.CG Maths.
Worked Solutions

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

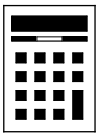
F

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 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

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

Do not write outside the box

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 4.5000 4.5160 4.5600

Writing them all to 4 decimal places can make them easier to compare

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

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Do not write outside the box

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		2827.18 A
11/05/2020	Water bill		48.97	2778.21 B
18/05/2020	Mortgage payment		1135.72 C	1642.49

A: 670.43 + 2156.75 = 2827.18. The salary is credit so is money gained.

B: 2827.18 - 48.97 = 2778.21. The water bill is debit so is money paid.

C: 2778.21 - 1642.49 = 1135.72. The mortgage payment is the difference between the balance on 11/05/2020 and 18/05/2020

Turn over for the next question

7

Do not write outside the box

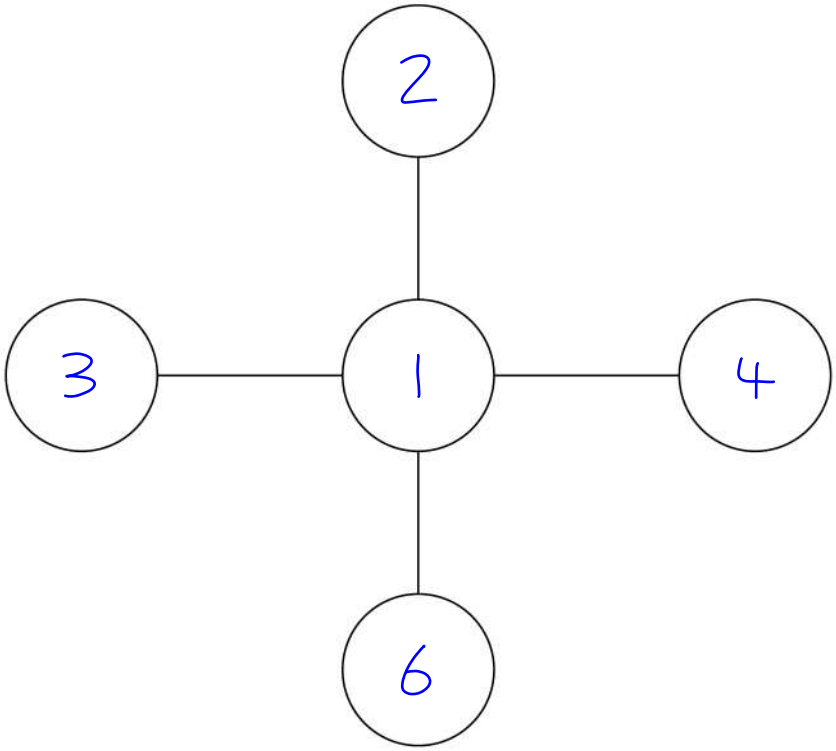
6 Put the numbers 1, 2, 3, 4 and 6 into the circles so that

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]



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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 ← Subtracting 145 m from the height of point A works out that the height of point B is 72 m

72−−59 ← The height of C is -59 m. Subtracting the height of C from the height of B works out the difference in their heights and so works out how much higher point B is than point C

Answer 131 metres

5

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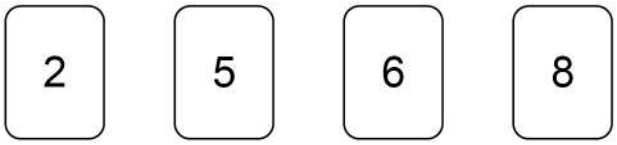
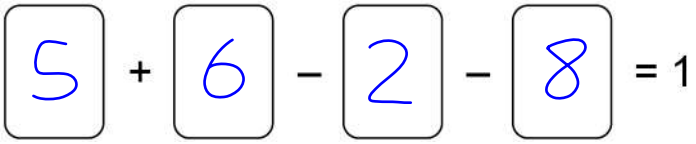
8 Here are four number cards.



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

[1 mark]



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Two of the cards are chosen at random.

