

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

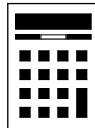
Foundation Tier Paper 3 Calculator

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.

Advice

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

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	
26–27	
28–29	
30	
TOTAL	



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 Solve $4 + x = 12$

Circle your answer.

[1 mark]

$x = -16$

$x = -8$

$x = 8$

$x = 16$

$4 + 8 = 12$

2 Circle the largest number.

[1 mark]

4.5061

4.5

4.516

4.56

All the numbers have 4 units and 5 tenths. 4.56 has 6 hundredths and this is more than the others have

3 Circle the expression that means half the value of x

[1 mark]

$\frac{x}{2}$

$\frac{2}{x}$

$\frac{1}{2} - x$

$x - \frac{1}{2}$

This means to divide x by 2, which is half of x



4 Circle the value of 10^6

[1 mark]

one hundred

one thousand

one million

one billion

$$10^6 = 1,000,000$$

5 Complete the bank statement.

[3 marks]

Date	Description	Credit (£)	Debit (£)	Balance (£)
01/05/2020	Starting balance			670.43
08/05/2020	Salary	2156.75		<u>2827.18</u>
11/05/2020	Water bill		48.97	<u>2778.21</u>
18/05/2020	Mortgage payment		<u>1135.72</u>	1642.49

$$670.43 + 2156.75$$

The salary is credit so is money gained

$$2827.18 - 48.97$$

The water bill is debit so is money paid

$$2778.21 - 1642.49$$

The mortgage payment is the difference between the balance on 11/05/2020 and 18/05/2020

Turn over for the next question

Turn over ►

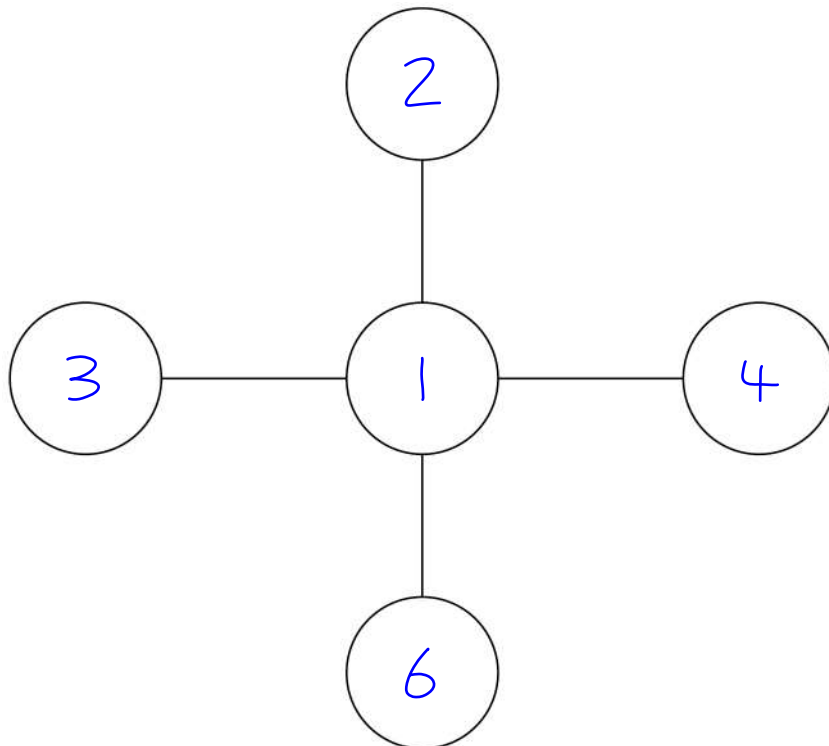


6

Put the numbers 1, 2, 3, 4 and 6 into the circles so that
each line of three numbers multiplies to 12
the total of the vertical line is one more than the total of the horizontal line.

Use each number once.

[2 marks]



- 7 Point A is 217 metres **above** sea level.
Point B is 145 metres **lower** than point A.
Point C is 59 metres **below** sea level.
How much **higher** is point B than point C?

[3 marks]



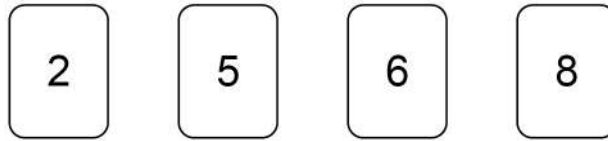
$$217 - 145 - -59$$

217 - 145 works out the height of point B. Subtracting -59 works out the difference between point B and point C. Point C is negative as it is below sea level, which can be set to a height of 0

Answer 131 metres



8 Here are four number cards.



8 (a) Use each card once to make this calculation correct.

