

Please write clearly in block capitals.

Centre number

Candidate number

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

F

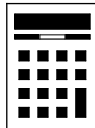
Foundation Tier Paper 2 Calculator

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
TOTAL	

Advice

In all calculations, show clearly how you work out your answer.



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

Any writing in blue indicates what must be written in order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

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

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

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

Answer **all** questions in the spaces provided.

1 Circle the factor of 32

[1 mark]

 16 12 3 64

$$32/16 = 2$$

16 goes into 32 so it is a factor

2 y is 3 more than x .

Circle the correct equation.

[1 mark]

$$y = 3x$$

$y = x + 3$

$$y = x - 3$$

$$y = \frac{x}{3}$$

3 Circle the value of 0.15 as a fraction.

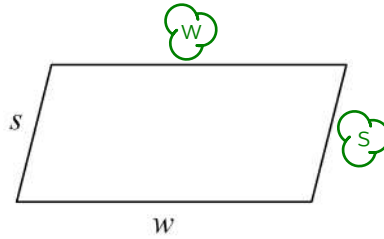
[1 mark]

 $\frac{1}{5}$ $\frac{1}{6}$ $\frac{3}{20}$ $\frac{3}{50}$

Enter 0.15 into the calculator then press =



4 Here is a parallelogram.



Circle the expression for the **perimeter**.

[1 mark]

$2s + 2w$

$s + w$

sw

$2sw$

Perimeter means to add all the outside edges together.
The opposite sides on a parallelogram are equal

5 Work out the value of $a^2 - 4a$ when $a = 10$

[2 marks]

$10^2 - 4 \times 10$

Substituting a for 10

Answer

60

Turn over for the next question



- 6 16 people were asked to name their favourite fruit juice.
Here are the results.

Favourite juice	Frequency
Apple	6
Grapefruit	1
Orange	4
Mango	5

- 6 (a) One of the people was picked at random.
Work out the probability that their favourite juice was orange **or** mango.

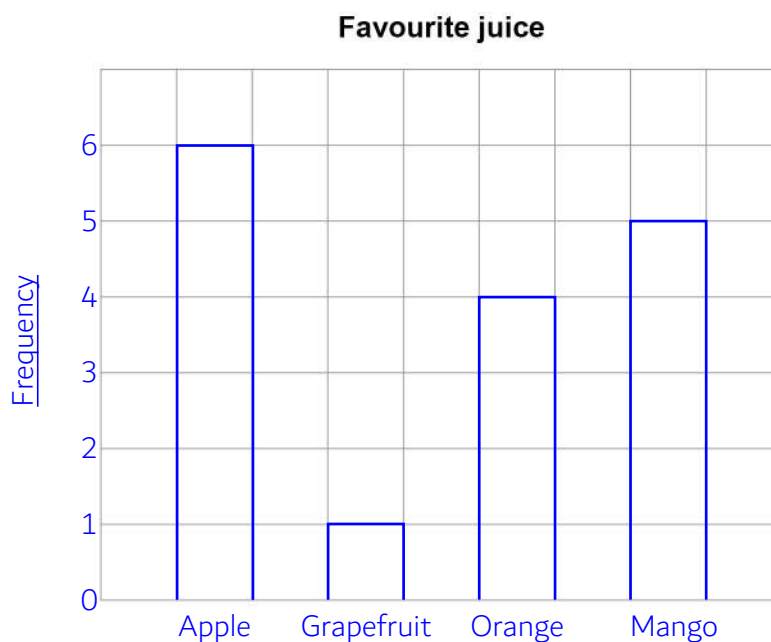
[1 mark]

Answer _____ $\frac{9}{16}$

4 + 5 = 9. So 9 out of the 16 people chose orange or mango

- 6 (b) On the grid, draw a bar chart to represent the results.

[3 marks]



7 6 cakes cost £10.74

Work out the cost of 11 of these cakes.

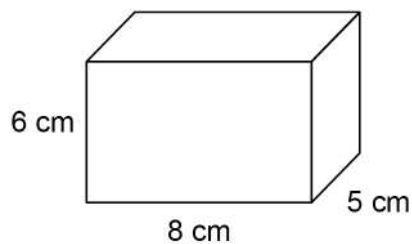
[2 marks]

$$\frac{10.74}{6} \times 11$$

Dividing the cost by 6 works out the cost of 1 cake.
Multiplying this by 11 works out the cost of 11

Answer £ 19.69

8 Here is a cuboid.



Work out the volume.