8 (b) List all the possible pairs of cards.

Two have been done for you.

[2 marks]

First card	Second card
2	5
5	2
2	6
2	8
5	6
5	8
6	2
6	5
6	8
8	2
8	5
8	6

The possibilities are systematically listed

8 (c) Write down the probability that the first card is an even number.

[1 mark]

Answer $\frac{9}{12}$

9 out of the 12 possibilities for the first card are even

4

Do not write outside the box

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]

$72 \times 28 = 2016$ ← Multiplying the 72 tutor groups by the 28 in each group works out that there are 2016 students in school A

16×18 ← Multiplying the 16 tutor groups by the 18 in each group works out that there are 188 students in school B

$\frac{2016}{288} = 7$ ← Putting the number of students in school A over the number of students in class B gives 7, which is a whole number

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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]

325÷25=13 ← £3.25 is 325p. Dividing the cost of one box of chocolates in pence by the 25 chocolates in each box works out that the cost per chocolate is normally 13p per chocolate

25×2 ← Multiplying the 25 chocolates in each box by 2 works out that there are 50 chocolates in 2 boxes

500÷50 ← £5 is 500p. Dividing the cost of two boxes using the special offer by the 50 chocolates in two boxes works out that the cost per chocolate using the special offer is 10p per chocolate

13−10 ← Subtracting the cost per chocolate using the special offer from the normal cost per chocolate works out the difference and so how much cheaper per chocolate the special offer is

Answer 3 pence

Turn over for the next question

5

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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

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Amy goes first in the next game.

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

11 (b) Assume that she will choose a square at random.

Write down the probability that she will put her first cross in square F6

[1 mark]

Answer $\frac{1}{36}$

1 out of the 36 squares are F6

11 (c) In fact, Amy decides to put her first cross into a corner square.

What does this mean about the probability that she will put her first cross in square F6?

Tick a box.

- ☐ It is smaller than the answer to part (b)
- ☑ It is greater than the answer to part (b)
- ☐ It is the same as the answer to part (b)

Give a reason for your answer.

[1 mark]

It is 1/4 ← 1 out of the 4 corners is F6. 1/4 is greater than 1/36

4

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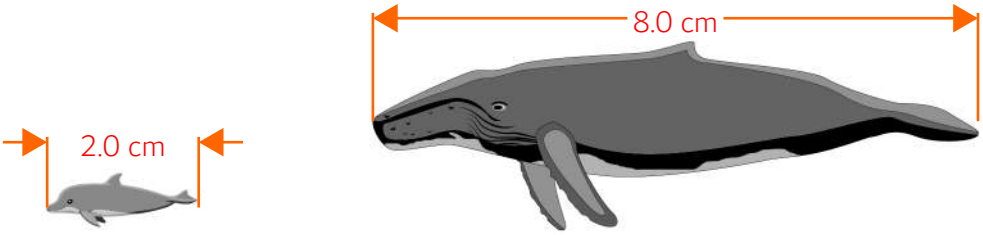
12 A dolphin and a whale are drawn to scale.



Dolphin

Whale

The actual length of the dolphin is 3 metres.

Estimate the actual length of the whale.

You **must** show your working.

[2 marks]

8÷2 ← Dividing the measured length of the whale by the measured length of the dolphin works out that the whale is 4 times as long as the dolphin

3x4 ← Multiplying the actual length of the dolphin by 4 works out the actual length of the whale

Answer 12 metres

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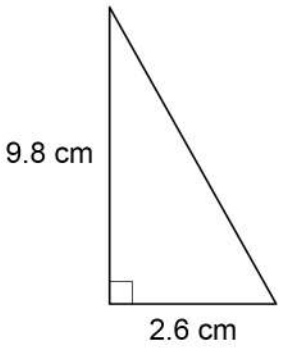
13 (a) Work out the area of this triangle.