[1 mark]

$$\boxed{5} + \boxed{6} - \boxed{2} - \boxed{8} = 1$$



9

School A has 72 tutor groups.

Each group has 28 students.

School B has 16 tutor groups.

Each group has 18 students.

Show that $\frac{\text{number of students at school A}}{\text{number of students at school B}}$ is a whole number.

[2 marks]

$$\frac{72 \times 28}{16 \times 18}$$

Multiplying the number of tutor groups by the number of students in each group gives the number of students in the school

$$7$$

Dividing the number of students at school A by the number of students at school B gives 7, which is a whole number



- 10 Boxes of chocolates each contain 25 chocolates.
One box costs £3.25
A shop has a special offer.

Two boxes for £5

How much cheaper **per chocolate** is the special offer?

[3 marks]

$$\frac{325}{25} - \frac{500}{2 \times 25}$$

Dividing the price in pence by the number of chocolates gives the price per chocolate in pence. £3.25 is 325p and this gets 25 chocolates so $325/25$ works out the cost per chocolate. £5 is 500p and this gets 2 lots of 25 chocolates so $500/(2 \times 25)$ works out the cost per chocolate using the special offer. Subtracting this from the cost per chocolate without the special offer works out the difference in the price per chocolate and therefore how much cheaper per chocolate the special offer is

Answer 3 pence

Turn over for the next question



- 11** In a game, the player going first uses crosses and the player going second uses circles. To win the game, a player must get three crosses or three circles together in a line. The line must be horizontal, vertical or diagonal.

- 11 (a)** Here is the position in a game.

	A	B	C	D	E	F
1					O	
2				O		
3			X	X		
4				X		
5		O			O	
6		X				

It is Amy's turn to put a cross on the grid.

She wins if she puts a cross in B3

Write down **all** the other squares where she could put a cross to win the game.

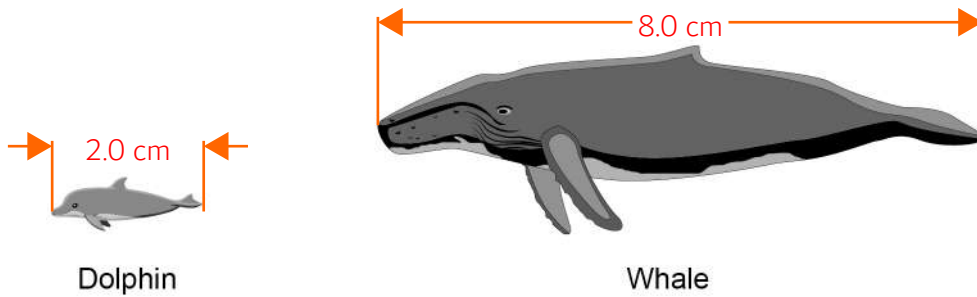
[2 marks]

Answer B2, E3, C5, D5



12

A dolphin and a whale are drawn to scale.



The actual length of the dolphin is 3 metres.

Estimate the actual length of the whale.

You **must** show your working.**[2 marks]**

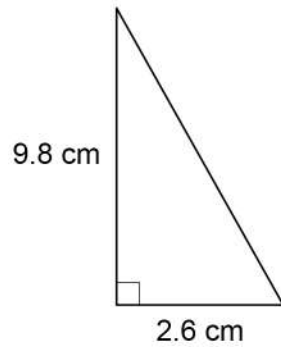
$$\frac{8}{2} \times 3$$

8/2 works out how many times longer the whale is than the dolphin. Multiplying this by the 3m length of the dolphin

Answer 12 metres



- 13 (a) Work out the area of this triangle.



Not drawn
accurately

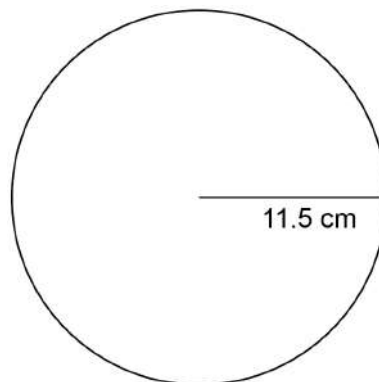
[2 marks]

$$\frac{1}{2} \times 2.6 \times 9.8$$

Area of triangle = $\frac{1}{2} \times \text{base} \times \text{height}$

Answer 12.74 cm²

- 13 (b) A circle has a radius of 11.5 cm



Not drawn
accurately

Work out the area of the circle.

