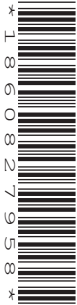


Thursday 15 May 2025 – Morning**GCSE (9–1) Mathematics****J560/01 Paper 1 (Foundation Tier)****Time allowed: 1 hour 30 minutes****You must have:**

- the Formulae Sheet for Foundation Tier (inside this document)

You can use:

- a scientific or graphical calculator
- geometrical instruments
- tracing paper

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

Last name

INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. You can use extra paper if you need to, but you must clearly show your candidate number, the centre number and the question numbers.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.
- Use the π button on your calculator or take π to be 3.142 unless the question says something different.

INFORMATION

- The total mark for this paper is **100**.
- The marks for each question are shown in brackets [].
- This document has **20** pages.

ADVICE

- Read each question carefully before you start your answer.

Please note that these worked solutions have neither been provided nor approved by OCR and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue should be written in the exam.

Anything written in green in a rectangle doesn't have to be written in the exam.

If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

- 1 (a) Write down an odd number between 10 and 20.

11 is odd as it ends in a 1, 3, 5, 7 or 9. Odd numbers are not divisible by 2

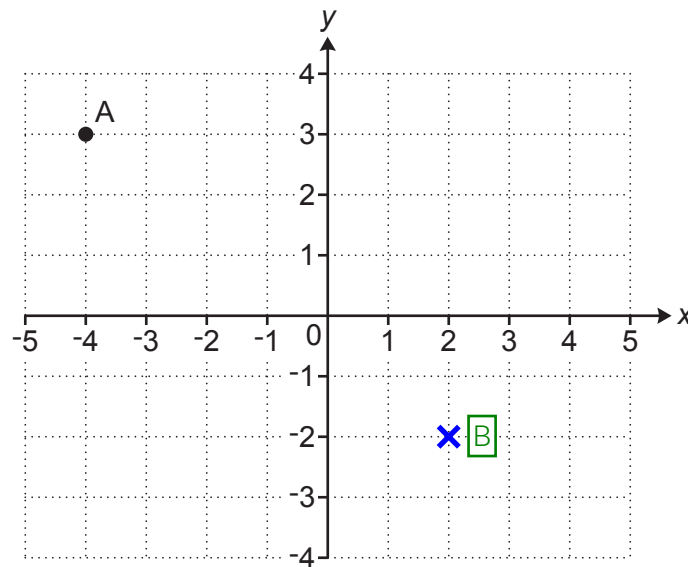
(a) 11 [1]

- (b) Write down **two** cube numbers less than 10.

$1^3 = 1$ and $2^3 = 8$, so both 1 and 8 are cube numbers

(b) 1 and 8 [2]

- 2 Point A is shown on this grid.



- (a) Write down the coordinates of point A.

(a) (..... -4 , ... 3) [1]

- (b) Plot point B on the grid at (2, -2)

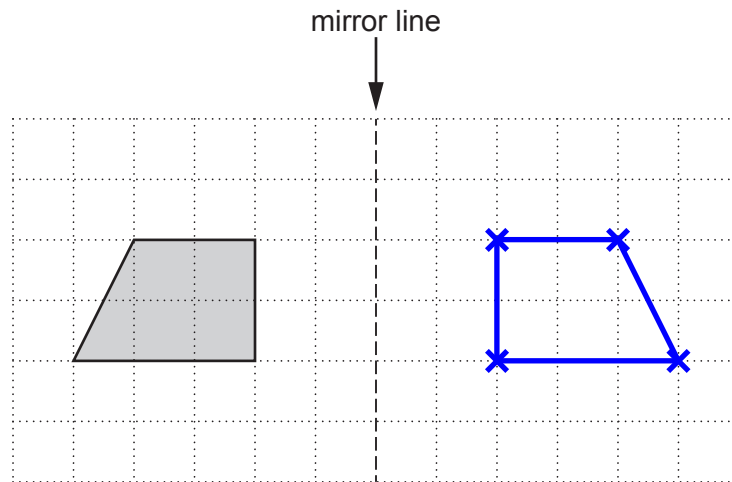
Across to 2 then down to -2

x-coordinate

y-coordinate

[1]

- 3 Reflect the trapezium in the mirror line.