[1 mark]

Volume of cuboid = length x width x height = $8 \times 5 \times 6$

Answer 240 cm³



- 9 Work out two numbers that
are multiples of 9
and
have a difference of 54

[2 marks]

The first multiple of 9 is 9. 54 more than
this is 63 which is also a multiple of 9

Answer 9 and 63

- 10 Convert 11.2 kilometres into miles.

Use 8 km = 5 miles

[2 marks]

$$\frac{11.2}{8} \times 5$$

Dividing by 8 works out how many lots of
8km it is. Each lot of 8km is a lot of 5 miles

Answer 7 miles



- 11 Annie spends these amounts in four shops using £20 notes, £10 notes and £5 notes.

Shop A	£65	$3 \times 20 + 5$
Shop B	£40	2×20
Shop C	£115	$5 \times 20 + 10 + 5$
Shop D	£75	$3 \times 20 + 10 + 5$

In each shop she
pays the exact amount
uses the **smallest** possible number of notes.

Work out the total number of each note she uses.

[3 marks]

For each shop as many £20 notes as possible should be used. Then using £10 and £5 notes if necessary

Number of £20 notes 13

Number of £10 notes 2

Number of £5 notes 3

3 £20s are used in shop A, 2 £20s are used in shop B, 5 £20s are used in shop C, 3 £20s are used in shop D. $3 + 2 + 5 + 3 = 13$. 1 £10 is used in shop C. 1 £10 is used in shop D. $1 + 1 = 2$. 1 £5 is used in shop A. 1 £5 is used in shop C. 1 £5 is used in shop D. $1 + 1 + 1 = 3$



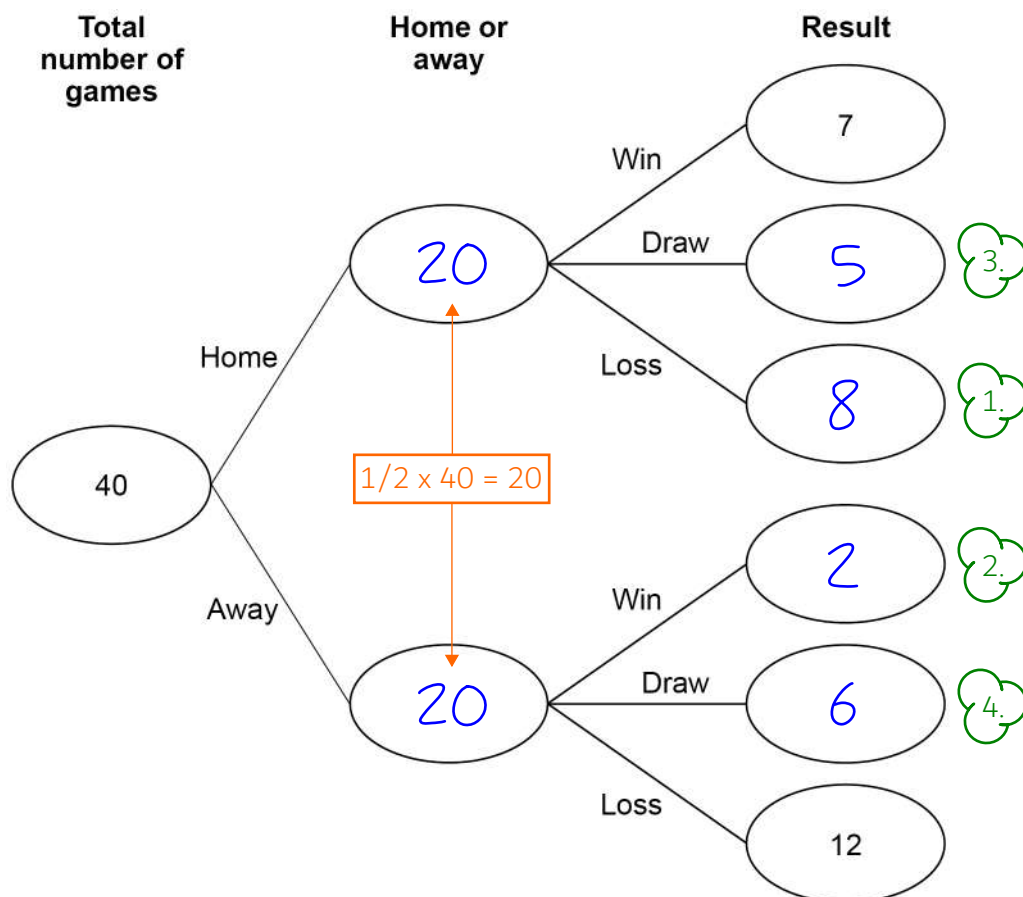
- 12** A sports team played 40 games.
Half were home games and half were away games.
Each game was a win, a draw or a loss.