[2 marks]

$$\pi \times 11.5^2$$

Area of circle = πr^2 , where r is the radius

Answer $\frac{529}{4} \pi$ cm²



14 A machine takes 4 seconds to fill a packet of crisps.

14 (a) In total, how many packets can 35 of these machines fill in 8 hours?

[4 marks]

$$35 \times \frac{8 \times 60 \times 60}{4}$$

There are 60 minutes in an hour so multiplying 8 hours by 60 converts it into minutes. There are 60 seconds in a minute so multiplying this by 60 converts it into seconds. Dividing this by 4 works out how many lots of 4 seconds go into it and therefore how many packets are filled by a machine in 8 hours. Multiplying this by 35 works out how many packets are filled by 35 machines in 8 hours

Answer 252000

14 (b) Each packet of crisps contains 32.5 grams of crisps.

At what rate does a machine put the crisps into the packets?

Give your answer in grams per second.

[2 marks]

$$\frac{32.5}{4}$$

Grams per second means to divide the grams by the seconds.
There are 32.5 grams and 4 seconds to fill each packet

Answer 8.125 grams per second



15 (a) Complete the table of values for $y = x^2 - 2$

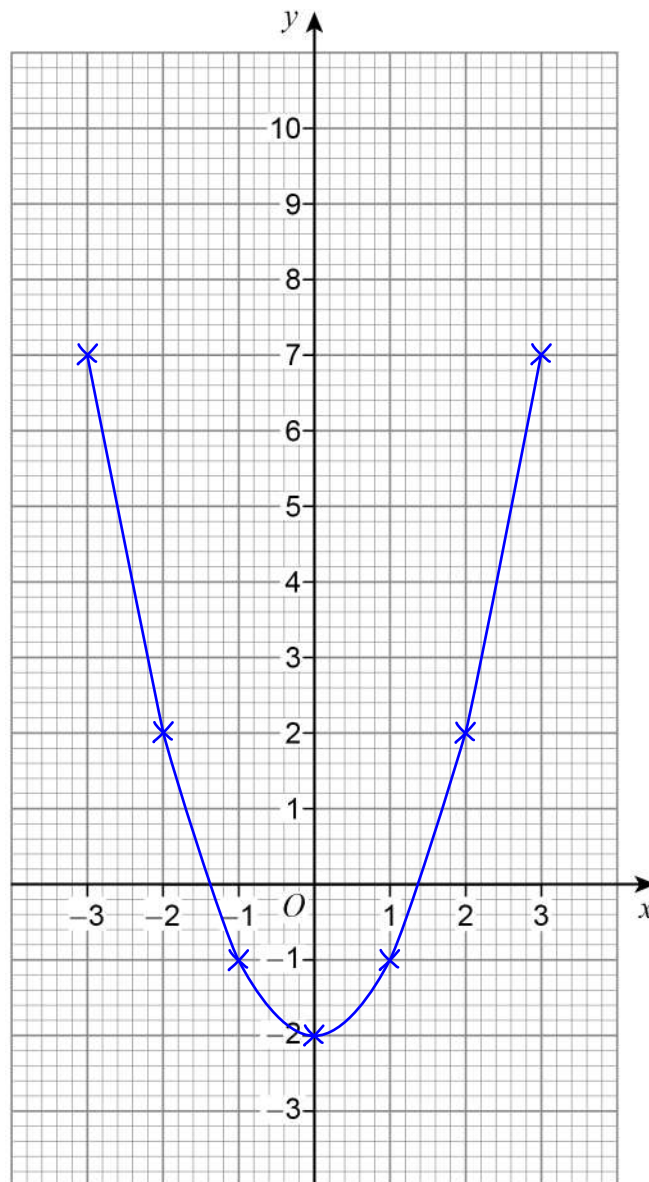
[1 mark]

x	-3	-2	-1	0	1	2	3
y	7	2	-1	-2	-1	2	7

Use table mode by pressing MENU then 3.
 $f(x) = x^2 - 2$. Ignore $g(x)$. Start: -3. End: 3. Step: 1

15 (b) Draw the graph of $y = x^2 - 2$ for values of x from -3 to 3

[2 marks]