Reflecting each corner by counting the jumps to the mirror line then doing the same number on the other side. Then connecting the corners

[2]

- 4 Here is a list of numbers.

34 42 17 26 34 12 27

- (a) Write down the mode.

34 appears 2 times. This is more than any other number

(a) 34 [1]

- (b) A student says,

The median is 26 as it is the middle number.

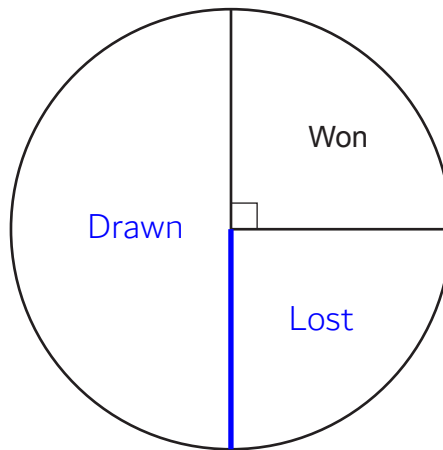
Explain why the student is **not** correct.

The numbers were not put in order

The numbers should be put in order first. Then the middle number can be found

[1]

- 5 The pie chart shows the proportion of games won by a sports team.



- (a) The sports team won 9 games.

Work out how many games the sports team played.

$$9 \times 4$$

1/4 of the games were won. So multiplying the 9 games won by 4 undoes the 1/4 and finds the total games played

(a) 36 [2]

- (b) The ratio of the number of games drawn by the sports team to the number of games lost by the sports team was 2 : 1.

Complete the pie chart above.

[2]

$$360 - 90$$

There are 360° in total in the pie chart. Subtracting the known 90° finds that there are 270° left

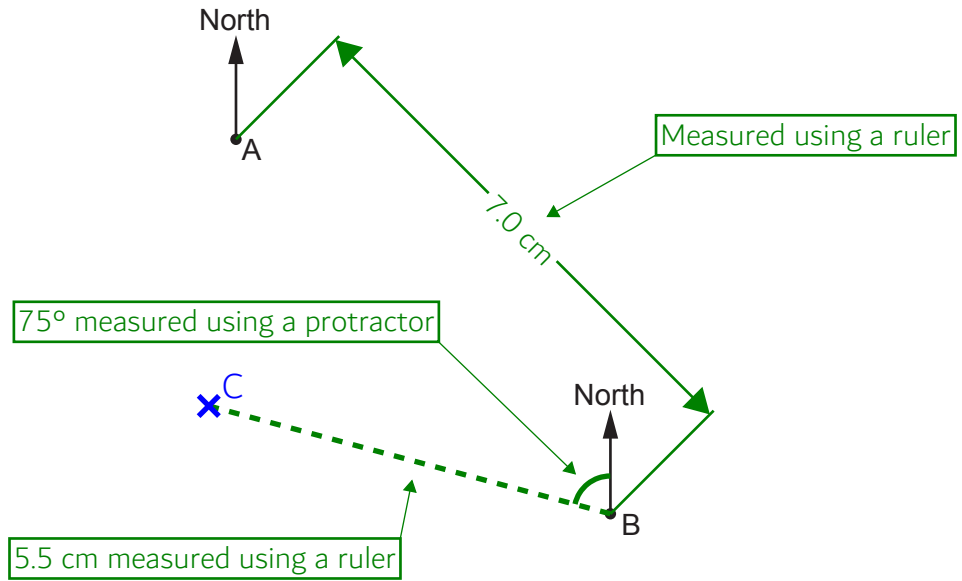
$$270 \div 3$$

2 + 1 = 3 parts in total in the ratio, which are represented by 270°. So dividing the 270° by 3 finds that 1 part of the ratio is worth 90°. This must be the angle for games lost as this is 1 part of the ratio

Drawing a 90° angle for lost. The rest of the pie chart must be for drawn

- 6 The scale drawing shows the positions of ship A and ship B.

Scale: 1 cm represents 6 km



- (a) Find the actual distance between ship A and ship B.

7×6 ← Multiplying the 7 cm measured on the scale drawing by the 6 km each cm represents finds that the actual distance is 42 km

(a) ⁴² km [2]

- (b) Ship C is 33 km from ship B on a bearing of 285° .