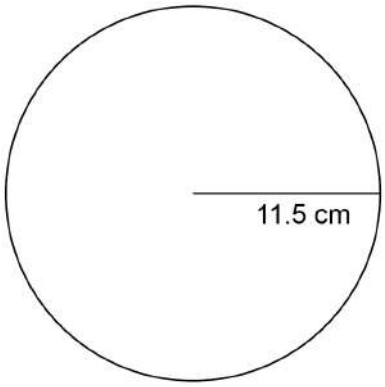
Not drawn accurately

[2 marks]

$\frac{1}{2} \times 2.6 \times 9.8$ ← Area of triangle = 1/2 x base x height

Answer 12.74 cm^2

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 = π x radius^2

Answer $\frac{529}{4}\pi$ cm^2

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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]

8×60 ← There are 60 minutes in an hour so multiplying the 8 hours by 60 converts it into 480 minutes

480×60 ← There are 60 seconds in a minute so multiplying the 480 minutes by 60 converts it into 28800 seconds

$28800 \div 4$ ← 8 hours is 28800 seconds. Dividing this by the 4 seconds to fill a packet of crisps works out how many lots of 4 seconds it is and so works out that a machine can fill 7200 packets of crisps in 8 hours

7200×35 ← Multiplying the 7200 packets that one machine can fill in 8 hours by the 35 machines works out that all 35 machines can fill 252000 packets of crisps 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]

$32.5 \div 4$ ← 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

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

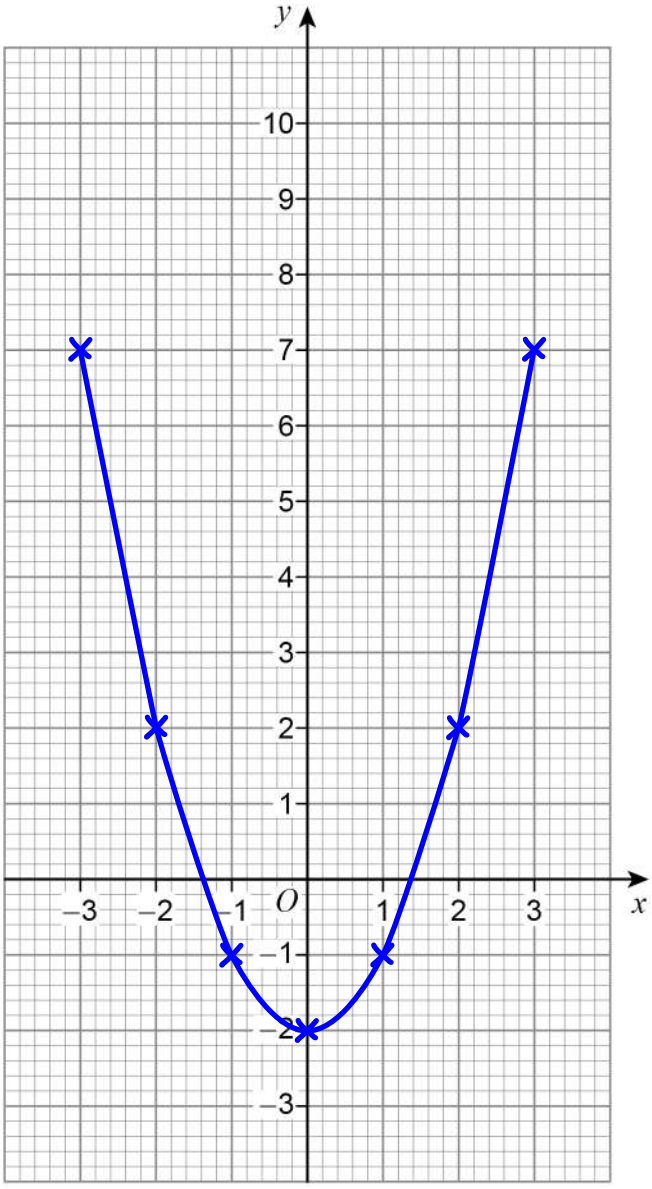
[1 mark]

x	–3	–2	–1	0	1	2	3
y	7	2	–1	–2	–1	2	7

Using table mode on the calculator. Set f(x) = x^2 - 2. 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]