Of the **home** games, $\frac{2}{5}$ were losses.

Of the **away** games, $\frac{1}{10}$ were wins.

- 12 (a)** Complete the frequency tree.

[4 marks]



1. $\frac{2}{5} \times 20 = 8$
2. $\frac{1}{10} \times 20 = 2$
3. The rest of the home games must have been draws. $20 - 7 - 8 = 5$
4. The rest of the away games must have been draws. $20 - 2 - 12 = 6$



12 (b) The team gets

6 points for a win

3 points for a draw

0 points for a loss.

Work out the **total** number of points that the team got.

[2 marks]

$$\underline{6(7+2)} + \underline{3(5+6)}$$

Adding the points for the wins and draws gives the total number of points. The losses are ignored as there are no points for these

7 + 2 works out how many wins there were. Multiplying this by 6 as there are 6 points for each win

5 + 6 works out how many draws there were. Multiplying this by 3 as there are 3 points for each draw

Answer

87

13 Factorise fully $50x + 100$

[2 marks]

50 is the highest common factor of 50 and 100 so this is brought out as a factor. There are no letters in common between the two terms. The rest is left in a bracket

Answer

$50(x+2)$



14 Some buttons are red or blue in the ratio red : blue = 3 : 5

What fraction of the buttons are red?

Circle your answer.

[1 mark]

$$\frac{2}{5}$$

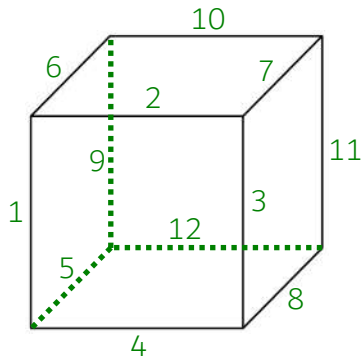
$$\frac{3}{5}$$

$$\frac{3}{8}$$

$$\frac{5}{8}$$

There are 8 parts in total in the ratio. Out of these 3 are red

15 Which of these is a correct statement about a cube?



Tick **one** box.

[1 mark]

It has 12 edges.

It has 12 faces.

It has 12 planes.

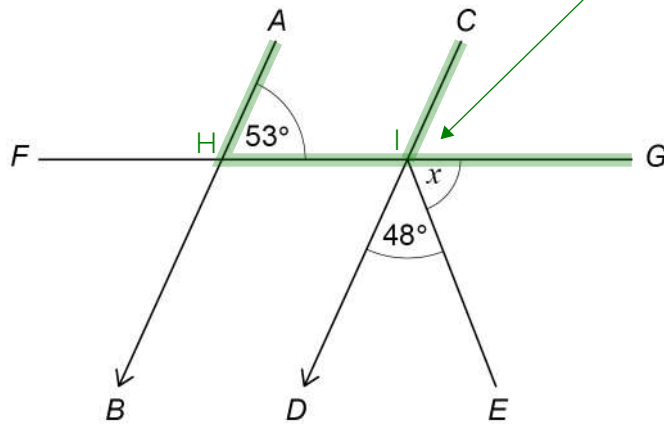
It has 12 vertices.



16

AB is parallel to CD .

FG is a straight line.



This angle is 53° as it is corresponding to AHI

Not drawn accurately

Work out the size of angle x .

[3 marks]

$180 - 53 - 48$

Angles around a point on a straight line add up to 180 so subtracting the other angles around point I on line CD from 180 leaves x

Answer 79 degrees



17 Harry and his sister Jess have some money in the ratio Harry : Jess = 1 : 4

Harry has £7.35

They pay £16.99 for a present for a friend.

Harry uses $\frac{1}{3}$ of his money.

Jess pays the rest.

How much money does Jess have left?