On the scale drawing, mark and label the position of ship C with a cross. [2]

$33 \div 6 = 5.5$ ← Dividing the 33 km by the 6 km which is represented by each cm finds that the distance on the scale drawing is 5.5 cm

$360 - 285 = 75$ ← There are 360° around a point. Subtracting the 285° clockwise from north (which is the bearing of 285°) from 360° finds that the angle is 75° anticlockwise from north at B

7 (a) Simplify.

(i) $a \times a \times a \times a \times a \times a \times a$

7 lots of a multiplied together is a to the power of 7

(a)(i) a^7 [1]

(ii) $4b \times 5b^2$

The multiplication can be done in any order. So doing the 4×5 first to get 20. Then $b \times b^2 = b^1 \times b^2 = b^{1+2} = b^3$

(ii) $20b^3$ [2]

(b) Solve.

$$6k - 3 = 177$$

$6k = 180$ ← Adding 3 to both sides eliminates the -3 on the left and gets the k term on its own

Dividing both sides by 6 eliminates the 6 on the left and gets k on its own

(b) $k =$ 30 [2]

8 Write a number in each box to make each statement true.

(a) $\boxed{-27} + 12 = -15$ ← Subtracting 12 from both sides eliminates the 12 on the left and gets the unknown number on its own. $-15 - 12 = -27$ [1]

(b) $\frac{5}{\boxed{14}} \times 2 = \frac{5}{7}$ ← Dividing both sides by 2 eliminates the $\times 2$ on the left and gets the fraction on its own. $5/7 \div 2 = 5/14$ [1]

- 9 (a) Here are all the factors of a number, A.

1 2 3 5 6 10 15 30

- (i) Write down the value of A.

Every whole number has itself as a factor (as every whole number is divisible by itself). So if the greatest factor is 30, the value of A must be 30

(a)(i) 30 [1]

- (ii) Here is a number, B, written as the product of its prime factors.

$$B = 3 \times 5 \times 7$$

Find the highest common factor (HCF) of A and B.

$2 \times 3 \times 5$ ← Using the calculator to express 30 as a product of its prime factors

3×5 ← The highest common factor is the lowest power of each prime factor in both lists multiplied together. There are no 2s in B so this is the lower power of the 2s. Both have 3 as the lowest. Both have 5 as the lowest. There are no 7s in A so this is the lowest power of the 7s

Newer Casio calculators can work out the HCF of two numbers without having to do this method

(ii) 15 [2]

- (b) Find a number between 150 and 200 which has factors 7 and 8.

2^3 ← Expressing 8 as a product of its prime factors using the calculator

7×2^3 ← 7 is already prime. Multiplying the highest power of each prime factor in 7 and 2^3 finds that the lowest common multiple of 7 and 8 is 56

Newer Casio calculators can work out the LCM of two numbers without having to do this method

56, 112, 168 ← Counting in 56s until a number is found which is between 150 and 200 as multiples of 56 will have both 7 and 8 as factors

(b) 168 [2]

- 10 Write the following numbers in order of size, smallest first.

$\frac{7}{19}$ 0.3685 $\frac{360}{1000}$ 36.8%

36.84% 36.85% 36.00% 36.80%

Multiplying any fraction or decimal by 100 converts them to percentages. Writing them all as percentages to 2 decimal places to make them easier to compare

$\frac{360}{1000}$ 36.8% $\frac{7}{19}$ 0.3685
..... [2]
smallest

11 Here is a list of three numbers.

8 15 10

A fourth number is added to the list.
The mean of the four numbers is 13.

Work out the fourth number.

$\frac{t}{m \ n}$

Mean = total $\div$ number, where total is the total of all four numbers and number is the number of numbers. Writing this as a formula triangle

13×4

Covering t in the formula triangle finds that total = mean $\times$ number. So multiplying the mean of 13 by the 4 numbers finds that the total of the four numbers is 52

$52 - 8 - 15 - 10$

Subtracting the known numbers from the total of 52 find that the missing fourth number is 19

..... 19 [3]

12 (a) Use the formula

$$v = u + at$$

to find the final velocity, when:

- the initial velocity is 8 m/s
- the acceleration is 6.5 m/s²
- the time is 14 seconds.