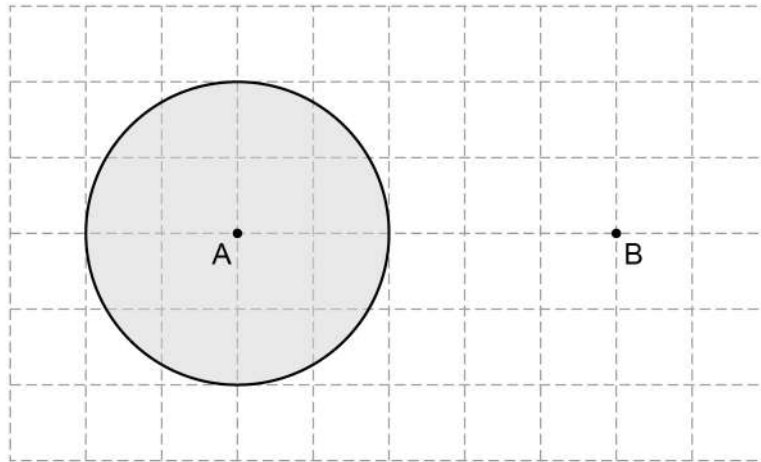


Turn over ►



16 (a) Towns A and B are shown on a centimetre grid.

Scale: 1 cm represents 10 miles



What does the shaded area represent?

Tick **one** box.

[1 mark]

All the points nearer to A than to B

All the points at least 30 miles from B

All the points halfway between A and B

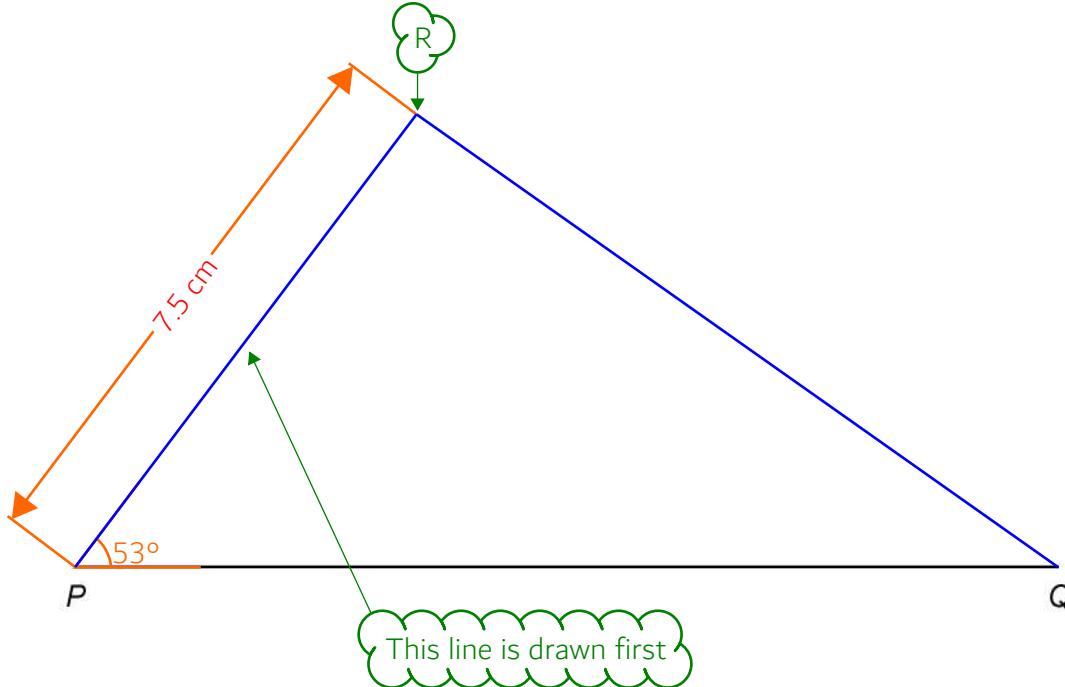
All the points within 20 miles of A

The circle has radius of 2cm so represents 20 miles



- 16 (b) Complete an accurate drawing of triangle PQR so that
angle QPR is 53°
the length of side PR is 7.5 cm

[2 marks]



- 17 Multiply out $5x(3x - 2)$

[2 marks]

