed.

She finds that 4 of the boxes contain 2 kg of grass seed.

The other box contains 1 kg of grass seed.

- (b) Does this affect whether Maisie has enough grass seed to make her lawn?
Give a reason for your answer.

(1)

(Total for Question 4 is 5 marks)



MARK SCHEMES

official mark schemes, in the same order as the questions



Paper: 1MA1/3H																								
Question	Answer	Mark	Mark scheme	Additional guidance																				
1	$a = \frac{p+9}{3}$	M1 A1	for correct first step to rearrange, eg $p + 9 = 3a - 9 + 9$ or $\frac{p}{3} = \frac{3a-9}{3}$ oe or answer ambiguously shown eg $a = p + 9 \div 3$ or answer given as $\frac{p+9}{3}$ oe oe	May be seen in different equivalent forms but must be carried out, not just intention seen.																				
2	Description	C1	Identifies a mistake in the working Acceptable examples Rob should divide by 8 He should have added the 3 and 5 first He divided 120 by 3 and 5 instead of 8 He did not do it as $120 \times \frac{3}{8}$ and $120 \times \frac{5}{8}$ He did not add the two ratios first Not acceptable examples He has done it in two parts but he should do it in one The answer should be 45 : 75 They do not add up to 120 He is supposed to add his numbers 40 + 24 does not equal 120																					
3	22	P1 P1 A1	for process to find total German eg $200 - 104 - 70 (= 26)$ for complete process to find boys choosing Spanish eg $90 - (60 + ("26" - 18))$ cao	for process to find girls choosing French, eg $104 - 60 (= 44)$ or girls total, eg $200 - 90 (= 110)$ for complete process to find boys choosing Spanish eg $70 - ("110" - "44" - 18)$ <table border="1"> <tr> <td></td><td>F</td><td>S</td><td>G</td><td>total</td></tr> <tr> <td>girls</td><td>44</td><td>48</td><td>18</td><td>110</td></tr> <tr> <td>boys</td><td>60</td><td>22</td><td>8</td><td>90</td></tr> <tr> <td>total</td><td>104</td><td>70</td><td>26</td><td>200</td></tr> </table>		F	S	G	total	girls	44	48	18	110	boys	60	22	8	90	total	104	70	26	200
	F	S	G	total																				
girls	44	48	18	110																				
boys	60	22	8	90																				
total	104	70	26	200																				

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	1.765(2...)	M1	for fully evaluating the numerator or denominator, eg 18.3... or 10.4(1) or answer of 1.76 or 1.77 or digits 1765(2...)	Answer must be given to at least 3 decimal places rounded or truncated. Check first 4 significant figures only.
		A1	for 1.765(2.....)	
		B1	for 1.6 oe	
(b)	1.6	B1	for 1.6 oe	
2	$2 \times 2 \times 3 \times 5$	M1	for a complete method to find prime factors, could be shown on a complete factor tree, with no more than one error or by division by prime factors with no more than one error or for 2, 2, 3, 5 (1)	Condone the inclusion of 1 for the method mark
		A1	for $2 \times 2 \times 3 \times 5$ oe	Accept $2^2 \times 3 \times 5$
3	No with reason	C1	for No and valid reason, eg compares $\frac{1}{3}$ with $\frac{1}{2}$ or 16 (with 24) Acceptable examples No, $\frac{1}{3}$ are red not $\frac{1}{2}$ There are 16 red counters (not 24) No as she has used the ratio 1:1 (not 1:2) Incorrect as it is 16 : 32 No as she should divide by 3 (as $1 + 2 = 3$) No as they would both be 24 so it doesn't fit in the ratio 1 : 2 No because $24 + 48 = 72$ Not acceptable examples Yes, ... No as the number of red counters would be lower There is 1 red for every 2 blue	

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: 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: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	$\frac{95}{28}$	M1	for a method to add using common denominators with at least one fraction correct (matching numerator with common denominator) eg $\frac{60}{28} + \frac{35}{28}$ or $(2)\frac{4}{28} + (1)\frac{7}{28}$	Use of decimals gets no credit unless it leads to a correct fraction
		A1	$\frac{95}{28}$ oe eg $3\frac{11}{28}$	
	$1\frac{3}{5}$	M1	for $\frac{6}{5} \times \frac{4}{3}$ or $\frac{24}{20} \div \frac{15}{20}$ or $\frac{8}{5}$ oe eg $1\frac{9}{15}$	Use of decimals gets no credit unless it leads to a correct fraction
		A1	cao	
2	140	P1	for beginning to solve the problem eg $50 \div 5 \times 8 (=80)$ or $14 : 8 : 5$ oe or $14 : 8$ and $8 : 5$ oe (linked)	80 may be seen in the ratio $80 : 50$
		P1	for a full process to solve the problem eg " 80 " $\div 4 \times 7$ or $\frac{50}{5} \times "14"$ or $140 : 80 : 50$	
		A1	cao	
				If 140 clearly identified as houses in working award full marks

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
10	6 : 15 : 20	P1	chooses a multiplier to equate the two fractions in terms of b eg $\frac{2}{5} \times \frac{3}{3} (= \frac{6}{15})$ or $\frac{3}{4} \times \frac{5}{5} (= \frac{15}{20})$ or lists equivalent fractions to $\frac{2}{5}$ up to at least $\frac{6}{15}$, eg. $\frac{2}{5}, \frac{4}{10}, \frac{6}{15}, \dots$ or lists equivalent fractions to $\frac{3}{4}$ up to at least $\frac{15}{20}$, eg. $\frac{3}{4}, \frac{6}{8}, \frac{9}{12}, \frac{12}{16}, \frac{15}{20}, \dots$ or $(a : b =) 2 : 5$ and $(b : c =) 3 : 4$ or for 6 : 15 or 15 : 20 seen	
		P1	puts into related terms ready for ratio eg $\frac{2}{5} \times \frac{3}{3} = \frac{6}{15}$ and $\frac{3}{4} \times \frac{5}{5} = \frac{15}{20}$ or for $(a : b =) 6 : 15$ and $(b : c =) 15 : 20$ or lists equivalent ratios up to a common element for b, eg $a : b = 2 : 5, 4 : 10, 6 : \underline{15}$ and $b : c = 3 : 4, 6 : 8, 9 : 12, 12 : 16, \underline{15} : 20$	Need not be written in ratio form
		A1	for 6 : 15 : 20 oe	Accept equivalent ratios Accept $a = 6, b = 15$ and $c = 20$



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	1.25	P1	for finding an expression for the area of one shape, eg $\frac{1}{2} \times 8 \times 6x$ (= 24x) or $5(4x - 1)$ (= 20x - 5) oe	Condone missing brackets for area of rectangle for all process marks
		P1	for finding an expression for the area of both shapes, eg $\frac{1}{2} \times 8 \times 6x$ and $5(4x - 1)$ oe or [area of triangle] - 10 or [area of rectangle] + 10 oe or [area of triangle] - [area of rectangle]	
		P1	for writing a correct equation, eg $\frac{1}{2} \times 8 \times 6x = 5(4x - 1) + 10$ oe or (dep on 1 st P1) eg, [area of triangle] - 10 = [area of rectangle] or [area of triangle] = [area of rectangle] + 10 or [area of triangle] - [area of rectangle] = 10	
		A1	for 1.25 oe	
6	168	P1	for a start to the process, eg $\frac{57}{100} \times 800$ (= 456) or $57 \div (12 + 7)$ (= 3) or $800 \div (12 + 7)$ (= 42.1...) or [amount] $\times \frac{57}{100}$ or [amount] $\times \frac{7}{12 + 7}$	May be seen as part of other calculations, eg $\frac{7}{12 + 7} \times 57$ (= 21) or $\frac{7}{12 + 7} \times 800$ (= 294.7...) [amount] can be any figure considered as being 57% of 800 or 43% of 800 calculated incorrectly or a figure calculated using a full or partial ratio incorrectly as a first step
		P1	for a complete process to find the weight of glass, eg $\frac{57}{100} \times 800 \times \frac{7}{12 + 7}$ oe	
		A1	for an answer in the range 167.9 to 168 SCB2 for an answer of 288	



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 9.349̄ or 9.3499(...) or 12.649̄ or 12.6499(...) 9.25 ≤ LB < 9.3 12.6 < UB ≤ 12.65 sin(x) = 0.731(...) Answer only award no marks.
		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: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
2	1380 2070 3450	M1	for beginning to work with ratio, eg $6900 \div (2 + 3 + 5) (= 690)$ or $6900 \div 2 (= 3450)$ or $6900 \div 5 (= 1380)$ or one accurate value correctly assigned	Award M0 for a correct value assigned to an incorrect person
		M1	for full method to find the value for two people, eg two of: $"690" \times 2 (= 1380)$ or $"690" \times 3 (= 2070)$ or $"690" \times 5 (= 3450)$ or $(6900 - "3450") \div 5 \times 2 (= 1380)$ or $(6900 - "3450") \div 5 \times 3 (= 2070)$ or $(6900 - "1380") \div 8 \times 3 (= 2070)$ or $(6900 - "1380") \div 8 \times 5 (= 3450)$ or $6900 \div 2 (= 3450)$ and $6900 \div 5 (= 1380)$	Award M0 for a correct value assigned to an incorrect person
		A1	for Sid (£) 1380 Tam (£) 2070 Musa (£) 3450 If M1M0, award SCB2 for Sid (£) 3450 Tam (£) 2070 Musa (£) 1380	Correct values not assigned or assigned to an incorrect person, coming from an incorrect method, eg (Sid $\Rightarrow$) $6900 \div 2 = 3450$ and (Tam $\Rightarrow$) $6900 \div 3 = 2300$ and (Musa $\Rightarrow$) $6900 \div 5 = 1380$ will score no marks