$v = 8 + 6.5 \times 14$

Substituting the known values into the formula. u is the initial velocity. a is the acceleration. t is the time

v is the final velocity so the right side can be typed into the calculator to get the final velocity

(a) 99 m/s [2]

(b) Use the formula

$$p = \frac{1}{2}qr$$

to find the value of q when $p = 39$ and $r = 6$.

$39 = \frac{1}{2} \times q \times 6$

Substituting the known values into the formula

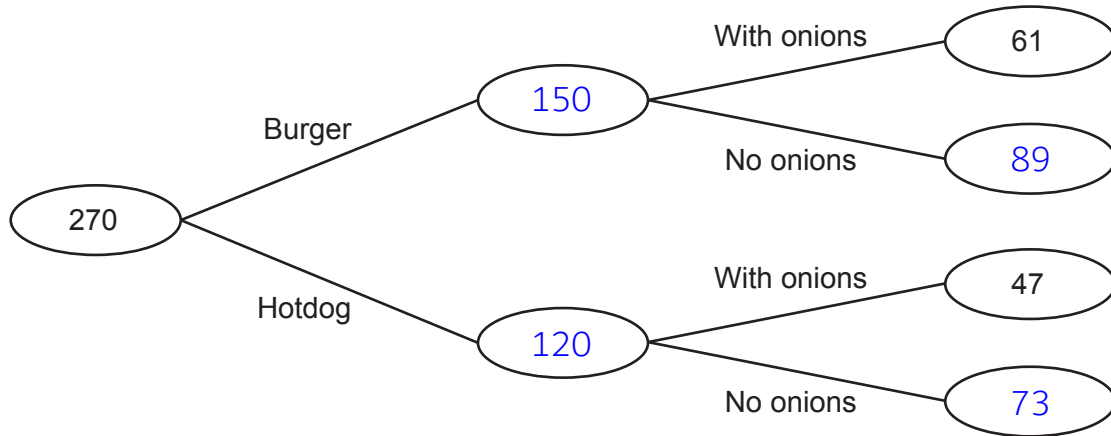
$\frac{39}{\frac{1}{2} \times 6} = q$

Dividing both sides by $\frac{1}{2} \times 6$ eliminates them on the right and gets q on its own

(b) $q =$ 13 [2]

- 13** A food stall only sells burgers and hotdogs.
Each burger or hotdog is sold either with onions or with no onions.

The frequency tree below shows that one day a total of 270 burgers and hotdogs were sold.



- (a) $\frac{5}{9}$ of the food sold on that day were burgers.

Complete the frequency tree.

[4]

$\frac{5}{9} \times 270$ ← Multiplying the $\frac{5}{9}$ by the 270 finds that there were 150 burgers

$270 - 150$ ← Subtracting the 150 burgers from the 270 total finds that there were 120 hotdogs

$150 - 61$ ← This finds that there were 89 burgers with no onions

$120 - 47$ ← This finds that there were 73 hotdogs with no onions

- (b) Show that 40% of the food sold on that day were with onions.

[2]

$61 + 47$ ← Adding the 61 burgers with onions and the 47 hotdogs with onions finds that 108 items of food had onions

$\frac{108}{270} \times 100 = 40$ ← Putting the 108 over the total 270 expresses the fraction of the food that had onions. Multiplying this by 100 converts it to a percentage

- 14** A 1.5 litre carton of orange juice costs £1.30.
Gabi has £10 to spend on orange juice and buys the maximum possible number of cartons.

Each day Gabi drinks 350 millilitres of the orange juice she has just bought.

Work out how many days the orange juice will last Gabi.
You must show your working.

$$10 \div 1.30$$



Dividing the £10 by the £1.30 and rounding down the result (as rounding up would result in too many) finds that 7 cartons can be bought

$$1.5 \times 1000 \times 7$$



1 litre = 1000 millilitres. So multiplying the 1.5 litres by 1000 converts it to millilitres. Multiplying this by the 7 cartons which can be bought finds that there is 10500 millilitres in total

$$10500 \div 350$$



Dividing the 10500 millilitres in total by the 350 millilitres each day finds that the juice will last 30 days