Plotting the points from the table of values then joining them with a curve

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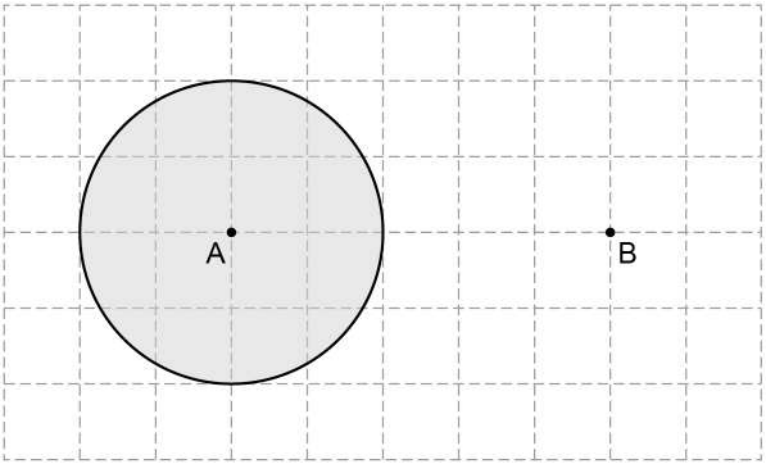
16 (a) Towns A and B are shown on a centimetre grid.

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

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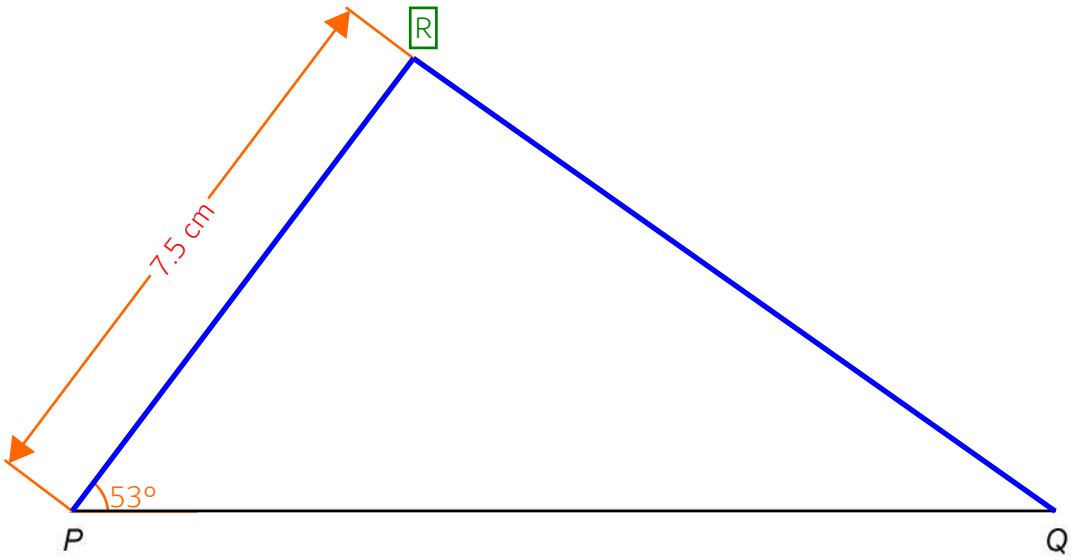
16 (b) Complete an accurate drawing of triangle *PQR* so that

angle *QPR* is 53°

the length of side *PR* is 7.5 cm

[2 marks]



First measuring the 53° angle using a protractor. Then measuring 7.5 cm in that direction using a ruler. Point R is at the end of this line. Connecting the end of the line to Q with a ruler completes the triangle

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

[2 marks]