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 $n^2 - 2n^2 + 4n - 4$ 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	Working	Answer	Mark	Notes
1		$2 \times 2 \times 3 \times 3$	M1 A1	for complete method to find prime factors; could be shown on a complete factor tree with no more than 1 arithmetic error or 2,2,3,3,(1) $2 \times 2 \times 3 \times 3$ oe
2		14:21:42	P1 P1 P1 A1	for 2 out of 3 expressions in one letter eg from x , $x+7$ $2x+14$ or see a set of numbers to show interpretation of the relationships, eg 10, 17, 34 (dep) for sum of their 3 expressions = 77 eg $x + x + 7 + 2x + 14 = 77$ oe or 2 systematic correct trials including addition for a correct process to isolate their term in x or $x=14$ for ratio 14:21:42 oe
3	CB extended to form CG	Reasoning	B1 M1 C2 (C1)	for 35 or 75 or 145 or 105 or $DEF = 70$, marked on the diagram or 3 letter description for $180-70-35$ or $180-75-35$ or a correct pair of angles that would lead to 75 or 70, eg $AFB = 35$ and $FAB = 75$ or $AFB = 35$ and $ABG = 75$ or $FBC = 35$ and $ABG = 75$ or $EDF = 75$ and $DEF = 70$ or $FDC = 105$ and $FBC = 35$ or $ABC = 105$ and $FBC = 35$ (dep on B1M1) All figures correct with all appropriate reasons stated. Angles must be clearly labelled or on the diagram. Full solution must be seen (dep on B1 or M1) for one reason clearly used and stated.) <u>Corresponding angles</u> are equal, <u>alternate angles</u> are equal, <u>opposite angles</u> in a <u>parallelogram</u> are equal, <u>angles in a triangle</u> sum to 180, <u>angles</u> on a straight <u>line</u> sum to 180, vertically <u>opposite angles</u> are equal, <u>vertically opposite angles</u> are equal, <u>angles in a quadrilateral</u> sum to 360, <u>co-interior angles</u> sum to 180, <u>allied angles</u> sum to 180, <u>angles</u> around a <u>point</u> sum to 360

Paper: IMA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	96	P1	for process to find the ratio of the number of pens of each colour sold, eg $2 \times 7 : 5 \times 3 : 6 \times 4$ (= 14 : 15 : 24)	Does not have to be seen as a ratio but all three needed P3 can be implied by the values 56, 60 and 96
		P1	for process to find the proportion of green pens sold, eg $\frac{212}{"14"+"15"+"24"}$ or $\frac{"24"}{"14"+"15"+"24"}$	
		P1	for a complete process to find the number of green pens sold, eg $\frac{212}{"14"+"15"+"24"} \times "24"$ or $\frac{"24"}{"14"+"15"+"24"} \times 212$	
		A1	cao	
7	8.5	P1	for process to use the area of $PQRS$ to find the length of PQ , eg $10y = 45$ or $45 \div 10$ (= 4.5)	Sets up equation for area Uses perimeter of $ABCD$ Accept $\frac{17}{2}$
		P1	for process to use the perimeter of $ABCD$, eg $2x + 2 \times "4.5" = 26$ or $26 - 2 \times "4.5"$ (= 17) or $26 \div 2$ (= 13)	
		P1	for process to use length of BC to find length of AB , eg solves $2x + 2 \times "4.5" = 26$ or $(26 - 2 \times "4.5") \div 2$ or $"13" - "4.5"$	
		A1	for 8.5 or $8\frac{1}{2}$	



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
9 (a)	100 : 81	M1	for a scale factor of 0.9 oe used; OR for 10 : 9 oe OR 81 : 100 oe OR 81%	eg. 1 : 0.81, accept 1.23(4...) : 1
		A1	for 100 : 81 oe	
	6 : 5	P1	for 1.44 oe used as the scale factor or 1.2 oe OR for 144 : 100 oe or $\sqrt{144} : \sqrt{100}$ oe OR 5 : 6 oe	
		A1	for 6 : 5 oe	
10 (a)	Diagram completed 0.85 0.15, 0.85, 0.15, 0.85	M1	for $1 - 0.15 (=0.85)$	fit their diagram provided probabilities are less than 1
		A1	fully correct diagram	
	0.2775	M1	for one correct product eg $0.15 \times 0.15 (= 0.0225)$ or $0.15 \times 0.85 (= 0.1275)$ or $0.85 \times 0.85 (= 0.7225)$	
		M1	for a complete method eg "0.0225" + $2 \times$ "0.1275" OR $1 - "0.7225"$ oe	
10 (b)	0.2775	A1	oe, eg $\frac{111}{400}$	fit their diagram provided probabilities are less than 1

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
17 (a)	Explanation	C1	For stating the LCM of (4+7) and (5+3) is 88 or there is no smaller multiple of 8 and 11 (than 88)	
(b)	23	P1	for using a scale factor appropriately eg $4 \times 8 (=32)$ or $3 \times 11 (=33)$ or $7 \times 8 (=56)$ or $5 \times 11 (=55)$ or for writing a pair of suitable fractions, eg $\frac{7}{11}$ and $\frac{3}{8}$ or $\frac{4}{11}$ and $\frac{5}{8}$ or $\frac{3}{8}$ and $\frac{4}{11}$	May be seen in a two-way table or probability tree
		P1	for finding the number of large cubes and red cubes or small and yellow or small and red eg $7 \times 8 (=56)$ and $3 \times 11 (=33)$ or $4 \times 8 (=32)$ and $5 \times 11 (=55)$ or $4 \times 8 (=32)$ and $3 \times 11 (=33)$ OR a suitable fractional equation, eg $\frac{7}{11} - x = \frac{3}{8}$ or $\frac{5}{8} - x = \frac{4}{11}$ or $x = 1 - \frac{3}{8} - \frac{4}{11}$ OR a suitable pair of probabilities with a common denominator, eg $\frac{56}{88}$ and $\frac{33}{88}$ or $\frac{32}{88}$ and $\frac{55}{88}$ or $\frac{33}{88}$ and $\frac{32}{88}$	May be seen in a two-way table or probability tree
		A1	cao	$\frac{23}{88}$ scores P2A0



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
2	2 (supported)	P1	for a process to find the number of men, eg. $(60 \div 2) \div 3 (= 10)$	$60 \div 3 = 20$ scores no marks Any ratio must come from correct processes to find the number of children and the number of men Award 0 marks for 2 with no correct supportive working Award full marks for 2 : 1 given as a final answer from correct supportive working
		P1	for a process to find the number of children, eg. $60 - "30" - "10" (= 20)$	
		P1	for a start of a process to find the value of n , eg. $("20" : "10") \div 5$ or $20 : 10 = 10 : 5$ or $"20" \div "10"$	
		A1	for 2 with supportive working	
3	$2 \frac{1}{3}$	M1	for either $\frac{7}{4}$ oe or $\frac{4}{3}$ oe	
		M1	for method to find the product, eg. $\frac{7 \times 4}{4 \times 3}$ or $\frac{21 \times 16}{12 \times 12}$ oe or for $\frac{28}{12}$ or $\frac{7}{3}$ oe	
		A1	for $2 \frac{1}{3}$ or an equivalent mixed number	
4	perpendicular line constructed	C2	for a fully correct construction with all relevant arcs drawn	Perpendicular line segment between P and CD must be within guidelines Accept dotted lines
		(C1	for a perpendicular line drawn from P to the line CD or all relevant arcs drawn)	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
14	$\frac{13}{20}$	P1	for finding the fraction who chose either soup ($\frac{2}{5}$ oe) or chose prawns ($\frac{3}{5}$ oe) or for process to share any number in the ratio 2 : 3 eg $100 \div (2 + 3) \times 2$ (=40)	Starting number 100 Soup : Prawn 40:60
		P1	for a process that could lead to the proportion who chose lasagne or curry for either starter, eg sharing 40% (soup) in the ratio 5 : 3 or sharing 60% (prawns) in the ratio 1 : 5 or $\frac{2}{5} \times \frac{5}{8}$ or $\frac{2}{5} \times \frac{3}{8}$ or $\frac{3}{5} \times \frac{1}{6}$ or $\frac{3}{5} \times \frac{5}{6}$ or for continuing the process with their starting number to find the number who chose lasagne or curry for either starter	L:C L:C 25:15 10:50
		P1	for a complete process to find the proportion who chose curry for both starters, eg $(\frac{2}{5} \times \frac{3}{8}) + (\frac{3}{5} \times \frac{5}{6})$ or to find the number who chose curry for both starter for their starting number	$15 + 50 = 65$ and $\frac{15+50}{100}$
		A1	$\frac{13}{20}$ or equivalent fraction	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
2	12.85 or 12.86 or 13.5(0)	P1 P1 P1 A1	for $9 + 2 + 1$ (= 12) for working out how many lots of 175g are needed eg $6000 \div "12" \times 2 \div 175$ (= 5.71...) for a complete process eg $"5.71..." \times 2.25$ (= 12.857...) for 12.85 or 12.86 or 13.5(0)	Award this mark for sight of 4500, 1000 or 500 Process may lead to 5 or 6 instead of 5.71... "5.71..." (ft) may be rounded or truncated.eg "6"
3 (a)	450 000	B1	cao	
(b)	7×10^{-3}	B1	cao	
(c)	4.73×10^3	M1 A1	for 4730 oe or for 4.73×10^n where $n \neq 3$ cao	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
14	8 : 12 : 9 : 1	P1 P1 P1 A1	for $2 + 3 (= 5)$ and $9 + 1 (= 10)$ OR for assigning a total number of sweets for F + G and O + J eg $F + G = 100$, $O + J = 50$ for finding correct multiplier for relationship between totals for F + G and O + J eg $\times 4$ to get from 5, 10 to 20, 10 OR for working out the number of sweets from their totals for F, G eg 40, 60 or for O, J, eg 45, 5 for $2 \times 4 (= 8)$ and $3 \times 4 (= 12)$ OR for ratio in unsimplified form, eg 40 : 60 : 45 : 5 cao	May be in algebraic form, eg $2a + 3a (= 5a)$ and $9a + 1a (= 10a)$ May be in algebraic form, eg $F + G = 5a$, $O + J = 2.5a$
15	0.7 to 1.1	M1 M1 A1	for tangent to the curve drawn at $t = 12$ for method to find the gradient of their tangent, eg $28 \div 30$ for answer in the range 0.7 to 1.1 dependent upon tangent drawn	Working may be seen on the diagram Ignore negative signs