30

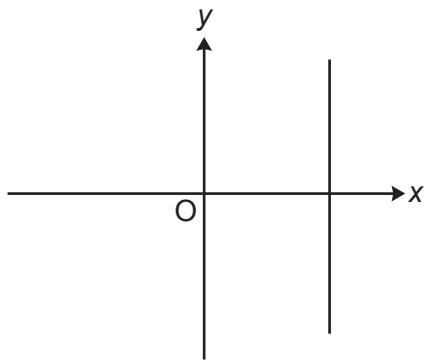
[5]

15 For each graph below, select its possible equation from this list.

A $x = 4$ **B** $y = 4$ **C** $y = x$

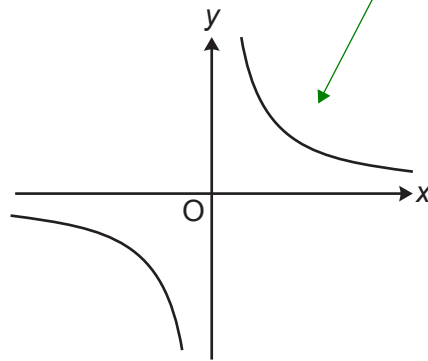
D $y = x^2$ **E** $y = \frac{1}{x}$ **F** $y = x^3$

Write the letter of the equation beneath each graph.



A

All the x-coordinates could be 4
so the equation could be $x = 4$

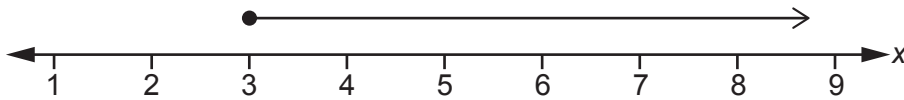


Increasing x reduces y as
dividing by more makes it less

E

[2]

16 Write down the inequality shown on this number line.

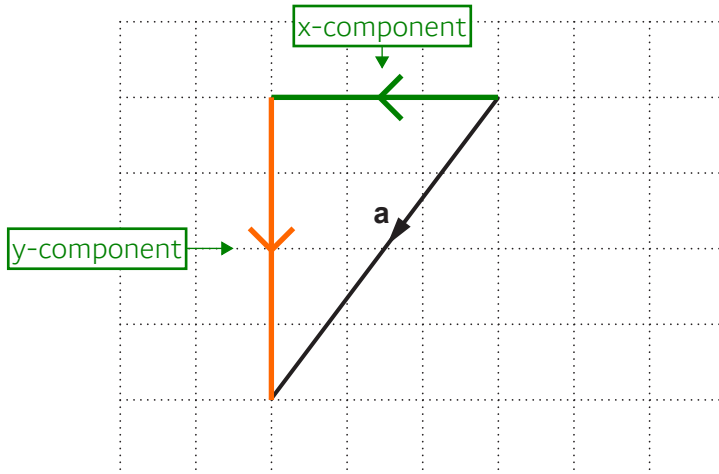


$x \geq 3$

[2]

The arrow goes to the right so x is greater.
It can be equal as the circle is shaded in

17 (a) Vector **a** is drawn on this grid.



Write vector **a** as a column vector.

3 to the right is 3 in the x-direction.
4 up is 4 in the y-direction

(a)
$$\begin{pmatrix} \text{x-component} & \rightarrow & 3 \\ \text{y-component} & \rightarrow & 4 \end{pmatrix}$$
 [2]

(b) Work out.

$$\begin{pmatrix} 2 \\ 4 \end{pmatrix} + \begin{pmatrix} 3 \\ -1 \end{pmatrix}$$

$2 + 3$ ← Adding the x-components to find that the x-component of the result is 5

$4 + -1$ ← Adding the y-components to find that the y-component of the result is 3

(b)
$$\begin{pmatrix} 5 \\ 3 \end{pmatrix}$$
 [1]

(c) $\overrightarrow{PQ} = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$

Work out $3\overrightarrow{PQ}$.

3×2 ← Multiplying the 3 by the x-component finds that the x-component of the result is 6

3×4 ← Multiplying the 3 by the y-component finds that the y-component of the result is 12

(c)
$$\begin{pmatrix} 6 \\ 12 \end{pmatrix}$$
 [1]

18 Calculate.

$$\frac{4.5^3}{1.8} + \frac{3.6}{2.4^2}$$

Give your answer correct to 3 significant figures.