Answer $15x^2 - 10x$

$5x \times 3x = 15x^2$
$5x \times -2 = -10x$

Turn over for the next question

5

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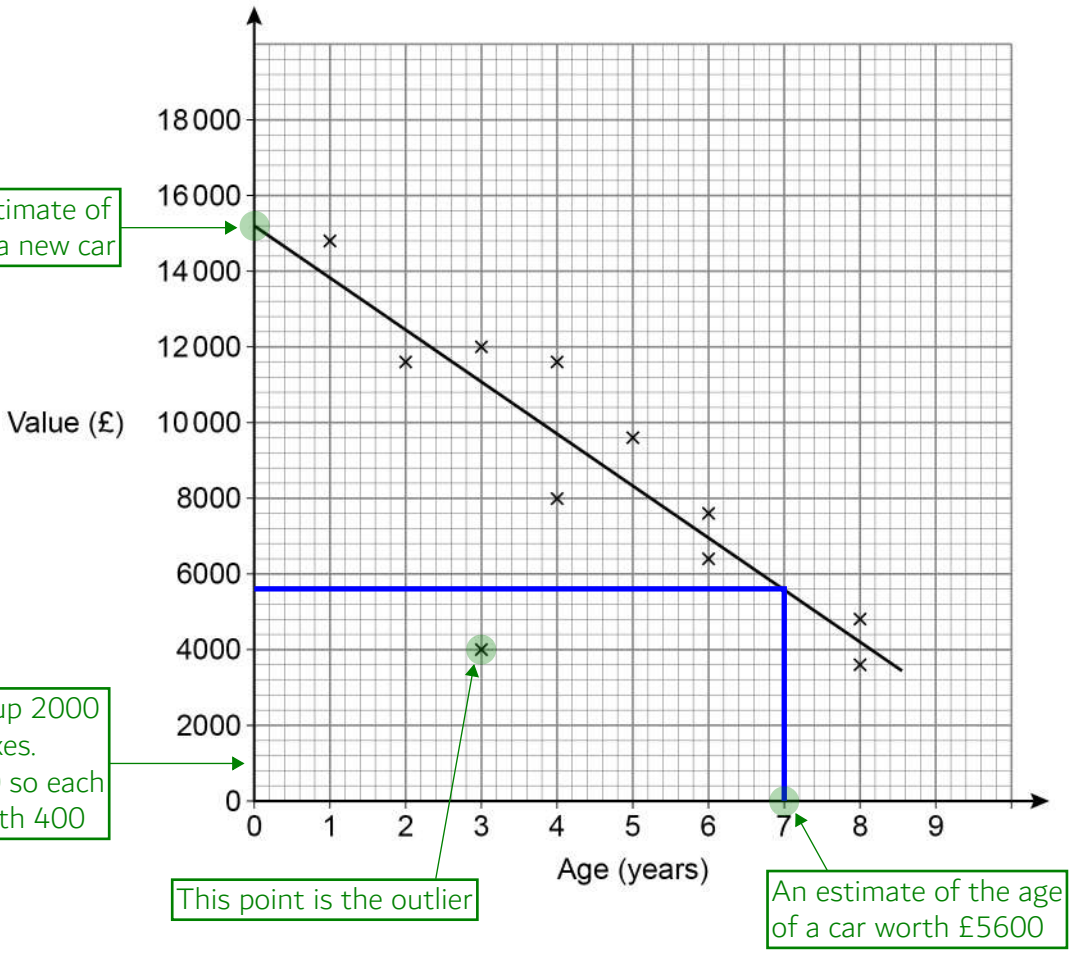
18 The scatter diagram shows the age and value of some cars in 2019

All the cars were of the same make and model.