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
15	(M) 18, (K) 15	P1	for start of process, eg $(6x + 1.5)$ and $(5x + 1.5)$ or $(6x + 1.5)$ and $(11x + 3)$ or $a + 1.5$ and $b + 1.5$ OR starts to work with ratio, eg $6 : 5 = 12 : 10$	
		P1	for setting up an equation, eg $\frac{6x+1.5}{5x+1.5} = \frac{13}{11}$ or $66x + 16.5 = 65x + 19.5$ or $\frac{6x+1.5}{11x+3} = \frac{13}{24}$ or $144x + 36 = 143x + 39$ or $\frac{a}{b} = \frac{6}{5}$ and $\frac{a+1.5}{b+1.5} = \frac{13}{11}$ or $5a = 6b$ and $11a + 16.5 = 13b + 19.5$ oe OR for comparing $12 : 10$ to $13 : 11$ and deducing 1 part = 1.5	
		P1	for isolating in terms of x , eg $66x - 65x = 19.5 - 16.5$ or $144x - 143x = 39 - 36$ or $x = 3$ or for eliminating a or b , eg $55a = 66b$ and so $66b = 65b + 15$ OR for process to find values for M and K, eg 12×1.5 and 10×1.5	
		A1	cao	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
16	40	M1	for $ABD = 120$ and $AED = 60$ or for using the properties of a cyclic quadrilateral eg $EAB + BDE = 180$	Angles may be shown on the diagram
		M1	for using the ratio of 2 : 1 eg showing sizes of angles such that $EAB : BCD = 2 : 1$	May be expressed using algebra eg $EAB = 2x$ and $BCD = x$
		M1	(dep on M1) for linking an angle from the cyclic quadrilateral with angle(s) in the triangle (other than $EAB : BCD = 2 : 1$) eg $BDE = BCD + 60$ or $BDE = 180 - BDC$ or $EAB + BCD + AEC = 180$	Could be expressed using algebra eg $x + 60 = 180 - 2x$
		A1	for $BCD = 40$ from correct working	
17	42 : 63 : 15 : 20	P1	for a first step to write a relationship between 2 weights, eg $A + B : C + D = 3 : 1$ or $A : B = 2 : 3$ or $C : D = 3 : 4$ or $A + B = 3(C + D)$ or $A = \frac{2}{3}B$ or $C = \frac{3}{4}D$	
		P1	for giving all 3 relationships in the same form eg $A + B : C + D = 3 : 1$ and $A : B = 2 : 3$ and $C : D = 3 : 4$ or $A + B = 3(C + D)$ and $A = \frac{2}{3}B$ and $C = \frac{3}{4}D$	
		P1	for complete process to link all 4 weights, eg $\frac{2}{3}B + B = 3\left(\frac{3}{4}D + D\right)$ and $A = \frac{2}{3}B$ and $C = \frac{3}{4}D$ or $A : B : C : D = A : 63 : C : 20$ and $A = \frac{2}{3}B$ and $C = \frac{3}{4}D$ or $C : D = 3 : 4$ and $A : B : D = 42 : 63 : 20$	
		A1	oe	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
18	(c) 30 (t) 54	P1	for setting up an equation, eg $7c + 5t = 480$ or $c : t = 5 : 9$ or $\frac{c}{t} = \frac{5}{9}$ or $9c = 5t$ or for starting to work with ratio of total costs, eg $7 \times 5 (= 35)$ and $5 \times 9 (= 45)$ or $7 \times \frac{5}{14}$ and $5 \times \frac{9}{14}$ or $35 : 45$ or $7 : 9$	
		P1	for a process to eliminate c or t from correct equations, eg $7c + 9c = 480$ or $7 \times \frac{5t}{9} + 5t = 480$ or $7c + \frac{9c}{5} \times 5 = 480$ or for $480 \div ("35" + "45") (= 6)$ or for a process to find total cost of carrots or total cost of tomatoes, eg $480 \div ("7" + "9") \times 7 (= 210)$ or $480 \div ("7" + "9") \times 9 (= 270)$	
		P1	for a process to isolate t or c , eg $16c = 480$ or $80c = 2400$ or $80t = 4320$ or or for one value correct eg $c = 30$ or $t = 54$ or for a process to find cost of 1 kg of carrots or 1 kg of tomatoes, eg $5 \times "6" (= 30)$ or $9 \times "6" (= 54)$ or $"210" \div 7 (= 30)$ or $"270" \div 9 (= 30)$	
		A1	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: 1MA1/3H				
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: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	Yes, supported by correct figures	P1	for a process to find the number of sweets Tina gives to Andy, eg $14 \div 7 \times 3 (=6)$ or for a process to work with fractions of the total to find fraction given to Andy, eg $\frac{14}{21} \times \frac{3}{7} (= \frac{2}{7})$ or for dividing a given number (eg 441) in the ratio 1 : 6 : 14 (= 21 : 126 : 294)	May work with an equivalent ratio, eg 21 : 126 : 294 and do $294 \div 7 \times 3 (=126)$ as a first step May work in multiples of x for all marks
		P1	for a process to find number for Andy and Tina after first exchange, eg A = 1 + "6" (=7) and T = 14 – "6" (=8) or for a process to find the number of sweets Tina gives to Luke eg $(14 - "6") \times \frac{12.5}{100} (=1)$ or for a process to work with fractions of the total to find fraction given to Luke, eg for $\frac{(14 - "6")}{21} \times \frac{12.5}{100}$ or process to work out the number of sweets given to Andy and Luke for their total, eg "294" $\div 7 \times 3 (=126)$ and ("294" – "126") $\times \frac{12.5}{100} (=21)$	
		P1	for a process to find the final amounts or final shares for at least two of Andy, Luke and Tina eg two of $1 + "6" (=7)$, $6 + "1" (=7)$, $14 - "6" - "1" (=7)$ or $\frac{1}{21} + \frac{"2"}{7} (= \frac{7}{21})$, $\frac{6}{21} + \frac{"1"}{21} (= \frac{7}{21})$, $\frac{14}{21} - \frac{"2"}{7} - \frac{"1"}{21} (= \frac{7}{21})$ or "21" + "126" (= 147), "126" + "21" (= 147), "294" – "126" – "21" (= 147)	
		C1	Yes, supported by full working and accurate figures for Andy, Luke and Tina	Accurate figures with no supportive working scores 0



Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
2		Yes (supported)	P1 P1 A1 P1 C1 OR P1 P1 A1 P1 C1	for process to work out the total number of children, e.g. $117 \times 4 (= 468)$ (dep P1) for process to work out total number of adults or the total number of people, e.g. $"468" \times 5 \div 2 (= 1170)$ or $"468" \times 7 \div 2 (= 1638)$ for 1170 or 1638 for process to work out the percentage of theatre full, e.g. $\frac{"468"+"1170"}{2600} \times 100 (= 63)$ or for a process to work out 60% of 2600 ($= 1560$) for a correct conclusion supported by correct figures e.g. 63% or 1560 and 1638 OR for a process to work out 60% of 2600, eg. $\frac{60}{100} \times 2600 (= 1560)$ (dep P1) for process to work out this total number of children, e.g. $"1560" \times 2 \div 7 (= 445(.7...))$ for 445(.7...) for process to work out children in the circle, eg. $"445(.7...)" \div 4 (= 111 \text{ to } 112)$ for a correct conclusion supported by correct figures e.g. 111 to 112 [Where appropriate accept rounded or truncated values]



Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
2 cont.			OR P1 for a process to find the maximum number of children, eg. $2600 \times 2 \div 7 (= 742(.8\dots))$ P1 for process to work out the total number of children, e.g. $117 \times 4 (= 468)$ A1 for 468 and 742(.8...) P1 for $\frac{468}{742(.8\dots)} \times 100 (= 63)$ or process to work out 60% of “742(.8...)” (= 445(.7...)) C1 for a correct conclusion supported by correct figures e.g. 63% or 468 and 445(.7...) [Where appropriate accept rounded or truncated values]	
3		Side elevation Front elevation	C2 for the side elevation (4 cm by 2 cm rectangle with a solid line drawn 1 cm from the 2 cm edge, and correct orientation) [C1 for the side elevation as a rectangle] C2 for the front elevation as a trapezium in correct orientation with base 4 cm, parallel sides 1 cm and 4 cm [C1 for the front elevation as a trapezium with two right angles] [Ignore incorrect or no labelling]	



Paper 1MA1: 3H				
Question	Working	Answer	Mark	Notes
4		68	P1 P1 P1 P1 A1 OR P1 P1 P1 P1 A1	for a process to find the number of vanilla cakes, eg $420 \times 2 \div 7$ oe (= 120) for a process to find the number of banana cakes, eg 420×0.35 oe (= 147) (dep P1) for a full process to find the number of lemon/chocolate cakes eg $420 - (\text{vanilla cakes}) - (\text{banana cakes})$ (= 153) (dep on previous P1) for a process to find the number of lemon cakes eg " $153 \div 9 \times 4$ oe (= 68) OR for writing two proportions in the same format for combining the proportions of vanilla and banana cakes eg $2/7 + 7/20$ (= 89/140) (dep P1) for a full process to find the proportion or number of lemon/chocolate cakes eg $1 - "89/140"$ (= 51/140) (dep on previous P1) for a process to find the number of lemon cakes eg " $51/140 \times 420 \div 9 \times 4$ (= 68) OR for a complete method to find the interior or exterior angle of the dodecagon eg $180 - \frac{360}{12}, \frac{180}{12} (12 - 2)$ oe (= 150), $360 \div 12$ (=30) for a complete method to find the interior angle of polygon P eg at <i>B</i> or <i>C</i> : $360 - "150" - 90$ (= 120) or " $30" + 90$ (= 120) or for a complete method to find the interior or exterior angle of the hexagon eg $180 - \frac{360}{6}, \frac{180}{6} (6 - 2)$ oe (= 120), $360 \div 6$ (= 60) for 30 and 120 or 30 and 60 or 120 and 150 or 60 and 150 complete solution, fully supported by accurate figures
5		Shows polygon is a hexagon	M1 M1 A1 C1	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	3 : 5	P1 P1 P1 P1 A1	for process to find 20% or 120% of the cost, eg 8500×0.2 (= 1700) oe or 8500×1.2 (= 10 200) oe for process to find total cost of payments, eg 12×531.25 (= 6375) for complete process to find value of deposit, eg “10 200” – “6375” (= 3825) or $8500 - “6375”$ (= 2125) and “2125” + “1700” (= 3825) OR the deposit as a proportion of the total cost, eg $1 - \frac{“6375”}{“10200”}$ ($= \frac{3}{8}$) for finding a correct un-simplified ratio, eg “3825” : “6375” oe or 5:3 or $1.\dot{6} : 1$ or $\frac{5}{3} : 1$ Accept 1: $1.\dot{6}$, 1: $\frac{5}{3}$	When partitioning all figures quoted must be correct or a full method shown eg $10\% = 8500 \div 10$ (=850) and $20\% = “850” + “850”$ (=1700) May be seen as a fraction of the total eg $\frac{3825}{10200}$ ($= \frac{3}{8}$) Figures at this stage must be expressed as part of a ratio eg 51:85, $\frac{3}{8} : \frac{5}{8}$ Ignore consistent units
5	(a) 0, -4, -6, -4, 0 (b) Graph (c) 2.6 and -1.6	B2 (B1) M1 A1 M1 A1	fully correct figures at least 2 correct figures) (dep B1) for at least 5 points correctly plotted ft from (a) fully correct graph for $y = -2$ drawn or intersections with $y = -2$ or $y = x^2 - x - 4$ drawn or 1 correct value ft a quadratic graph or for answers in the range 2.5 to 2.7 and -1.5 to -1.7	Must be a curve If answers stated as coordinates, award M1 for both coordinates and M0 for one coordinate