Typing it into the calculator exactly as it is above gives 51.25, which is 51.3 to 3 significant figures

51.3

[2]

19 The ratio 40 grams to 1 kilogram can be written in the form $1 : n$.

Find the value of n .

$1000 \div 40$

1 kilogram = 1000 grams. So the ratio is 40 : 1000.
Dividing both sides by 40 gets 1 on the left

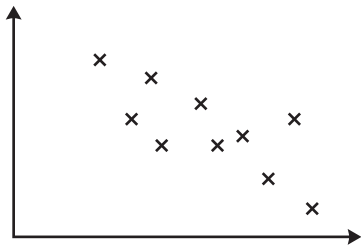
$n = 25$ [2]

20 Complete each statement by writing the missing power in the box.

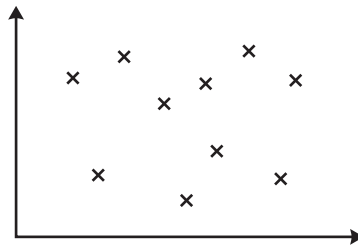
(a) $(4^3)^2 = 4^{\boxed{6}}$ [1]
 $(a^x)^y = a^{xy}$. So multiplying the 2 and 3

(b) $\frac{1}{4} = 4^{\boxed{-1}}$ [1]
 To the power of -1 means to do the reciprocal. $1/4$ is the reciprocal of 4. Reciprocal means '1 over', or flip the fraction

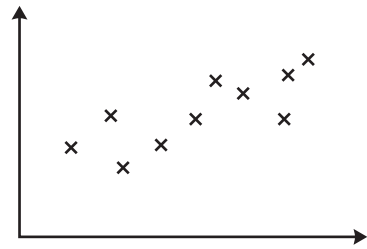
21 (a) Describe the correlation shown in each of these scatter diagrams.



Negative



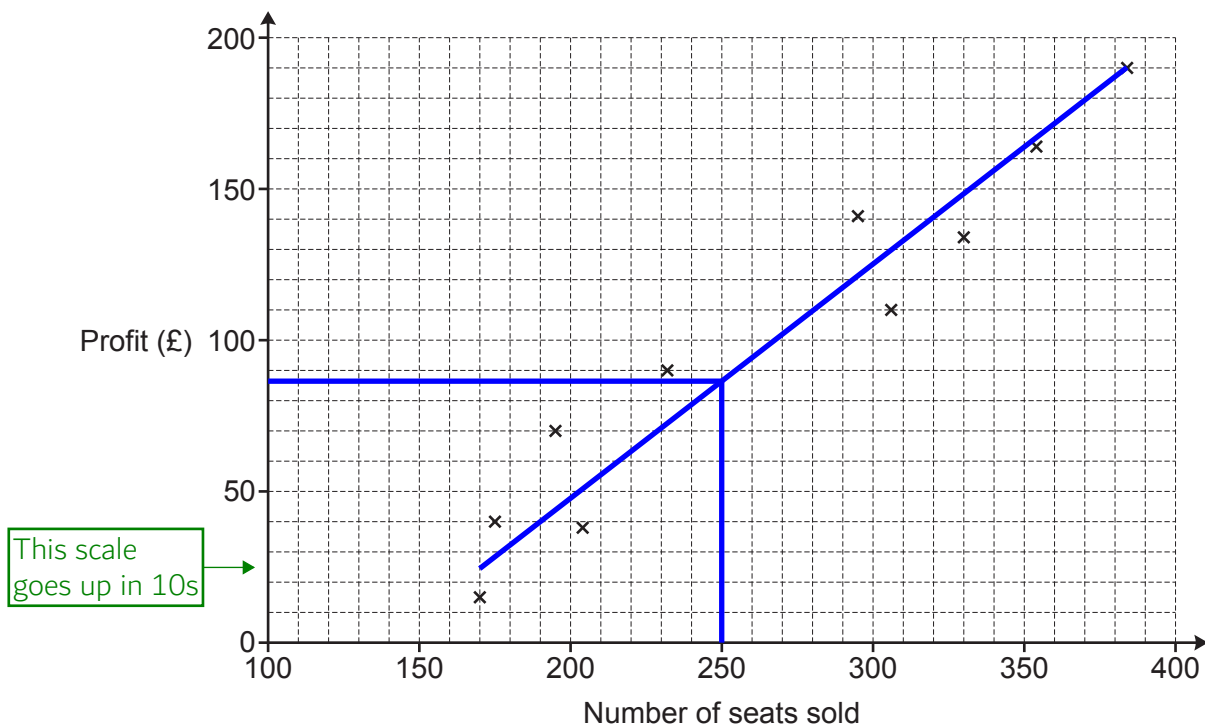
None



Positive

[2]

(b) A theatre records the number of seats sold and the profit made for 10 performances. The scatter diagram shows these results.