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

[1 mark]

Answer Negative

As one variable increases the other decreases

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

Answer 2012

Turn over for the next question

5

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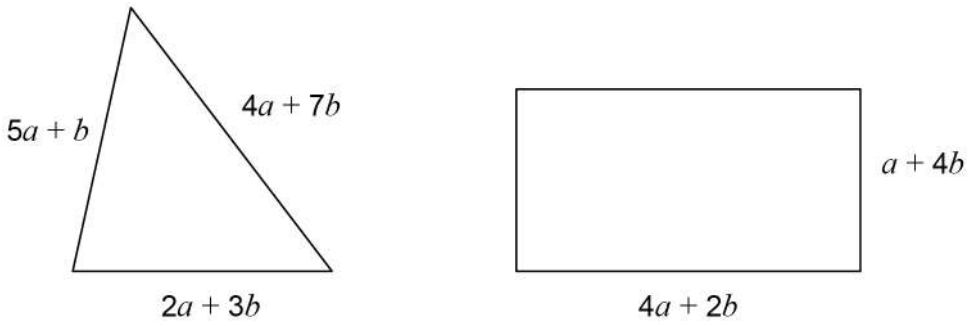
19 Here are a triangle and a rectangle.



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

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

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

[2 marks]

$19-4\times5=-1$ ← Using table mode on the calculator. Set f(x) = 19 - 4x. Start: 1. End: 30. Step: 1. This lists the first 30 terms of the sequence. When x = 5, f(x) = -1 and this is the first negative value of f(x). This works out that the 5th term is -1 and this is the first negative term

Answer 5

↑ n = 5 on the 5th term

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

6

Do not write outside the box

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

The 5 after the 6 in the thousands place causes the 6 to round up to a 7 then everything after it is ignored and set to 0. 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]

2.6+1 ← Adding the 2.6 and 1 parts of the ratio works out that there are 3.6 parts in total which represent the £270

270÷3.6 ← Dividing the £270 by the 3.6 parts of the ratio which represent it works out that 1 part of the ratio is worth £75. So Kaz gets £75

75×2.6 ← Multiplying the value of 1 part of the ratio by the 2.6 parts which represent Jeff works out that Jeff gets £195

195−75 ← Subtracting the £75 Kaz gets from the £195 Jeff gets works out how much more Jeff gets than Kaz

Answer £ 120

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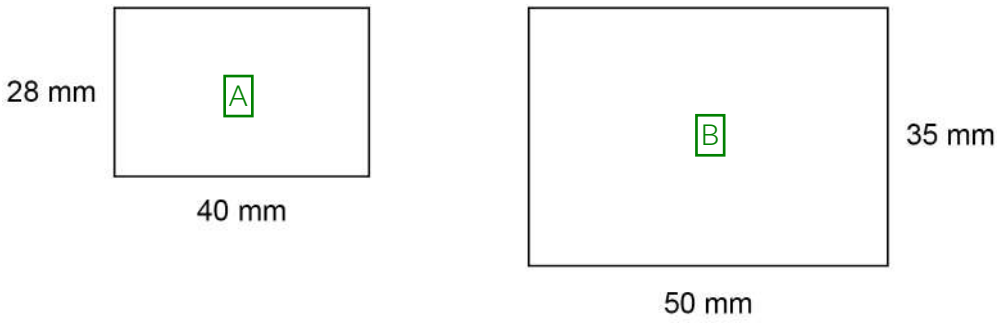
24 Here are two rectangles.

Not drawn accurately



Show that the rectangles are similar.

[1 mark]

$\frac{50}{40} = 1.25$ ← Dividing the length of B by the length of A works out that the scale factor between their lengths is 1.25

$\frac{35}{28} = 1.25$ ← Dividing the width of B by the width of A works out that the scale factor between their widths is 1.25

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

6

Do not write outside the box

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.