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
16 (a)	0.455	M1	for $0.65 \times (1 - 0.65)$ or 0.65×0.35 ($=0.2275$ or $\frac{91}{400}$) or 2×0.2275 oe	Could be shown on a tree diagram but must show an intention to multiply
		A1	oe	Acceptable equivalents are 45.5% or $\frac{91}{200}$ oe
	42	M1	for a start of the process eg $78 \div 0.65$ ($= 120$) or 78×0.35 ($=27.3$)	$\frac{78 \times 0.35}{0.65}$, $\frac{78}{0.65} - 78$
		A1	cao	
17	4 : 1	P1	for associating algebraic expressions with the correct ratio eg $p - 5 : q - 5$ ($= 5 : 1$) or $p + 20 : q + 20$ ($= 5 : 2$)	
		P1	for $\frac{p+20}{q+20} = \frac{5}{2}$ or $\frac{p-5}{q-5} = \frac{5}{1}$ oe or $p - 5 = 5(q - 5)$ or $2(p + 20) = 5(q + 20)$ oe	Award for one of the two simultaneous equations eg $5q - p = 20$, $5q - 2p = -60$ oe
		M1	for a complete method shown to find p or q	Award for a simultaneous equation method to eliminate one variable leading to either $p = 80$ or $q = 20$
		M1	for a complete method shown to find p and q or two values for p and q that are in the ratio 4 : 1 or an unsimplified ratio 4 : 1 (eg 80 : 20) or an answer of 1 : 4	Award for a simultaneous equation method to eliminate both variables leading to either $p = 80$ and $q = 20$
		A1	cao	

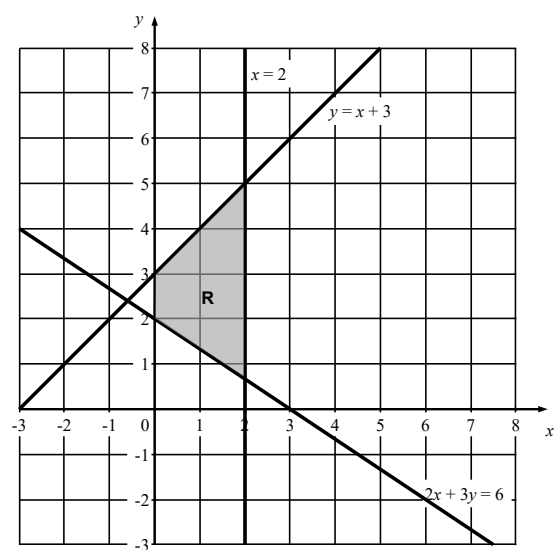


Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
3	No (supported)	P1	for $3000 \div (2 + 3) (= 600)$	Full method to compare No working, answer only no marks No may be implied by a statement
		P1	for “600” $\times 2 (= 1200)$ or “600” $\times 3 (= 1800)$ or “600” $\div 6 (= 100)$ or “600” $\div 20 (= 30)$	
		P1	for “1200” $\div 6 (= 200)$ or “1800” $\div 20 (= 90)$ or “100” $\times 2 (= 200)$ or “30” $\times 3 (= 90)$	
		P1	for “90” $\div$ (“200” + “90”) $\times 100 (= 31.0\dots)$ or “90” $\div$ (“200” + “90”) $(= 0.31\dots)$ or $0.3 \times$ (“200” + “90”) $(= 87)$ or “90” $\div$ (“200” + “90”) $(= 0.31\dots)$	
		C1	correct conclusion and fully correct calculations with accurate figure eg No and 87 or No and 31% or No and 0.31	
4	(a)	B2	for all 4 values correct	Accept a freehand curve drawn that is not made of line segments Line sections outside the required range can be ignored.
		(B1)	for 2 or 3 correct values)	
	(b)	M1	fit (dep on B1) for plotting at least 4 of the points from their table correctly	
		A1	for a fully correct curve drawn	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
20	98 ⁹¹	B1	cao	Must be clear and unambiguous
21 (a)	3 : 4	P1	for start of process, eg isolate terms in c , eg $4c = 3d$ or divide all terms by d , eg $\frac{5c}{d} + 1 = \frac{c}{d} + 4$	Accept any equivalent ratio or $c = 3, d = 4$
(b)	5 : 2	A1	for 3 : 4	
		P1	for start of process: to take all terms to one side eg $6x^2 - 7xy - 20y^2 (= 0)$ or divide all terms by y^2 , eg $\frac{6x^2}{y^2} = \frac{7xy}{y^2} + \frac{20y^2}{y^2}$ or substitute a value of x ($x > 0$) or a value of y ($y > 0$) into the equation, eg $x = 5, 150 = 35y + 20y^2$	Accept $x = 5, y = 2$ or equivalent ratios, eg, $1 : \frac{2}{5}$
		P1	for second step in process, eg $(2x - 5y)(3x + 4y) (= 0)$ or $6p^2 - 7p - 20 (= 0)$ (where $p = \frac{x}{y}$) or $20y^2 + 35y - 150 (= 0)$	
		A1	5 : 2	



Q13(a)



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
3	30	P1	for $160 \div (3+7) (= 16)$ or $\frac{3}{3+7} (= \frac{3}{10})$	Award no marks for a correct answer with no supportive working
		P1	for “16” $\times 3 (= 48)$ or “ $\frac{3}{10}$ ” $\times 160 (= 48)$	
		P1	for a correct step using 48 eg “48” $\div 8 (= 6)$ or “48” $\times 25 \div 100 (= 12)$ or (indep) for combining $\frac{1}{8}$ and 25%, eg $\frac{1}{8} + \frac{1}{4} (= \frac{3}{8})$ or “0.125” + “0.25” $(= 0.375)$ or “12.5”(%) + 25(%) $(= 37.5(\%))$	
		P1	for a complete process to find the number of petrol cars, eg “48” – “6” – “12” oe $(1 - \frac{3}{8}) \times “48”$ oe or “ $\frac{3}{10}$ ” $\times (1 - \frac{3}{8}) \times 160$ oe	
		A1	cao SC B2 for an answer of 100 if P0 scored	
4 (a)	0.00163	B1	cao	
(b)	4.38×10^5	B1	cao	
(c)	2.4×10^{-1}	M1	for $4 \times 6 \times 10^{3-5}$ or 0.24 oe eg 24×10^{-2} or 2.4×10^n where $n \neq -1$	
		A1	cao	



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
7	7.5	P1	for process to find the number of empty jars eg $3 \div 8 \times 400$ oe (= 150)	
		P1	for start of process to deal with ratios eg 3 : 4 and 4 : 8 or 3 : 4 : 8 oe	
		P1	for process to find the number of empty small jars eg $\frac{3}{3+4+8} \times "150"$ oe (= 30) or 30 : 40 : 80	
		P1	for process to find percentage, eg $\frac{"30"}{400} \times 100$ oe or $\frac{"7.5"}{100}$	
		A1	for 7.5 or $7\frac{1}{2}$ oe OR	
		P1	for start of process to deal with ratios eg 3 : 4 and 4 : 8 or 3 : 4 : 8 oe	
		P1	for process to find the proportion of the empty jars that are small eg $\frac{3}{3+4+8} (= \frac{1}{5})$	
		P1	for process to find the proportion of Kasim's jars that are empty small jars eg $\frac{3}{8} \times \frac{1}{5} (= \frac{3}{40})$	
		P1	for process to find percentage, eg $\frac{3}{40} \times 100$ oe or $\frac{"7.5"}{100}$	
		A1	for 7.5 or $7\frac{1}{2}$ oe	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
6 (a)(i)	2 : 6 : 5	P1	for process to compare ratios, eg $a : b = 2 : 6$ or $b : c = 3 : 2.5$	Could use 3 or any common multiple of 3 and 6
		A1	for 2 : 6 : 5 oe	
	$\frac{2}{13}$	M1	for process to find fraction, eg $\frac{[2]}{[2+6+5]}$ or for $\frac{a}{a+b+c}$	
		A1	for $\frac{2}{13}$ oe or ft (a)(i)	
	1 : 10	P1	for process to express all numbers in terms of one number, eg $p = 5 \times 2m (= 10m)$ or $m = \frac{n}{2}$ or for $2m = \frac{p}{5}$	
(b)		A1	or for assigning values in the ratio given, eg $m = 1, n = 2, p = 10$ or for $n : m : p = 2 : 1 : 10$ oe or 10 : 1 oe for 1 : 10 oe	