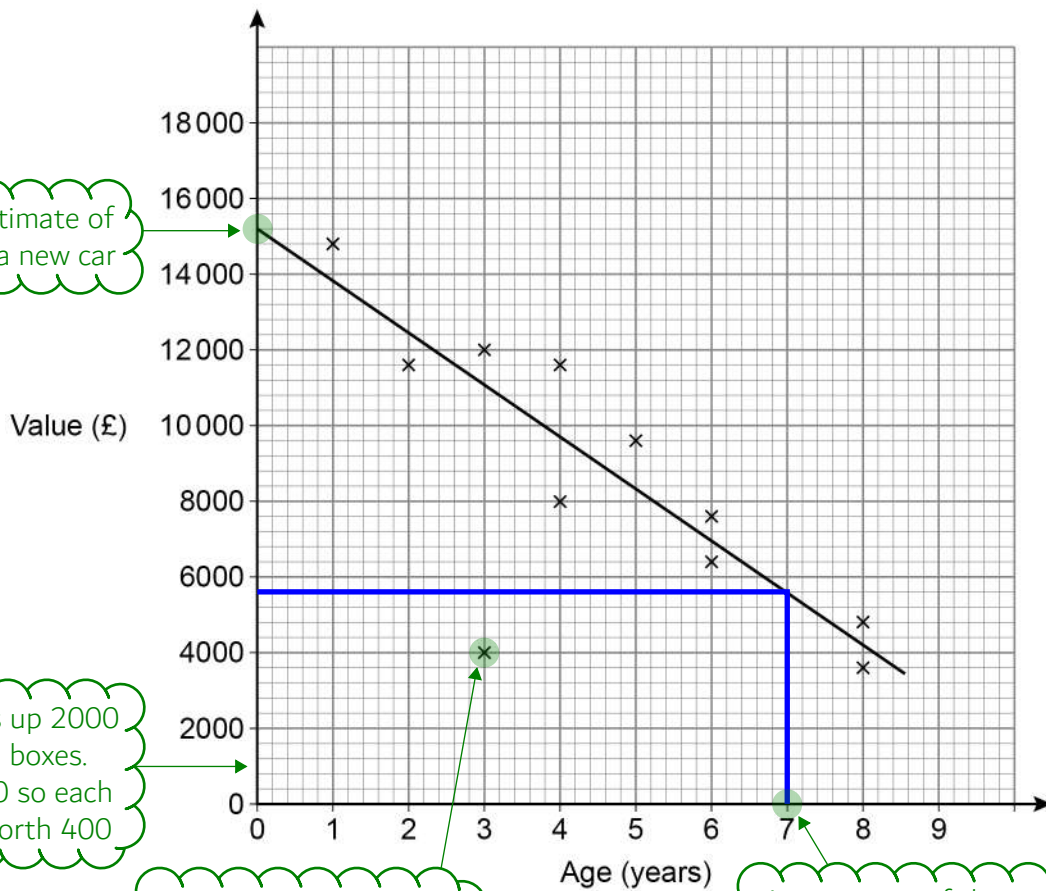
Answer $15x^2 - 10x$

Turn over for the next question

Turn over ►



- 18 The scatter diagram shows the age and value of some cars in 2019
All the cars were of the same make and model.



This is an estimate of the value of a new car

The scale goes up 2000 over 5 small boxes.
 $2000/5 = 400$ so each small box is worth 400

This point is the outlier

An estimate of the age of a car worth £5600

- 18 (a) What type of correlation does the scatter graph show?

[1 mark]

Answer Negative

As one variable increases the other decreases



18 (b) Write down the value of the car that was an outlier.

[1 mark]

Answer £ 4000

18 (c) Use the graph to estimate the value of a new car of this make and model in 2019

[1 mark]

Answer £ 15200

A new car has an age of 0 years and can be estimated using the line of best fit

18 (d) A car of this make and model had a value of £5600 in 2019

Use the graph to estimate the year in which it was made.

[2 marks]

2019-7

Answer 2012

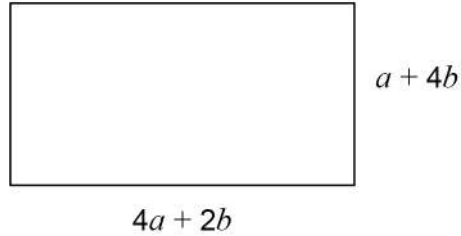
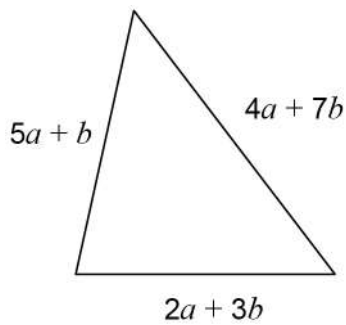
A line is drawn across from £5600 to the line then down to 7 years. This estimate the age of the car. Subtracting its age from 2019 gives the year it was made

Turn over for the next question



19

Here are a triangle and a rectangle.