[4 marks]

$$\underline{7.35 \times 4 - (16.99 - \frac{1}{3} \times 7.35)}$$

Subtracting what Jess has to pay from what she has leaves the amount she has left

The ratio tells us that Jess has 4 times as much as Harry. This works out how much money Jess has

$\frac{1}{3} \times 7.35$ works out how much Harry pays. Subtracting this from the £16.99 works out how much Jess has to pay

Answer £ 14.86



18 Solve $10x - 3 = 21$

[2 marks]

$$10x = 24$$

Adding 3 to both sides
gets the x term on its own

Dividing both sides
by 10 finds x

$$x = \frac{24}{10}$$

19 Work out which of these fractions is closer in value to 0.5

$$\frac{5}{16}$$

$$\frac{17}{25}$$

You **must** show your working.

[2 marks]

$$0.5 - \frac{5}{16} = 0.1875$$

$$0.5 - \frac{17}{25} = -0.18$$

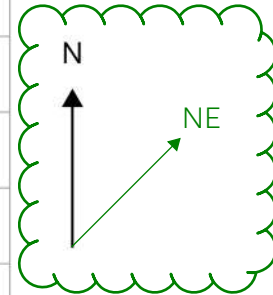
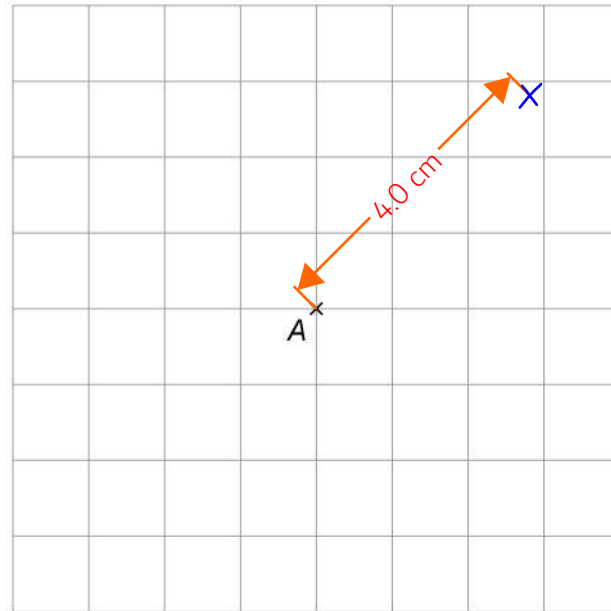
These tell us that $\frac{5}{16}$ is 0.1875
away from 0.5 and $\frac{17}{25}$ is 0.18 away
from 0.5. So $\frac{17}{25}$ must be closer

Answer $\frac{17}{25}$

Turn over ►



- 20 (a)** Point B is 400 metres north east of point A .
Mark point B on the centimetre grid.
Use a scale of 1 centimetre represents 100 metres.

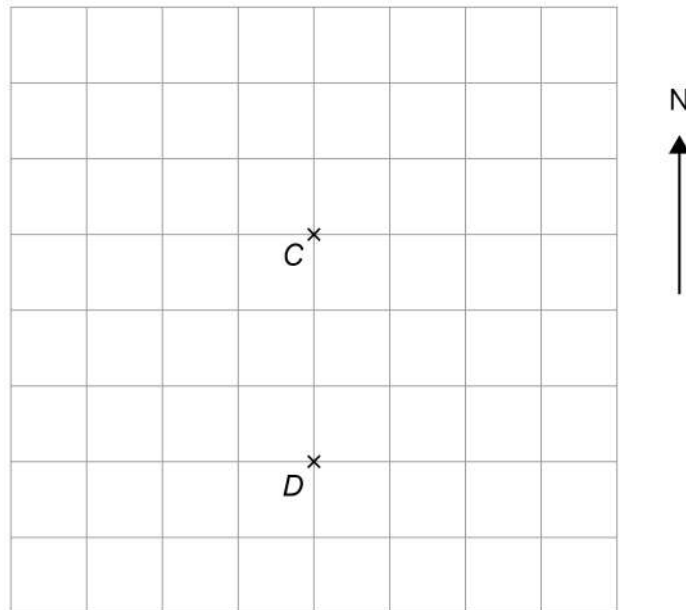
[2 marks]

Each 100m is represented by 1cm. $400/100 = 4$ so 400m is represented by 4cm



Points C and D are shown on a different centimetre grid.