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
4 (a)	4.5	P1	for a process to find the number of dark chocolates, eg $280 \times \frac{1}{7}$ oe (= 40)	
		P1	for a process to find one part of the ratio for milk chocolates to white chocolates eg $(280 - "40") \div (1 + 3)$ (= 60)	
(b)	No with reason	P1	for a process to find the number of white chocolates, eg $"60" \times 3$ (= 180) or $280 - "40" - "60"$ (= 180)	Condone milk, white incorrectly labelled
		P1	for a ratio of white chocolates : dark chocolates eg $"180" : "40"$ oe or for a process to find the value of n eg $"180" \div "40"$	Labels not required for this mark, but if seen must be correct Must be a 2-part ratio Allow $"40" : "180"$ if labelled as dark chocolate : white chocolate oe
		A1	(dep P3) for 4.5 oe	A correct answer with no supportive working gets 0 marks Condone answer of 4.5 : 1
		C1	for No with reason Acceptable examples No, the number of dark chocolates and white chocolates has not changed No, the ratio of $n:1$ only involved white and dark chocolates No, eating milk chocolates doesn't change the rest No, the ratio of dark to white chocolates doesn't change Not acceptable examples Yes,... No, it doesn't matter how many milk chocolates are eaten No, the number of white chocolates doesn't change No, the number of dark chocolates doesn't change	Reason must refer to or imply both dark and white chocolates

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
10 (a)	Diagram	B1	for correct vector drawn including arrow	May be drawn anywhere on the grid. Condone missing label Accept consistent incorrect notation for M1
	(b) $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$	M1	for $\mathbf{a} + 2\mathbf{b}$ drawn with resultant vector or for writing $\mathbf{a}$ and $\mathbf{b}$ as column vectors and attempt to add $\mathbf{a} + 2\mathbf{b}$, eg $\begin{pmatrix} 1 \\ 2 \end{pmatrix} + 2 \times \begin{pmatrix} 1 \\ -3 \end{pmatrix}$ or $\begin{pmatrix} 1+2 \\ c \end{pmatrix}$ or $\begin{pmatrix} d \\ 2+-6 \end{pmatrix}$ or $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$	
		A1	cao	
11 (a)	$\frac{2}{25}$	B1	accept 0.08	All powers and products must be evaluated
	(b) $\frac{1}{8}$	M1	$fg(x) = \frac{2}{(4x^3)^2}$ oe or $g(1) = 4$ or $\frac{2}{(4 \times 1^3)^2}$ oe	
		A1	oe	
12	BDAC	B2	all correct	
		(B1	for at least 2 correct)	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	12	P1	for a process to find the fifth term, eg $3a + 5a (= 8a)$	[8a] allow use of what is clearly indicated as the missing term $\frac{228}{19}$ or $\frac{228}{1+2+3+5+8}$ scores P1 P1 $\frac{228}{1+2+3+5+8}$ scores P0P1
		P1	for setting up the equation eg $a + 2a + 3a + 5a + [8a] = 228$	
		A1	cao	
6	(a) 0.5, 0.3	P1	for $1 - 0.05 - 0.15 (= 0.8)$	Award this mark for any two probabilities that sum to 0.8
	(b) 120	A1	oe	
		M1	$18 \div 0.15$ oe or $6 + 18 + a + b$ where $a + b = 96$	
		A1	cao	
7	18.3	P1	for finding the area of the triangle eg $0.5 \times 8 \times 8 (= 32)$	Accept rounded or truncated figures If the answer is given within the range but then rounded incorrectly award full marks.
		P1	for finding the area of the circle $\pi \times 8 \times 8 (= 201.06..)$	
		P1	for finding the area of the sector eg $\frac{1}{4} \times \pi \times 8^2$ or “201.06..” $\div 4 (= 50.26...)$	
		A1	for an answer in the range 18.2 to 18.3	
8	(a) Graph sketched	C1	Sketch	Accept freehand provided intention is clear
	(b) Graph sketched	C1	Sketch	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
3	Shown with reasons	M1	for method to find ACD using parallel lines eg $BCA = 125$ and $ACD = 180 - 125 (= 55)$ or $BCF = 180 - 125 (= 55) = ACD$ or $FCD = 125$ and $ACD = 180 - 125 (= 55)$ or $CFG = 180 - 125 (= 55) = ACD$	Angles must be clearly labelled on the diagram or otherwise identified. Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		M1	for method to find ADC eg $180 - 110 (= 70)$ or for method to find CAD eg $180 - ("70" + "55") (= 55)$ or $110 - "55" (= 55)$	
		A1	for $ACD = 55$ and $CAD = 55$	
		C1	for one correct parallel lines reason linked to their method eg <u>Corresponding</u> angles are equal <u>Allied</u> angles / <u>Co-interior</u> angles add up to 180 <u>Alternate</u> angles are equal	
		C1	for one other reason stated linked to their method eg <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 Vertically <u>opposite angles</u> are equal OR <u>Vertically opposite</u> angles are equal The <u>exterior angle</u> of a triangle is <u>equal</u> to the sum of the <u>interior opposite angles</u> . <u>Angles</u> in a <u>quadrilateral</u> add up to 360. Accept "4-sided shape"	
4	17.5	P1	for a first step, eg $5 \times 14 (= 70)$ or $14 \div 4 (= 3.5)$ or $5 \div 4 (= 1.25)$ or $4 \div 5 (= 0.8)$	Could be done algebraically. 11.2 as answer scores no marks.
		A1	oe	

Paper: IMA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
10 (a)	0.13, 0.94, 0.06, 0.73, 0.27	B2	for all values correctly placed	Allow values that are truncated or rounded as long as the intention is clear.
		(B1	for at least 2 correct values placed)	
		M1	(fit their diagram) for one correct product, eg $0.87 \times 0.94 (= 0.8178)$ or $0.87 \times 0.06 (= 0.0522)$ or $0.13 \times 0.73 (= 0.0949)$ or $0.13 \times 0.27 (= 0.0351)$	
		M1	for a full method, eg “0.8178” + “0.0522” + “0.0949” or 1 – “0.0351”	
(b)	0.9649	A1	for 0.9649, 96.49% or $\frac{9649}{10000}$	
11	D A B C	B2	for all correct	
		(B1	for at least 2 correct)	
12	6.4	P1	for a suitable start to the process, eg, $M = \left(\frac{7-3}{2}, \frac{13+21}{2} \right) (= (2, 17))$ or $N = \left(\frac{15-3}{2}, \frac{23+21}{2} \right) (= (6, 22))$	Condone missing brackets on coordinates Ignore units throughout
		P1	(dep on P1) for a correct first step using of Pythagoras, eg $(x_N - x_M)^2 + (y_N - y_M)^2$ eg $(“6” - “2”)^2 + (“22” - “17”)^2 (= 41)$	
		A1	for answer in the range 6.4 to 6.41	

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 " + " (0.6×60) " $(= 2 \text{ hrs } 36 \text{ mins})$ 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: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
1	16.2	M1 A1	for a correct first step to find BC , eg $19^2 = 10^2 + BC^2$ or $19^2 - 10^2$ ($= 261$) or $\sqrt{19^2 - 10^2}$ or $\sqrt{261}$ or $3\sqrt{29}$ for answer in the range 16.1 to 16.2	Can use alternative letter for BC provided intention is clear If using an alternative method using trigonometry must have BC as the only unknown ISW incorrect rounding if answer given in range
2 (a)	$2 \times 3 \times 3 \times 5$	M1 A1	for a complete method to find prime factors; could be shown on a complete factor tree with no more than one error or by division by prime factors with no more than one error or for 2, 3, 3, 5 for $2 \times 3 \times 3 \times 5$ oe	Condone the inclusion of 1 for this mark Accept $2 \times 3^2 \times 5$
(b)	36	B1	for 36	Accept $2^2 \times 3^2$ or $2 \times 2 \times 3 \times 3$
3	4	M1 A1	for method to use formula, eg $72 \div 6$ ($= 12$) or $72 \div 9$ ($= 8$) cao	Can be implied by $\frac{72}{6}$ or $\frac{72}{9}$

Paper: 1MA1/1H				
Question	Working	Answer	Mark	Notes
14	$ky - y = x + kx$ $y(k-1) = x(1+k)$	$y = \frac{x(k+1)}{k-1}$	M1 M1 A1	$y + x = k(y - x)$ or $\frac{y+x}{y-x} = k$ oe For isolating x and y on opposite sides eg $ky - y = x + kx$ Completing correct algebraic reasoning to reach conclusion
15		Proof to reach $\frac{24}{55}$	M1 M1 A1	for $100x = 43.636\ldots (43.\dot{6}\dot{3})$ or $10x = 4.3636\ldots (4.\dot{3}\dot{6})$ and $1000x = 436.36\ldots (436.\dot{3}\dot{6})$ (dep) for finding difference that would lead to a terminating decimal for completing algebra to reach $\frac{24}{55}$
16		$\frac{7}{3}$	M1 M1 A1	for $y = k\sqrt[3]{x}$ oe or $\frac{7}{6} = \sqrt[3]{8}k$ oe for $k = \frac{7}{6 \times \sqrt[3]{8}}$ oe for $\frac{7}{3}$ oe
17		Completes proof	M1 C1	Expands both expressions eg $\frac{1}{2}(n^2 + n + n^2 + n + 2n + 2)$ or $n^2 + n$ and $n^2 + n + 2n + 2$ or factorises $\frac{1}{2}(n+1)(n+n+2)$ Completes proof with explanation and reference to $(n+1)^2$

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
9		65.60	P1 P1 A1	for start in using inverse proportionality, eg $5 \times 4.5 (= 22.5)$ or $4.5 = \frac{k}{5}$ or $5 \times 4.5 \times 60 (= 1350)$ or $\frac{5}{3}$ or $\frac{3}{5}$ for process to find number of hours for each cleaner today, eg $\frac{22.5}{3} (= 7.5)$ for 65.6(0) (SC B2 for 61.5(0))
10 (a)		0 to 20 seconds	B1	for between 0 seconds and 20 seconds
		with reason	C1	for reason given eg gradient is greatest oe
(b)		18	B1	ft from (a)
11		0.119	P1 P1 A1	for starting the process, eg finds area 25π or 16π oe, or finds angle for town A, $0 - 19 (70^\circ)$, may be on diagram for a complete process, eg $\frac{70}{360} \times \frac{25\pi}{41\pi}$ $0.118 - 0.119$ or $11.8\% - 11.9\%$