Not drawn
accurately a and b are positive numbers.Which shape has the **larger** perimeter?You **must** work out expressions for both perimeters.**[3 marks]**

$11a + 11b$

Perimeter of the triangle. Added all the sides and collected the like terms. $5a + 4a + 2a = 11a$. $b + 7b + 3b = 11b$

$10a + 12b$

Perimeter of the rectangle. Added all the sides and collected the like terms. Opposite sides on the rectangle are equal. $4a + a + 4a + a = 10a$. $2b + 4b + 2b + 4b = 12b$

Tick a box.

triangle

rectangle

cannot tell

It is impossible to work out without knowing the values of a and b as the triangle has more a but less b



20 The n th term of a sequence is $19 - 4n$

What is the **smallest** value of n that gives a negative term?

[2 marks]

$$19 - 4 \times 5$$

The first negative term is -1 when n is 5

Answer _____

5

21 What is the name of the **longest** possible chord in a circle?

Circle your answer.

[1 mark]

tangent

circumference

radius

diameter

A chord is a straight line which connects two points on the circumference. None of these are chords

Turn over for the next question

Turn over ►



22 The number of people living in a town is 47 000 to the nearest 1000

Which **one** of these is a possible number of people living in the town?

Circle your answer.

[1 mark]

46 000

46 500

47 500

48 000

None of the others round to 47000 to the nearest 1000

23 Jeff and Kaz share £270 in the ratio Jeff : Kaz = 2.6 : 1

How much **more** than Kaz does Jeff get?

[3 marks]

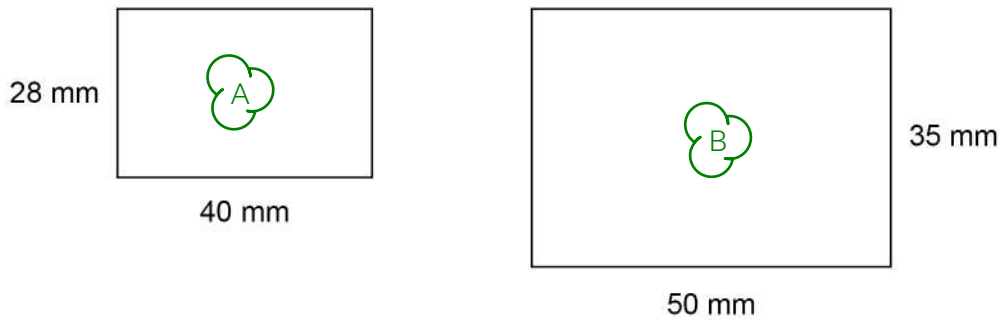
$$\frac{270}{2.6+1} \times (2.6-1)$$

2.6 + 1 works out how many parts there are in total in the ratio.
Dividing the £270 by this works out what 1 part is worth. 2.6 - 1 works
out how many parts Jeff gets more than Kaz. Multiplying this many
parts by the worth of 1 part gives how much more than Kaz Jeff gets

Answer £ 120



24 Here are two rectangles.



Show that the rectangles are similar.

[1 mark]

$$\frac{50}{40} = 1.25$$

$$\frac{35}{28} = 1.25$$

Dividing the length of B by the length of A works out the scale factor between their lengths. Dividing the width of B by the width of A works out the scale factor between their widths. These both give the same value so all the sides on rectangle A must have been scaled by the same factor and therefore they are similar

25 The equation of a straight line is $2y = 6x + 8$

Circle the gradient of the line.

[1 mark]

6

8

3

4

The general equation of a straight line is $y = mx + c$, where m is the gradient and c is the y intercept. Dividing both sides by 2 puts the equation into this form as $y = 3x + 4$. So as m is 3 the gradient must be 3



26

At a country park there is a house, a museum and a garden.
The table shows the prices per person to visit the park.

	Price per person
Garden only	Free
House and museum	£12.50
House only	£8
Museum only	£7

One day, 480 people visit the park.

67 visit the garden **only**.

40% visit the house **and** the museum.

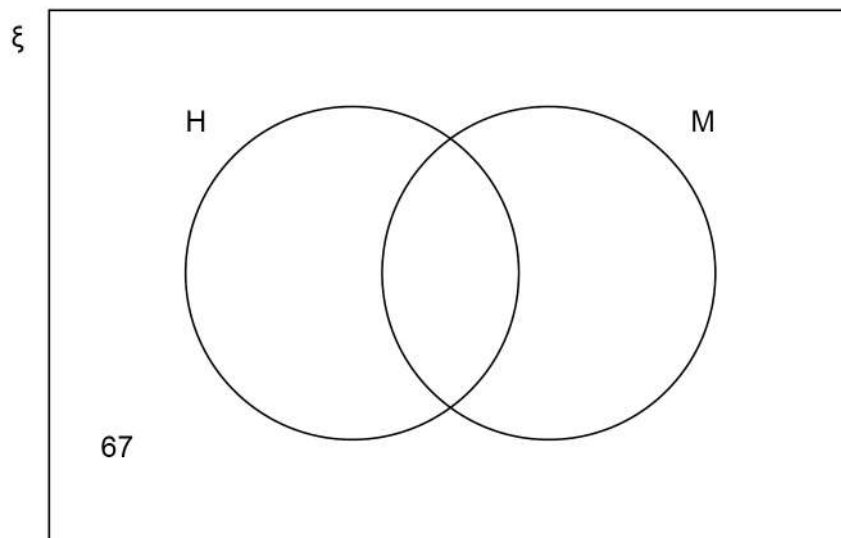
$\frac{3}{8}$ visit the house **only**.