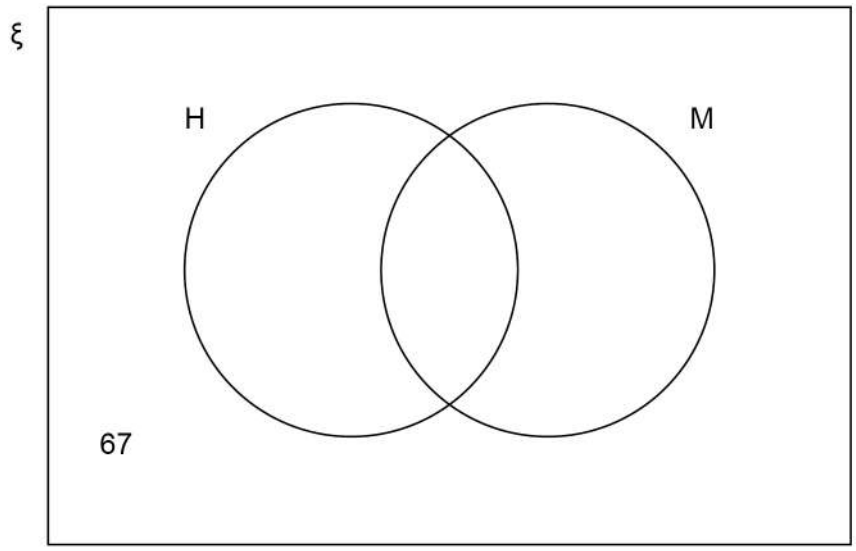
$\frac{3}{8}$ visit the house **only**.

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]



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

Putting the 40% over 100 converts it into a fraction. Multiplying this fraction by the 480 people works out that the number of people who visited the house and the museum is 192

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

This works out that the number of people who visited the house only is 180

$480 - 192 - 180 - 67 = 41$

Subtracting the number of people who visited the house and the museum, the house only and the garden only leaves 41 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

Multiplying the 41 people who visited the museum only by the £7 to visit the museum only expresses the amount paid to visit the museum only

Multiplying the 180 people who visited the house only by the £8 to visit the house only expresses the amount paid to visit the house only

Multiplying the 192 people who visited the house and museum by the £12.50 to visit the house and museum expresses the amount paid to visit the house and museum

Answer £ 4127

Turn over for the next question

5

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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]

198×0.45 ← Multiplying 198 pounds by 0.45 converts it into 89.1 kg

89.1÷6.25 ← Kilograms per square centimetre means to divide the kilograms by the square centimetres

Answer 14.256 kg/cm^2

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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]

10×6 ← Multiplying the mean by the 6 numbers works out that the total of the numbers must be 60

60−12−7−15−3=23 ← Subtracting the other numbers from the total of 60 works out that the other two numbers must add up to 23

3+19=22 ← Assuming that the smallest number is 3, adding the range of 19 to this works out that the largest number would be 22. This does not work as a number smaller than 3 must be added to 22 to get the 23 and we assumed that 3 was the smallest

2+19=21 ← Assuming that the smallest number is 2, adding the range of 19 to this works out that the largest number would be 21. This works as 2 + 21 = 23 so the other two numbers must be 2 and 21