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: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
12	73.6	P1	for correct initial use of Pythagoras eg $5^2 + 5^2 (=50)$ or a trigonometric ratio in the form $\frac{5+2}{0.5AC} = \sin 45$ oe	do not accept $\sqrt{20} \div 2$
		P1	for finding the length of half of the diagonal eg $\sqrt{50} \div 2 (=3.5...)$ or $0.5AC = \frac{5+2}{\sin 45} (=3.5...)$ oe	
		P1	for process to use tan eg $\tan TAC = (12 \div "3.5..") (=3.3..)$ or complete alternative method arriving at an equation with the subject as $\sin TAC$ or $\cos TAC$	
		A1	for an answer in the range 73.58 to 74.1	
13	408	M1	for $1.01 \times 400 (=404)$ or 408.04 or 412.08	412(.08) on the answer line M1A0 1.01×400 may be seen as part of a calculation
		A1	cao	
14	Evidence of solution	M1	for constructing an equation eg $y \propto \frac{1}{x^2}$ or eg $y = \frac{k}{x^2}$ oe	Must show all steps clearly
		M1	for substituting in the values a and 44 into $y = \frac{k}{x^2}$	
		C1	for a complete method to use the equation, the value of k and $x = 2a$ to show $y = 5.5$ eg $(2a)^2 y = 44a^2$ and $y = 44a^2 \div 8a^2 = 5.5$	



Paper: IMA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
9	10	P1	he has used the wrong centre for a process to start to solve the problem eg $6 \times 9 (= 54)$ machine days needed or 12 (machine days used in first 3 days) or 42 (machine days needed after first 3 days) or 6 (machine days not used in first 3 days) or $3 + 4 + 5$ equivalent to 2 days with 6 machines or has used 48 machine days in first 9 days	eg $3 + 4 + 5 (= 12)$ eg $6 \times 9 - 12 (= 42)$ eg $3 + 2 + 1 = 6$ eg $12 \div 6 = 2$
		P1	for " 42 " $\div 6 (= 7)$ (more days needed) or $3 \text{ days} - 2$ (equivalent) days $(= 1)$ extra day needed to make up for the days not used	
		A1	cao	
10	1.8	P1	process to find the amount of interest before tax eg $28.80 \div 20 \times 100 (= 144)$ OR for equation which would lead to $(x =) 0.018, 1.8$ or 1.018 eg $0.2 \times 8000 \times x = 28.8$ or $\frac{8000(100+x)}{100} = 8144$	
		P1	process to find the interest rate eg $\frac{144}{8000} (= 0.018)$ or $\frac{8144}{8000} (= 1.018)$	These numerical expressions may be seen multiplied by 100, eg $\frac{144}{8000} \times 100$
		A1	cao	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
7	4.56×10^{-2}	M1 A1	for $0.000000342 \div 0.0000075$ OR for 0.0456 oe eg 0.456×10^{-1} or 45.6×10^{-3} or $\frac{57}{1250}$ OR for an answer of 4.56×10^0 cao	
8	6	M1 M1 A1	for $720 \div 40 (= 18)$ or $720 \div 30 (= 24)$ for a complete process eg $(720 \div 30) - (720 \div 40)$ or $"18" \times 4/3 - "18"$ or $"24" - "24" \times 3/4$ cao	
9	No (supported)	P1 P1 P1 P1 A1	for finding the area of 3 or more faces of the cuboid and adding eg $(6 \times 8) + (8 \times 18) + (6 \times 18) \dots$ or $"48" + "144" + "108" \dots (= 300)$ complete process to find surface area of cuboid, eg $6 \times 8 \times 2 + 6 \times 18 \times 2 + 8 \times 18 \times 2 (= 600)$ for process to find side length of cube, eg [surface area] $\div 6$ and square rooting ($= 10$) (dep on previous P1) for processes to find volume of cube and volume of cuboid, eg [side length] ³ ($= 1000$) and $6 \times 8 \times 18 (= 864)$ for a process to find the volume of the cuboid $6 \times 8 \times 18 (= 864)$ and cube rooting ($= 9.52\dots$) to find a side length (dep on previous P1) for process to find surface area of cube, eg. $("9.52\dots")^2 \times 6 (= 544.28\dots)$ No with 1000 and 864 OR No with 600 and 544(.28...)	Could be an addition of <i>any</i> three faces eg $48 + 48 + 144$ etc. [surface area] must come from the addition of at least three attempts at area, but not from volume.

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
15	Proof	M1	for correct expressions for two consecutive even numbers eg $2n$ and $2n+2$	$(2n)^2 + (2n+2)^2$ $= 4n^2 + 4n^2 + 8n + 4$ $= 8n^2 + 8n + 4 = 4(2n^2 + 2n + 1)$
		M1	(dep M1) for expanding both expressions with at least one expansion fully correct eg $4n^2$ and $4n^2 + 4n + 4n + 4$ or for factorising both terms and intention to square correctly eg $(2n)^2$ and $2^2(n+1)^2$	Or $(2n)^2 + (2n+2)^2$ $= 4n^2 + 4n^2 + 8n + 4$ $= 8n^2 + 8n + 4 = 4(2n^2 + 2n + 1)$
		A1	complete proof	Or $(2n)^2 + (2n+2)^2$ $= 4(n)^2 + 4(n+1)^2$ $= 4(n^2 + (n+1)^2)$
16	-7.5	M1	for stating a correct relationship, eg $y = \frac{k}{x^2}$ or $8 = \frac{k}{2.5^2}$	Accept $y \propto \frac{k}{x^2}$ where k may be 1
		A1	for $k = 50$, could be seen in an equation	
		A1	-7.5 oe	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
17	$f = \frac{4d+3}{d+3}$	M1 M1 M1 A1	for clearing the fraction eg $d(f-4) = 3(1-f)$ or $df-4d = 3-3f$ (dep M1) for isolating f terms in a correct equation eg $df+3f = 3+4d$ (dep on two terms in f) for factorising eg $f(d+3) = 3+4d$ oe	Condone error in expansion of RHS for this mark
18	20	P1 P1 A1	for a statement of proportionality eg $x = k\sqrt{y}$ or 1.44 oe for using $\sqrt{1.44}$ as multiplier eg $(x_2 \Rightarrow) k\sqrt{1.44}y$ or 1.2 oe cao	Must be written in the form of an equation with a constant term, accept $x \propto k\sqrt{y}$



Paper: IMA1/3H					
Question		Answer	Mark	Mark scheme	Additional guidance
9	(a)	4	P1 A1	$12 \times 5 \div 15$ cao	
	(b)	Statement	C1	Acceptable examples it could take more time it could take less time it could take more or less time it would take longer if they worked at a slower rate Not acceptable examples the time will be less as there are more people if the rate at which the 15 people work changes it would have taken longer it would take less time	
10		14.14	P1 P1 P1 A1	works out scale factor eg $(9 + 6) \div 6 (= 2.5)$ OR for start of process to find angle DBE eg $\sin B = \frac{2}{6}$ oe uses Pythagoras eg $6^2 - 2^2 (= 32)$ or $\sqrt{32} (= 5.6\dots)$ OR calculates AC eg $2 \times "2.5" (= 5)$ OR for complete process to find angle DBE eg $\sin^{-1}\left(\frac{2}{6}\right) (= 19.4\dots)$ complete process to find CB eg $"2.5" \times "\sqrt{32}" (= 10\sqrt{2})$ or $\sqrt{(9+6)^2 - "5"^2} (= 10\sqrt{2})$ OR uses trigonometry, eg $15 \times \cos "19.4\dots"$	Note method can be carried out in either order May be seen on diagram If the answer is given within the range but then rounded incorrectly award full marks.



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
11	Shown	M1	for $6 \times 14.5 (= 87)$ or $13 \times 7 (= 91)$ or $13 \div 6 (= 2.16(666\dots))$	May work in hours or other units of time
		M1	for “87” $\div 7 (= 12.428\dots)$ or “87” $\div 13 (= 6.692\dots)$ or $6 \times 14.5 (= 87)$ and $13 \times 7 (= 91)$ or $14.5 \div “2.16” (= 6.692\dots)$	Accept figure rounded or truncated to 1dp
		C1	(dep M2) for 12.(428...) (workers) or 6.69(2...) (days) or 87 and 91	Figures must be correct and supported by working. Accept value in range 6.69 to 6.72 for number of days
12	comparison shown	M1	for starting to manipulate equation, eg $5y = 10x + 15$ or $5y = 10x - 4$ or $y - 2x + \frac{4}{5} = 0$ or $y - 2x = 3$	Ignore constant terms for both marks
		A1	for statement and equation(s) which can be used to show that the gradients of the two lines are the same, eg $5y = 10x + 15$ and $5y = 10x - 4$ and both have the same x coefficient OR $y = 2x - \frac{4}{5}$ and both have a gradient of 2	
13	enlargement	B2	for correct enlargement at (4, 8) (6, 4) (10, 4) (12, 8)	
		(B1	for correct size and orientation in the wrong position OR 3 of 4 vertices correct)	



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	$t = 20$ $p = 4, 50$	M1 M1 A1	for method to find a missing value of p , eg $\frac{100}{25}$ oe ($= 4$) or $\frac{100}{2}$ oe ($= 50$) or for $p = \frac{100}{t}$ for method to find the missing value of t , eg $100 \div \frac{5}{1}$ ($= 20$) or for finding both missing values of p cao	Marks for 4 or 50 can only be awarded if in correct cell of table or unambiguous in working Mark for 20 can only be awarded if in correct cell of table or unambiguous in working
14	Histogram drawn	B3 (B2) (B1)	for fully correct histogram, eg relative heights 1, 5, 6, 1.5 for 3 correct bars or for frequency $\div$ class interval for at least 3 frequencies and 2 correct bars of different widths) for 2 correct bars of different widths or for frequency $\div$ class interval for at least 3 frequencies)	Frequency densities are 1, 5, 6, 1.5
15	40	P1 P1 A1	for a start to the process, eg $\frac{x}{360} \times 2 \times \pi \times 18 (= 4\pi)$ oe or $\frac{4\pi}{2 \times \pi \times 18} (= \frac{x}{360})$ oe for a complete process to find x , eg $\frac{4\pi}{36\pi} \times 360$ oe cao	Any arrangement equivalent to this equation acceptable