The rest visit the museum **only**.

In total, how much do the 480 people pay to visit the park?

You may use the Venn diagram to help you.

[5 marks]



$$\frac{40}{100} \times 480 = 192$$

The number of people who visited the house and the museum

$$\frac{3}{8} \times 480 = 180$$

The number of people who visited the house only

$$480 - 192 - 180 - 67 = 41$$

Subtracting the number of people who visited the house and the museum, the house only and the garden only leaves the number who visited the museum only

$$192 \times 12.50 + 180 \times 8 + 41 \times 7$$

Adding together the amounts paid to visit the house and the museum, the house only and the museum only gives the total amount paid. The garden is ignored as it is free

The amount paid to visit the house and the museum

The amount paid to visit the house only

The amount paid to visit the museum only

Answer £ 4127

Turn over for the next question



27

The heel of a shoe exerts a pressure of 198 pounds per square inch.

Convert this pressure into kilograms per square centimetre.

Use

1 pound = 0.45 kilograms

1 square inch = 6.25 square centimetres

[3 marks]

$$\frac{198 \times 0.45}{6.25}$$

198 x 0.45 converts the pounds into kilograms. Dividing this by 6.25 as it is per square centimetre. Per means to divide and there are 6.25 square centimetres in 1 square inch

Answer 14.256 kg/cm²



28

Six positive numbers have

a mean of 10

a range of 19

Four of the numbers are 12 7 15 3

Work out the other two numbers.

[3 marks]

$$6 \times 10 - 12 - 7 - 15 - 3 = 23$$

$$x + x + 19 = 23$$

$$x = \frac{23 - 19}{2}$$

Answer 2 and 21

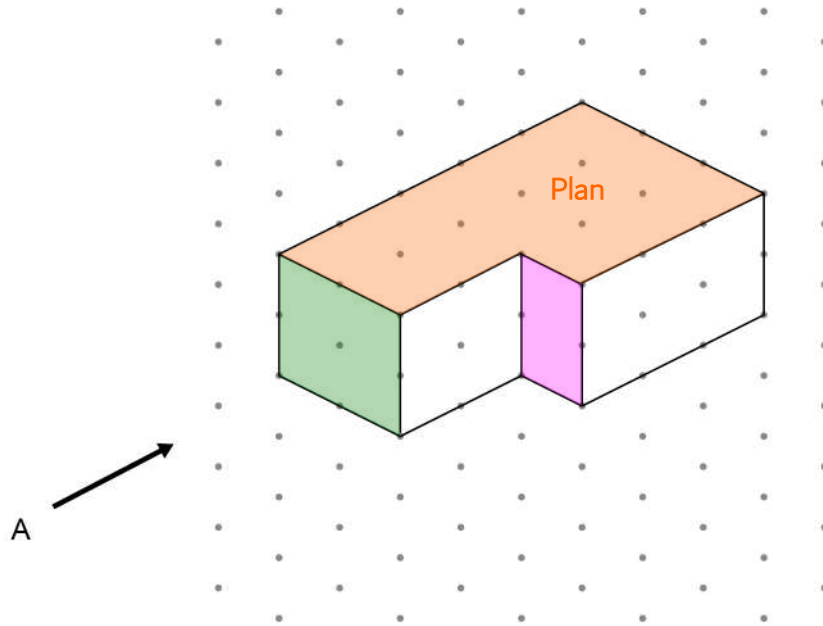
Mean = total/number so total = mean x number. 6×10 works out the total of all six of the numbers. Subtracting the four numbers leaves the total of the other two numbers. The other two numbers need to add up to 23. Assuming 3 is the smallest number, adding the range of 19 gives the largest number which would be 22, meaning that one of the two numbers would be 22 and the other would have to be 1, which is not possible as 3 was assumed to be the smallest. So one of the other two numbers must be smaller than 3. Let x be the smallest number. The largest number would be $x + 19$. Adding x and $x + 19$ must give 23. Rearranging to solve x gives the smallest number which must be 2. Then adding 19 gives the largest number which must be 21.