Scale: 1 : 1000



- 20 (b) Work out the bearing of D from C .

[1 mark]

Answer 180 °

180° are turned clockwise from north at point C to face point D

- 20 (c) Work out the actual distance, in metres, of D from C .

Use the scale 1 : 1000

[1 mark]

$$\frac{3 \times 1000}{100}$$

There is 3cm between C and D on the grid. 3×1000 works out how many centimetres this is in real life. There are 100 centimetres in a metre so dividing this by 100 works out how many metres it is

Answer 30 metres



21

Lynn works as a bus driver.

She is paid £10.80 per hour for the first 38 hours she works each week.

She is paid 25% **more** per hour for each extra hour she works.

One week, Lynn was paid £491.40

In total, how many hours did she work that week?

You **must** show your working.**[5 marks]**

$$38 + \frac{491.40 - 38 \times 10.80}{1.25 \times 10.80}$$

38 x 10.80 works out how much she earned in the first 38 hours.
 Subtracting this from the £491.40 leaves the amount she got for the extra hours. 1.25 x 10.80 increases what she is paid per hour by 25% as 100% + 25% = 125% = 1.25 as a decimal. Dividing the amount she got for the extra hours by this works out how many hours extra she did.
 Adding this to the 38 hours gives the hours she worked that week in total

Answer 44 hours



22 The square root of x is 4

Circle the value of x^2

[1 mark]

256

2

16

8

$(4^2)^2 = 256$

Squaring 4 undoes the square root and finds out what x is. Squaring this again works out what x^2 is

23 Here is a rule for a sequence.

After the first two terms, each term is the sum of the previous two terms.

The first five terms are p 23 q 57 r

Work out the values of p , q and r .

[2 marks]

$q = 57 - 23$

$23 + q = 57$. Subtracting 23 from both sides gives this

$p = 34 - 23$

$p + 23 = q$. q is 34. Subtracting 23 from both sides gives this

$r = 34 + 57$

$q + 57 = r$. q is 34

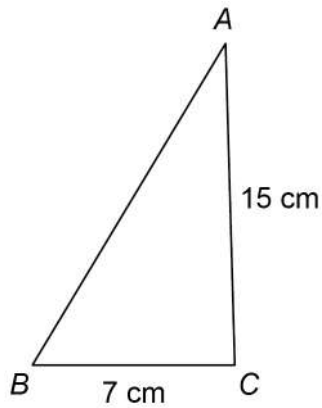
$p = 11$

$q = 34$

$r = 91$



24 Here is triangle ABC .



Not drawn
accurately

24 (a) Assume that angle $ACB = 90^\circ$

Work out the length AB .

[3 marks]

$$a^2 + b^2 = c^2$$

ABC is a right angled triangle so Pythagoras' Theorem, where c is the longest side and a and b are the shorter sides, can be used to work out side AB

$$\sqrt{7^2 + 15^2}$$

Square rooting both sides makes c the subject. Substituting in 7 for a and 15 for b

Answer $\sqrt{274}$ cm



24 (b) The actual length AB is greater than the answer to part (a).

What does this mean about angle ACB ?

Tick **one** box.

[1 mark]

It is 90°

It is less than 90°

It is more than 90°

It could be any of the above.

Increasing the angle between the 7cm and 15cm sides increases AB

25 Rearrange $g = 3h - 1$ to make h the subject.

[2 marks]