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
12	$\frac{62}{72}$	M1 M1 A1	for one correct product, eg $\frac{5}{8} \times \frac{7}{9} (= \frac{35}{72})$ oe or $\frac{3}{8} \times \frac{2}{9} (= \frac{6}{72})$ oe or $\frac{3}{8} \times \frac{7}{9} (= \frac{21}{72})$ oe or $\frac{5}{8} \times \frac{2}{9} (= \frac{10}{72})$ oe for a full method, eg $\frac{5}{8} \times \frac{7}{9} + \frac{3}{8} \times \frac{2}{9} + \frac{3}{8} \times \frac{7}{9}$ oe or $1 - \frac{5}{8} \times \frac{2}{9}$ oe for $\frac{62}{72}$ oe eg $\frac{31}{36}$	
13	80	M1 M1 A1	for setting up an equation with a constant term, eg $y = kx$ oe or $24 = k \times 1.5$ oe or $k = 16$ or for starting to work with direct proportion, eg $24 \div 1.5 (= 16)$ or $5 \div 1.5 (= 3.33\dots)$ for substituting in $y = kx$, eg $y = "16" \times 5$ or for a complete method, eg $24 \div 1.5 \times 5$ or $5 \div 1.5 \times 24$ cao	Condone the use of “ α ” instead of “ $=$ ” for the M marks



Paper: 1MA1/1H				
Question	Working	Answer	Mark	Notes
11 (a)		1, -3	B1	cao
(b)		-0.75, 2.75	B1	accept -0.7 to -0.8, 2.7 to 2.8
(c)		-2.8	B1	cao
12 (a)		$\frac{1}{9}$	M1	for showing a method using either reciprocal or square root e.g. $\frac{1}{n}$ or 9 seen
			A1	cao Accept $\pm\frac{1}{9}$ or 0.1 recurring
(b)		$\frac{16}{25}$	M1	for showing cube root of 64 as 4 and the cube root of 125 as 5 or $\frac{16}{n}$ ($n \neq 25$) or $\frac{n}{25}$ ($n \neq 16$) or an intention to find the cube root and square.
			A1	cao Accept 0.64
13 (a)		$y = \frac{9}{x^2}$	M1	begins to work with $y = \frac{k}{x^2}$ oe e.g. subs of a pair of numbers into $y = \frac{k}{x^2}$ or states $k=9$
			A1	for $y = \frac{9}{x^2}$ Accept $y = 9x^{-2}$
(b)		$\frac{3}{4}$	M1	fit (dep on previous M1) subs $y = 16$ into proportional formula of the form $y = \frac{k}{x^2}$ oe
			A1	oe



Paper: IMA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
20	$h = \frac{120}{\sqrt{t}}$	P1	for setting up a proportional relationship between h and p , eg $h \propto \frac{1}{p}$ or $h = \frac{k}{p}$ OR a proportional relationship between p and t , eg $p \propto \sqrt{t}$ or $p = K\sqrt{t}$	Condone the use of ' $\propto$ ' instead of '=' for the first two P marks Relationship may be implied by substitution
		P1	for process to substitute at least 2 values, eg $10 = \frac{k}{6}$ ($k = 60$) or $6 = K\sqrt{144}$ ($K = 0.5$)	
		P1	for full process leading to $h = \frac{60}{\sqrt{t}}$ or $p = 0.5\sqrt{t}$	Both constants must come from a correct process
		A1	$h = \frac{120}{\sqrt{t}}$ or $h = \frac{120\sqrt{t}}{t}$ or $h = \frac{60}{0.5\sqrt{t}}$	Formula for h in terms of t Does not need to be in simplest form
21	(a) $\frac{x+1}{3}$	M1	first step to change the subject of $y = 3x - 1$ or $x = 3y - 1$, eg $y + 1 = 3x$	
		A1	oe	
	(b) Shown	M1	for method to find $fg(x)$, eg $fg(x) = 3(x^2 + 4) - 1$	
		M1	for method to find $gf(x)$, eg $gf(x) = (3x - 1)^2 + 4$	
		M1	(dep on previous two M marks) for setting up equation, eg $3(x^2 + 4) - 1 = 2[(3x - 1)^2 + 4]$	
		M1	(dep 2nd M1) for correct expansion of $(3x - 1)^2$ eg $9x^2 - 3x - 3x + 1$	
		C1	for $15x^2 - 12x - 1 = 0$ from correct working	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
16	Shown (supported)	M1	for eliminating y or x , eg $x^2 + 3x - 3 = 5x - 4$	There must be a statement in words for the award of this mark
		M1	for rearranging, collecting terms and setting to 0 eg $x^2 - 2x + 1 (= 0)$	
		M1	for factorising or solving eg $(x - 1)^2 (= 0)$	
		C1	for statement confirming only 1 point in common eg only 1 root or only 1 value of x so only 1 set of coordinates	
17	$x = \frac{1}{2}z^6$	M1	for setting up an equation eg $x = ky^2$ oe or $y = cz^3$ oe	Accept use of proportionality sign, eg $x \propto y^2$ or $y \propto z^3$ or $x \propto ky^2$ or $y \propto cz^3$
		M1	for eliminating y eg $x = k(cz^3)^2$ oe OR substitutes values in both equations, eg $32 = ky^2$ and $y = cz^3$	Accept use of proportionality sign, eg $32 \propto ky^2$ and $y \propto cz^3$
		M1	for substituting in 32 and 2 to find the constant, eg $32 = m2^6$ OR combines equations, eg $32 = k c^2 2^6$	
		A1	oe	



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
16	0.78	P1 P1 P1 A1	for using 0.75 or 0.25 in a relevant product, eg $0.75 \times x$ or $0.25 \times y$ for using two products to form an equation, eg $0.75x + 0.25y = 0.36$ for a correct equation in one variable, eg $0.75(1 - p) + 0.25p = 0.36$ or $0.75f + 0.25(1 - f) = 0.36$ oe	Allow different letters Could work with fractions Could set up an equation for pass $\times$ pass + fail $\times$ fail = 0.64 Accept 78% or any equivalent fraction, eg $\frac{39}{50}, \frac{156}{200}$
17	$y = \frac{40}{\sqrt{x^3}}$	P1 P1 P1 A1	for setting up an equation with a constant term, eg $y = k\sqrt{t}$ or $t = \frac{K}{x^3}$ for a process to substitute values in one equation, eg $15 = k\sqrt{9}$ or $k = 5$ or $8 = \frac{K}{2^3}$ or $K = 64$ (dep P2) for combining the two equations ft their values of k and K , eg $y = 5\sqrt{\frac{64}{x^3}}$ OR for $y = 5\sqrt{t}$ and $t = \frac{64}{x^3}$ oe	Condone the use of ' α ' instead of ' $\pm$ ' for the first two P marks Equation can be implied by correct substitution Formula must include 40 Accept other forms for the power of x but must be a single term in x



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
9 (a)	Graph drawn	B2	for a correct line drawn	Accept answers in the form $\frac{a}{b}$ where a and b are integers If figures are given as part of the answer they must be correct, but can allow ft
		(B1)	for stating or plotting at least 2 points on the line eg (0, 0) and (4, 5) or (4, 5) and (8, 10) or giving the equation of the line eg $y = \frac{5}{4}x$	
(b)(i)	1.25	B1	oe or ft their line in part (a)	
(ii)	Explanation	C1	for explanation Acceptable examples the number of cups of water per cup of rice every cup of rice has 1.25 cups of water for every 4 cups of rice there are 5 cups of water Not acceptable examples cups of water ÷ cups of rice the gradient represents the steepness of the line the number of cups of rice for each cup of water	
10	$\frac{25}{\pi}$	P1	for showing $\pi d = 10$ or $2\pi r = 10$ or $r = \frac{10}{2\pi}$ or $d = \frac{10}{\pi}$	Need not be simplified but needs to show a single value of π
		P1	(dep P1) for using $r = \frac{5}{\pi}$ or $r = \frac{10}{2\pi}$ or $d = \frac{10}{\pi}$ in πr^2 eg $\pi \times \left(\frac{10}{2\pi}\right)^2$	
		A1	oe	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)	$f = \frac{224}{d^2}$	M1	for $3.5 = \frac{k}{8^2}$ oe ($k = 224$)	Accept use of ∞ for the M mark
		A1	for $f = \frac{224}{d^2}$ oe	
	4.73	M1	for $10 = \frac{"224"}{d^2}$ or $d^2 = "224" \div 10$	
		A1	or ft their value for k provided $f = \frac{k}{d^2}$ is used for answer in range 4.73 to 4.733	
13	Correct region R	M1	for at least two correct boundaries, eg $y = -3$ or $x = 2$ or $y = 2x + 1$ or $3x + 2y = 6$	
		M1	for the remaining two correct boundaries or a third correct boundary with shading correct with the inequalities for at least two correct boundaries	
		C1	for a correct region (R) clearly identified	



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
14	$y = \frac{100}{9x^4}$	P1	for setting up a correct proportional relationship, eg $d \propto x^2$ or $d = kx^2$	Condone the use of ' $\propto$ ' instead of ' $=$ ' for the four P marks
		P1	for setting up a second proportional relationship, eg $y \propto \frac{1}{d^2}$ or $y = \frac{K}{d^2}$	
		P1	(dep P1) for a process to find one of the constants of proportionality eg $24 = k \times 2^2$ ($k = 6$) or $4 = K \div 100$ ($K = 400$)	
		P1	full process to find y in terms of x eg $y = \frac{"400"}{("6" x^2)^2}$ oe	
		A1	$y = \frac{100}{9x^4}$ oe	
				Both constants must come from a correct process
				Expression must have been simplified, but could be given other equivalent ways eg $y = 11.111... x^{-4}$