By drawing a line of best fit, estimate the profit made when 250 seats are sold.

Drawing a line of best fit using a clear ruler. Drawing in the same direction as the trend of the points and trying to get the same number of points above and below the line. Reading up from 250 to the line and across to the profit to estimate the profit. To the nearest half a box, it is £85

(b) £ 85 [2]

- 22 £8000 is invested at a rate of $r\%$ per year simple interest. After 7 years the value of the investment is £10352.

Find the value of r .

$10352 - 8000$ ← Subtracting the original £8000 from the £10352 finds that the total interest was £2352
 $2352 \div 7$ ← As it is simple interest, the interest is the same every year. So dividing the total interest by the 7 years finds that the interest was £336 every year
 $\frac{336}{8000} \times 100$ ← Putting the £336 interest each year over the original £8000 expresses the fraction it increases each year. Multiplying this by 100 converts it to a percentage

$r = \dots\dots\dots 4.2 \dots\dots\dots [4]$

Both sides are equivalent. It is true for all values of x

- 23 (a) For each of the algebraic statements below decide whether it is an **equation** or an **identity**.

$(x - 1)(x - 2) = 12$ is an $\dots\dots\dots$ Equation
 Only true for some values of x . Can be solved

$(x - 1)(x - 2) = x^2 - 3x + 2$ is an $\dots\dots\dots$ Identity

$x^2 = 3x + 10$ is an $\dots\dots\dots$ Equation
 Expanding this gives the same as the right

[1]

- (b) A straight line is parallel to $y = 3x$ and passes through the point (2, 11).

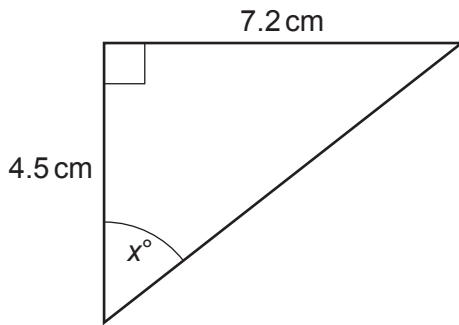
Find the equation of the line in the form $y = mx + c$.

$11 = 3(2) + c$ ← The general equation of a straight line is $y = mx + c$, where m is the gradient and c is the y -intercept. The gradient of $y = 3x$ is 3, so the gradient of the line parallel to this must also have gradient of 3. Substituting in the x and y -coordinate of (2, 11)
 $c = 5$ ← Subtracting $3(2)$ from both sides gets c on its own

It is parallel so has the same gradient of 3, so m is 3. $c = 5$

(b) $\dots\dots\dots y = 3x + 5 \dots\dots\dots [3]$

24 Here is a right-angled triangle.



Not to scale

Use trigonometry to work out the value of x .

S
H C
H T
A

Using right-angled trigonometry. Ticking O as the 7.2 cm is the opposite. Ticking A as the 4.5 cm is the adjacent. There are two ticks on the TOA formula triangle so this one can be used

$$\tan x = \frac{7.2}{4.5}$$

Covering t in the TOA formula triangle finds that $\tan$ of the angle = opposite/adjacent

Doing the inverse $\tan$ of both sides eliminates $\tan$ on the left and gets x on its own. $\tan^{-1}(7.2/4.5) = 57.9\dots$

$$x = \dots\dots\dots 58 \quad [3]$$

25 A town council are going to do a survey on how people travel to work or school and for how long they travel.

One day their interviewer stands outside the town railway station and chooses 20 people at random to form their sample.

Make **three different** criticisms or suggestions for improving the council's method for selecting their sample.