Answer 2 and 21

Turn over for the next question

6

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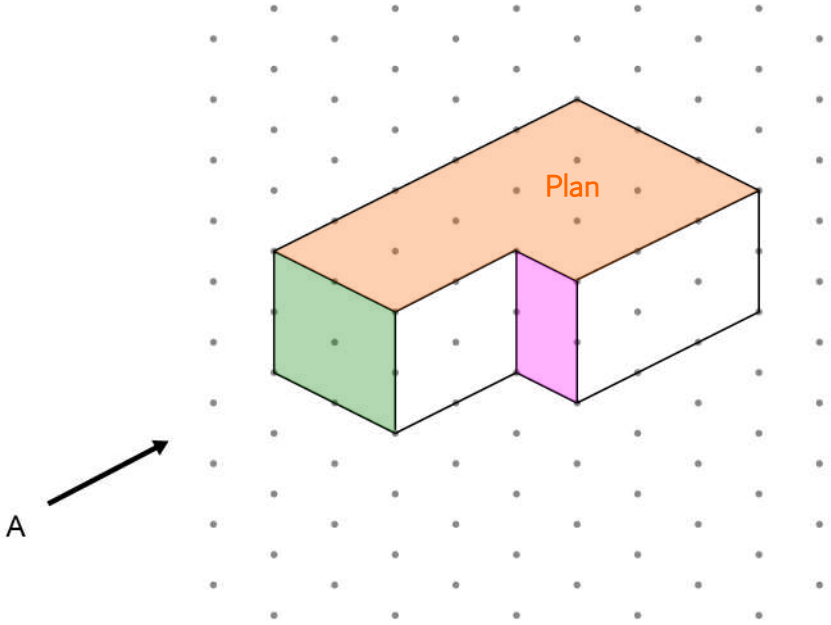
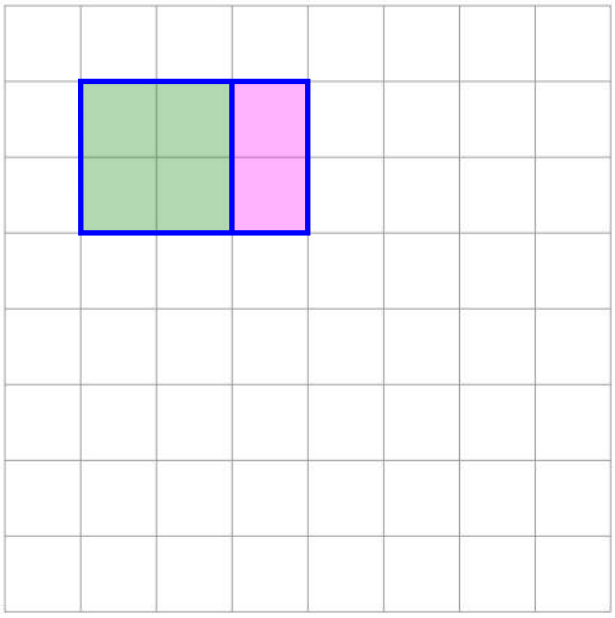
29 A solid shape is drawn on isometric paper.



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

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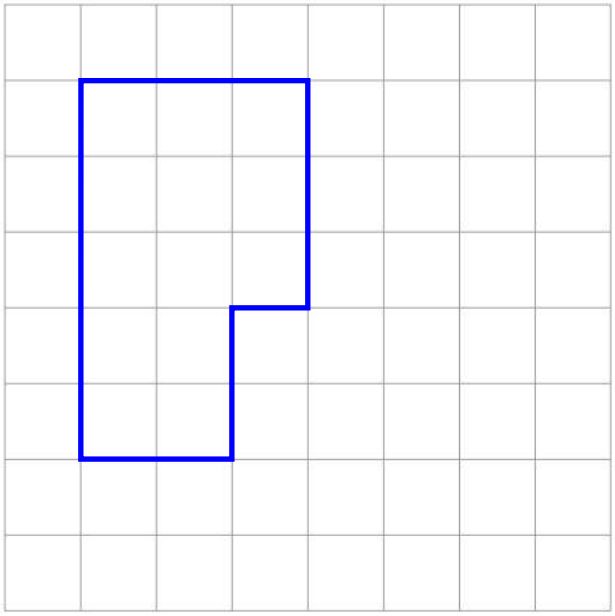
29 (b) On the centimetre grid, draw a plan of the shape.

[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

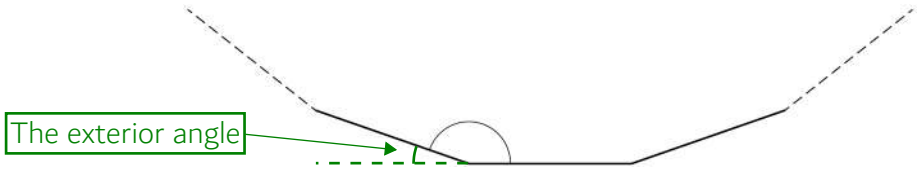
Answer 18.4

5

Do not write outside the box

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

Not drawn accurately



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

[2 marks]

360÷15 ← The exterior angles of any polygon add up to 360°. So dividing 360° by the 15 exterior angles works out that one of the exterior angles is 24°

180−24 ← The exterior and interior angle form a straight line and there are 180° around a point on a straight line. So subtracting the exterior angle from 180° work out that the interior angle is 156°

Answer 156 degrees

END OF QUESTIONS

2

.CG Maths.