Turn over for the next question

Turn over ►

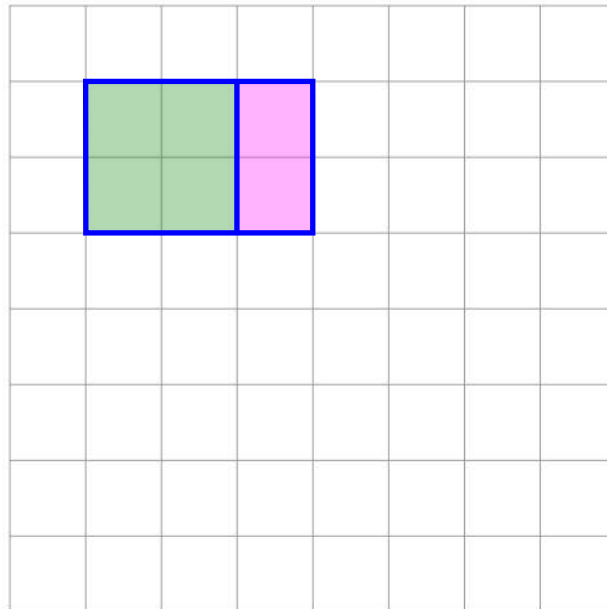


29 A solid shape is drawn on isometric paper.



29 (a) On the centimetre grid, draw the elevation of the shape from A.

[1 mark]

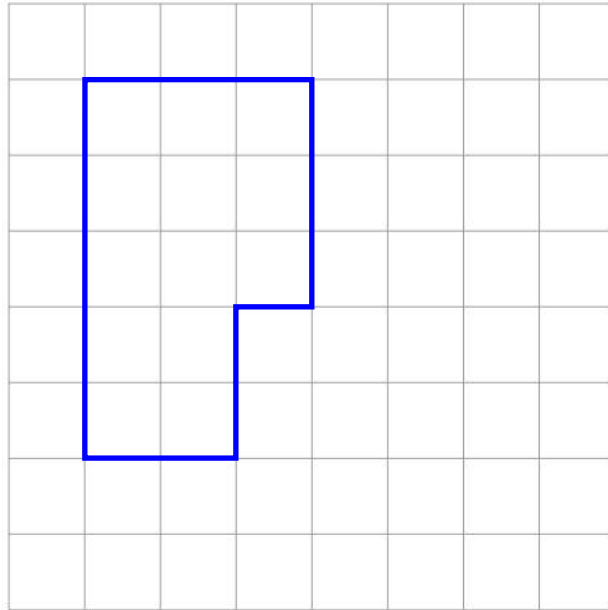


The shading is only to illustrate the faces seen and is not needed as part of the answer



29 (b) On the centimetre grid, draw a plan of the shape.

[1 mark]



30 Erik thinks of a prime number between 20 and 30

His number is $x\%$ of 125

Work out **one** possible value of x .

[3 marks]

$$\frac{23}{125} \times 100$$

23 is prime as it only has two factors, itself and 1.
Writing 23 as a fraction of 125 then multiplying
by 100 to convert it into a percentage

Answer _____

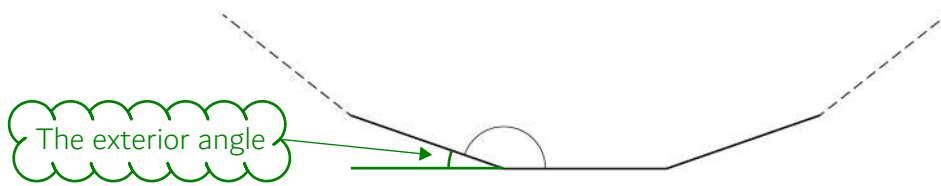
18.4

5

Turn over ►



31 Part of a regular polygon with 15 sides is shown.



Not drawn
accurately

Work out the size of an **interior** angle.

[2 marks]

$$180 - \frac{360}{15}$$

All of the exterior angles on a polygon add up to 360° . As it has 15 sides it must have 15 exterior angles. So $360/15$ works out the exterior angle. The exterior angle and the interior angle lie around a point on a straight line and angles around a point on a straight line add up to 180° . So subtracting the exterior angle from 180 works out the interior angle

Answer 156 degrees

END OF QUESTIONS