1 Only one day $\leftarrow$ Doing a longer period of time will get more reliable results

2 Biased location $\leftarrow$ People outside of the town railway station are more likely to be using train. There are other methods of travel such as walking or bus

3 Small sample $\leftarrow$ Asking more than 20 people will get more reliable results

[3]

- 26 There are 483 counters in a bag.
The counters are blue, red or yellow.

The ratio of blue counters to red counters is 1 : 5.
The ratio of red counters to yellow counters is 4 : 9.

Work out the number of red counters in the bag.

B	R	Y
1	5	
	4	9
4	20	45

Writing the ratios of blue, red and yellow above each other. Red is in common to both ratios so they can be combined by making the number of parts for red the same. Multiplying both sides of the 1 : 5 ratio by 4 and multiplying both sides of the 4 : 9 ratio by 5 gets 20 parts for red in both so that they can be written as one combined ratio

4 + 20 + 45

Adding the numbers of parts in the combined ratio finds that it has a total of 69 parts

483 ÷ 69

The total 69 parts represents the total 483 counters. So dividing the 483 counters by the 69 parts finds that 1 part of the ratio is worth 7 counters

7 × 20

Multiplying the value of 1 part of the ratio by the 20 parts representing red finds that there are 140 red counters

140

[4]

- 27 It takes 36 hours for 7 people to paint a fence.
Assume that all people paint at the same rate.

How long would it take 15 people to paint the same fence?
Give your answer in hours and minutes.

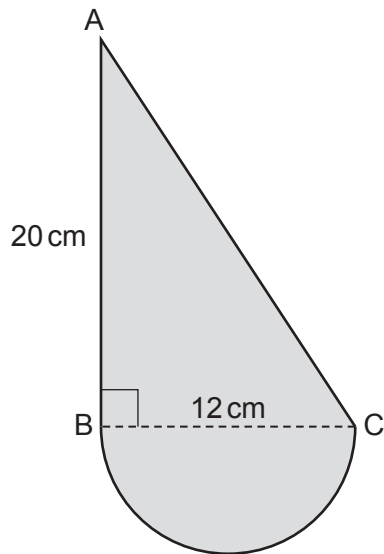
36×7 ← Multiplying the 36 hours by the 7 people finds that there is 252 hours worth of work to do

$252 \div 15$ ← Dividing the 252 hours worth of work by the 15 people finds that it will take 16.8 hours

Formatting the 16.8 hours as a sexagesimal on the calculator gives $16^{\circ}48'0''$, which can be read as 16 hours and 48 minutes

.....16..... hours 48..... minutes [4]

- 28 The shaded shape below is made from a right-angled triangle, ABC, and a semicircle. The length of AB is 20 cm and the diameter of the semicircle, BC, is of length 12 cm.



Not to scale

Calculate the perimeter of the shaded shape.
You must show your working.

$$20^2 + 12^2 = AC^2$$

Using Pythagoras' theorem in the right-angled triangle ABC to work out AC. $a^2 + b^2 = c^2$, where a and b are the shorter sides and c is the longest side

$$AC = \sqrt{544}$$

Square rooting both sides finds AC

$$\frac{\pi \times 12}{2}$$

Circumference = $\pi \times$ diameter. Dividing this by 2 as arc BC is half of the circumference of the full circle

$$6\pi + \sqrt{544} + 20$$

Adding all the outside sides: arc BC, AC and AB

..... 62.2 cm [6]

Turn over for question 29

29 (a) Write 0.0037 in standard form.

Multiplying 0.0037 by ten 3 times gives 3.7, which is at least 1 and less than 10. Multiplying 3.7 by 10^{-3} means to divide by ten 3 times so keeps it equal

(a) 3.7×10^{-3} [1]

- (b) A country consists of a south island and a north island.
The table below shows the population and area of each island in June 2023.

	Population	Area (km ²)
South island	1.2×10^6	1.5×10^5
North island	4.0×10^6	1.1×10^5

Work out the overall population density of the country in June 2023.

$$\frac{1.2 \times 10^6 + 4.0 \times 10^6}{1.5 \times 10^5 + 1.1 \times 10^5}$$

People per km² means to divide the number of people (population) by the area in km². Adding the two populations gives the total population of the country and adding the two areas gives the total area of the country

(b) 20 people per km² [4]

END OF QUESTION PAPER

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