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	Proof	M1	for eg, $(10x =) 0.723723\dots$ or $(100x =) 7.237237\dots$ or $(1000x =) 72.372372\dots$ or $(10000x =) 723.723723\dots$	Any recurring notation acceptable throughout. Proofs with terminating decimals (less than 6 figures) score M1M1A0
		M1	(dep M1) for a method using two recurring decimals that leads to a terminating decimal difference, using correct multiples of x eg $(10000x - 10x =) 723.723723\dots - 0.723723\dots$	
		A1	for completing the algebra to $\frac{241}{3330}$ oe	
14	0.48	P1	for setting up an equation with a constant term, eg $y = kx^2$ or $x = \frac{j}{w}$	Condone the use of " ∞ " instead of " ∞ " for the first two P marks Equation can be implied by correct substitution $y = \frac{1.92}{w^2}$
		P1	for a process to substitute values in one equation, eg $3 = k \times 0.5^2$ or $k = 12$ or $2 = j \div 0.2$ or $j = 0.4$	
		P1	(dep P2) for combining the two equations ft their values of k and j eg $y = "12" \times \left(\frac{"0.4"}{w}\right)^2$ oe OR for correct process to find the value of x when $w = 2$, eg $x = "0.4" \div 2 (= 0.2)$	
		P1	for substitution into their formula, eg $y = \frac{"1.92"}{2^2}$ OR for using found value of x to find the value of y , eg $y = "12" \times "0.2"^{0.2}$	
		A1	oe	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
13 (a)	No with reason	C1	for No with reason, Acceptable examples No, $4 \div 4 \neq 8 \div 6$ No, $4 \div 4 \neq 8 \div 6$ so they don't have the same constant No because $y = kx$ doesn't work No, it won't pass through (0, 0) Not acceptable examples Yes, ... No, they don't increase by the same number No, they don't have the same constant	
(b)(i)	49	M1	for stating a correct relationship, eg $w = k \times \sqrt{t}$ or $140 = k \times \sqrt{64}$ oe	Condone the use of ' α ' instead of '=' for both M marks
		M1	for method to find constant of proportionality, eg $140 \div \sqrt{64} (= 17.5)$ oe	Award of this mark implies the previous mark
		A1	cao	
(ii)	sketch	C1	for sketch	Sketch at end of mark scheme
14	180	M1	for $10 \times 9 \times 4 (= 360)$ or $10 \times 9 \times 4 \div 2$ or $10 \times 9 \div 2 (= 45)$ or $(9 \times 4) + (8 \times 4) + (7 \times 4) + (6 \times 4) + (5 \times 4) + (4 \times 4) + (3 \times 4) + (2 \times 4) + (1 \times 4)$ oe	
		A1	cao	

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
11	125	P1	for setting up an equation with a constant term, eg $T = \frac{k}{w}$ or $w = K\sqrt[3]{d}$	Condone the use of ' α ' instead of ' $\approx$ ' for the first two P marks Equation can be implied by correct substitution $T = \frac{120}{w}$ $w = \frac{1}{2}\sqrt[3]{d}$
		P1	for a process to substitute values in one equation, eg $20 = \frac{k}{6}$ or $k = 120$ or $1 = K\sqrt[3]{8}$ or $K = \frac{1}{2}$ oe	
		P1	(dep P2) for combining the two equations ft their values of k and K , eg $T = \frac{"120"}{\frac{1}{2}\sqrt[3]{d}}$ oe OR for a correct process to find the value of w when $T = 48$, eg $w = \frac{"120"}{48}$ (= 2.5 oe)	
		P1	for substitution into their formula, eg $48 = \frac{"120"}{\frac{1}{2}\sqrt[3]{d}}$ OR for substitution of found value of w in the equation for d , eg $"2.5" = \frac{1}{2}\sqrt[3]{d}$	
		A1	cao	

Paper: 1MA1/3H				
Question	Working	Answer	Mark	Notes
1 (a)		$160 < h \leq 170$	B1	correct class interval
(b)		Line segments joining the points (135, 4), (145, 11), (155, 24), (165, 22) and (175, 19)	C2 [C1]	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
3	Zurich (supported)	P1	for one process to compare, eg eg Currency conversion, $3.5 \times 1.25 (= 4.375)$ or $7.20 \div 1.25 (= 5.76)$ or finds 1g in one place $\pounds 3.50 \div 200 (= 0.0175)$ or $7.20 \div 360 (= 0.02)$ or finds 200g in Zurich, $7.2 \div 360 \times 200 (= 4.0)$ or finds 360g in London, $3.5 \div 200 \times 360 (= 6.30)$ or finds grams per unit cost, $200 \div 3.50 (= 57.1...)$ or $360 \div 7.20 (= 50)$	Accept figures rounded or truncated to 2sf throughout
		P1	for a complete process to find comparable figures in the same currency, eg comparing 200g in £ or francs $3.5 \times 1.25 (= 4.375)$ and $7.2 \div 360 \times 200 (= 4.0)$ or “4.0” $\div 1.25 (= 3.20)$ OR comparing 360g in £ or francs “6.30” $\times 1.25 (= 7.875)$ or $3.5 \div 200 \times 360 (= 6.30)$ and $7.20 \div 1.25 (= 5.76)$ OR comparing 1g in £ or francs “0.0175” $\times 1.25 (= 0.0218...)$ and $7.20 \div 360 (= 0.02)$ or $\pounds 3.50 \div 200 (= 0.0175)$ and “0.02” $\div 1.25 (= 0.016)$ OR comparing quantity per unit cost in £ or francs $200 \div 3.50 (= 57.1...)$ and $360 \div “5.76” (= 62.5)$ or $200 \div “4.375” (= 45.7...)$ and $360 \div 7.20 (= 50)$	Accept working in pence Ignore incorrect units for P marks Award if this mark implies the previous
		C1	for Zurich supported by correct comparable values, eg 4.3(75 F) and 4(.0 F) or (£)3.2(0) or 7.8(75 F) or (£)6.3(0) and (£)5.76 or 0.021(8... F) and 0.02 (F) or (£)0.017(5) and (£)0.016 or 57(.1... g/£) and 62(.5 g/£) or 45(.7... g/F) and 50 (g/F)	Clear indication that bar is better value for money in Zurich supported by correct values for comparison Units not needed but if given must be correct Table with examples at end of mark scheme



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	Yes (supported)	P1 P1 P1 C1	for a process to find the volume of 1 tank eg $\pi \times 40^2 \times 160$ (= 804247.7... or 804.2...or 256000π) for complete process to find the volume of 4 tanks, [volume of tank] $\times 4$ eg $\pi \times 40^2 \times 160 \times 4$ (= 3216990.8... or 3216.9... or 1024000π) or for process to find volume of fertiliser available per tank eg $32 \times 1000 \div 4$ (= 8000) for a process to find the volume of fertiliser needed for 1 tank eg [volume of tank] $\div 101$ (= 7962.8...) or 4 tanks (= 31851.3...) OR for a process to find volume of mixture that 32 litres of fertiliser will make eg 32000×101 (= 3232000) or 32×101 (= 3232) for Yes supported by correct figures shown eg a comparable figure in the range 31.8 to 31.9 (litres) or in the range 31800 to 31900 with 32000 (cm³) or in the range 3216 to 3217 with 3232 (litres) or in the range 3216000 to 3217000 with 3232000 (cm³) or in the range 7958 to 7963 with 8000 (cm³)	Values can be truncated or rounded For this mark, [volume of tank] must come from a calculation involving π, r^2, h For this mark, [volume of tank] must come from a calculation involving π, r^2, h or be stated as their volume. There are other possible pairs of values which can be used in the comparison
5	(a) 16 (b) 5.5	M1 A1 M1 A1	for a ratio of $\frac{20}{5}$ or $\frac{5}{20}$ or 4 or 0.25 or $\frac{5}{4}$ or $\frac{4}{5}$ or 1.25 or 0.8 oe cao for $22 \times "0.25"$ or $22 \div "4"$ oe oe	

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: IMA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	0.4, 0.4	P1	for process to find sum of unknown probabilities, eg $1 - 0.2 (= 0.8)$	Award mark for any two probabilities given that sum to 0.8, eg given in the table Accept any equivalent fraction or 40%
		A1	oe	
		P1	for complete process to find total number of cubes, eg $12 \div 0.2$ or 12×5 or $(“0.4” \div 0.2) \times 12 + (“0.4” \div 0.2) \times 12 + 12$	
		A1	OR states $0.1 = 6$ or $0.4 = 24$ cao	
2 (a)	600	P1	for starting process to calculate amount of flour eg $60 \div 15 (= 4)$ or $3 \times 50 (= 150)$	4 implied by 200g of sugar
		P1	for complete process eg $\frac{60}{15} \times “150”$	
		A1	cao	
		P1	for process to calculate amount of butter eg $\frac{60}{15} \times 2 \times 50 (= 400)$	
(b)	2		OR for process to calculate the number of packs of butter needed eg [butter] $\div 250$	[butter] must be clearly stated or calculated, may be seen in part (a) 2 must not come from incorrect working
		A1	cao	

Paper: IMA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
4 (a)	Yes (supported)	P1	for start of process, eg $5 \times 9 (= 45)$ or $10 \times 14 (= 140)$ or $5 \times 2 (= 10 \text{ (kg)})$ or $3 \div 2 (= 1.5 \text{ (boxes)})$	Accept values rounded or truncated to 1dp in both (a) and (b). Ignore units
		P1	for process using ratio of areas, eg $"140" \div "45" (= 3.1...)$ or for using ratio of amount of seed eg $"10" \div 3 (= 3.3...)$ or for finding coverage for 1 kg of grass seed, eg $"45" \div 3 (= 15 \text{ (m}^2\text{)})$	
		P1	for process to find amount of seed needed, eg $"140" \div "45" \times 3 (= 9.3... \text{kg})$ or $"140" \div "45" \times "1.5" (= 4.6... \text{(boxes)})$ oe or $"15" \times 2 (= 30 \text{ (m}^2 \text{ per box)})$ and $"140" \div "30" (= 4.6... \text{(boxes)})$ or for process to find area that can be seeded, eg $"10" \div 3 \times "45" (= 150 \text{ (m}^2\text{)})$ or $"140" \div "10" (= 14 \text{ (m}^2\text{)})$ oe	Accept 9.4 Accept 4.7
		C1	for "Yes" supported by correct figures eg 4.6...(and 5), or 9.3...and 10 or 150 and 140 (or 140 to 148.5) or 15 and 14	
(b)	Yes, (does not have enough) (supported)	C1	for reasoning supported with correct figures, eg does not have enough seed and compares 9 (kg) with 9.3...(kg) or 4.5 (boxes) with 4.6... (boxes) or 135 (m ²) with 140 (m ²) ft from (a)	Values used in (a) do not need repeating in (b) as long as intention is clear