$$g + 1 = 3h$$

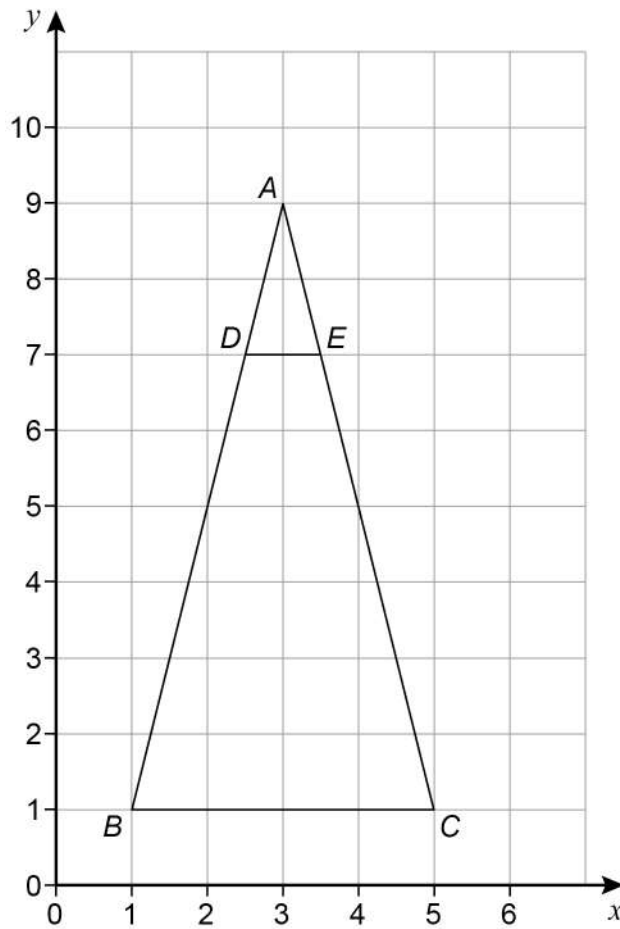
Adding 1 to both sides gets the h term on its own

Dividing both sides by 3 gets h on its own making it the subject

Answer $\frac{g+1}{3} = h$



26



Describe fully the **single** transformation that maps triangle ABC to triangle ADE .

[3 marks]

Enlargement by scale factor $1/4$ from $(3, 9)$



27

A ball contains 5000 cm^3 of air.

More air is pumped into the ball at a rate of 160 cm^3 per second.

The ball is full of air when it becomes a sphere with radius 15 cm



$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3 \quad \text{where } r \text{ is the radius}$$

Does it take **less than** 1 minute to fill the ball?

You **must** show your working.

[4 marks]

 s^d ←

Quoting the distance, speed, time formula triangle as the volume is basically distance, the rate it is pumped is basically speed and we are calculating time

$$\frac{\frac{4}{3} \pi \times 15^3 - 5000}{160}$$

$\frac{4}{3} \pi \times 15^3$ works out the volume of the full sphere. Subtracting the 5000 cm^3 which is already in the ball leaves the volume needed to fill the ball, which can be thought of as the distance. Time = distance/speed so the volume needed to fill the ball is divided by 160, which is the rate the air is pumped into the ball and can be thought of as the speed

57.1

Yes ←

57.1 seconds is less than 1 minute, which is 60 seconds



28

 p is a positive number. n is a negative number.

For each statement, tick the correct box.

[4 marks]

	Always true	Sometimes true	Never true
$p + n$ is positive	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
$p - n$ is positive	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
$p^2 + n^2$ is positive	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
$p^3 \div n^3$ is positive	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

$p + n$ could be positive as $2 + -1 = 1$ but it could also be not positive as $1 + -2 = -1$.
 $p - n$ is always positive as subtracting a negative is a double negative so it becomes a positive and a positive add a positive must be positive. $p^2 + n^2$ must be positive as p^2 and n^2 are positive, as squaring means to multiply by itself and a positive multiplied by positive is positive and a negative multiplied by a negative is double negative so becomes a positive and positive add a positive must be positive. $p^3 \div n^3$ must always be negative as a positive cubed is positive and a negative cubed is negative and dividing a positive by a negative gives a negative

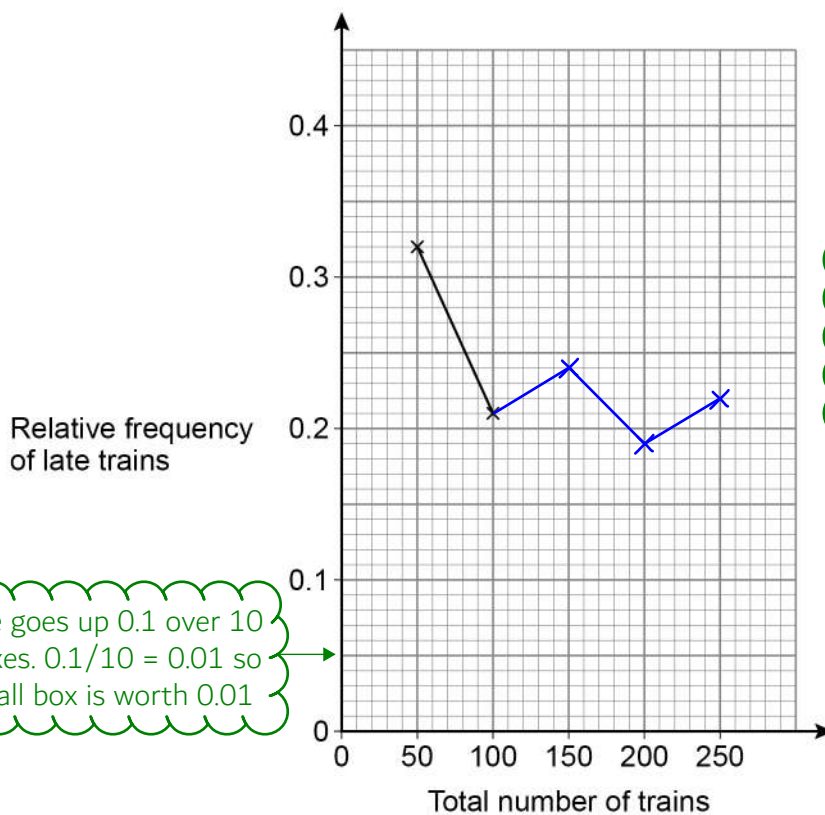


- 29 250 trains arrived at a station.
The number of trains that were late was recorded after every 50 trains.
The table shows some information about the results.

Total number of trains	50	100	150	200	250
Total number of late trains	16	21	36	38	55
Relative frequency of late trains	0.32	0.21			

- 29 (a) Complete the relative frequency graph.

[3 marks]



$$\begin{aligned} 36/150 &= 0.24 \\ 38/200 &= 0.19 \\ 55/250 &= 0.22 \end{aligned}$$

Expressing the number of late trains as a fraction of the total number of trains gives the relative frequency. Converting these to decimals so they can be plotted

The scale goes up 0.1 over 10 small boxes. $0.1/10 = 0.01$ so each small box is worth 0.01

- 29 (b) Write down the best estimate of the probability that a train arriving at the station is late.

[1 mark]

Answer 0.22

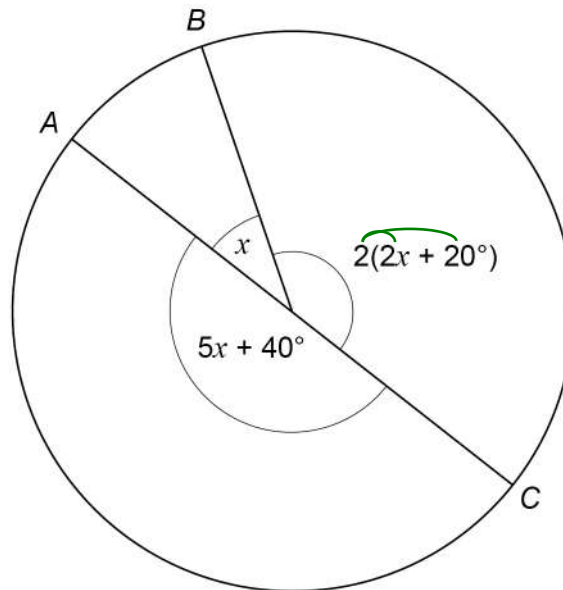
Each relative frequency is an estimate of the probability but the best one is the one based on the most trains



30

A , B and C are three points on a circle.
The radii from A , B and C are shown.

Not drawn
accurately



Is AC a diameter of the circle?

You **must** show your working.

[3 marks]

$$x + 4x + 40$$

Adding together both of the angles above AC and expanding $2(2x + 20)$

$$5x + 40$$

Simplifying by collecting like terms

Yes

The angles above line AC are the same as the angle below it meaning both must be 180° in order to add up to 360° . Therefore AC must be a diameter as the radii from A and C are 180° apart and therefore form a straight line going through the centre



31

A straight line

has gradient 6

and

passes through the point (3, 19)

Work out the equation of the line.

Give your answer in the form $y = mx + c$ **[3 marks]**

$$c = 19 - 6 \times 3$$

Rearranged to make c the subject by subtracting mx from both sides to give $c = y - mx$. Then substituted in the point and the gradient. Substituted y for 19, m for 6 as m is the gradient and x for 3

m is 6 and c is 1

Answer

$$y = 6x + 1$$

END OF QUESTIONS

6

