.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

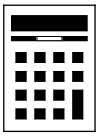
F

Foundation Tier Paper 2 Calculator

Thursday 4 June 2020 Morning 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	
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

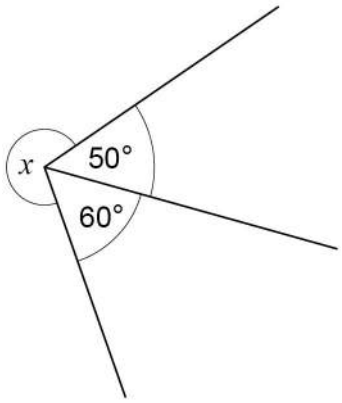
1 Circle the ratio that is the same as 3 : 4

[1 mark]

6 : 7 | 6 : 8 | 6 : 9 | 6 : 16

Dividing both sides of 6 : 8 by 2 gives 3 : 4

2



Not drawn accurately

Circle the size of angle x.

[1 mark]

70° | 110° | 250° | 270°

There are 360° in total around a point. 360 - 50 - 60 = 250

3 Circle the expression that has the **smallest** value when $x = 4$

[1 mark]

$5 - x$ | $\frac{1}{2}x$ | $x + 1$ | $x - 4$

5 - 4 = 1 | 1/2 x 4 = 2 | 4 + 1 = 5 | 4 - 4 = 0

Substituting 4 for x in each expression to work out their values. 0 is the smallest

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4 The term-to-term rule for a sequence is

add 1 then double

The first two terms are 2 and 6

Circle the next term.

[1 mark]

9 13 (14) 18

6 + 1 = 7
7 x 2 = 14

5 (a) Solve $7x = 56$

[1 mark]

$x =$ 8

Dividing both sides by 7 gets x on its own. 56 ÷ 7 = 8

5 (b) Solve $25 - y = 18$

[1 mark]

$y =$ 7

7 must be subtracted from 25 to get 18

6

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6 Eleven people play a game.

Here are their scores.

12 9 15 9 18 18 3 14 9 16 20

6 (a) Write down the mode.

[1 mark]

Answer 9

9 appears the most

6 (b) Work out the median.

[2 marks]

3, 9, 9, 9, 12, 14, 15, 16, 18, 18, 20 ← Putting the numbers in order then underlining from each end until the number in the middle is found

Answer 14

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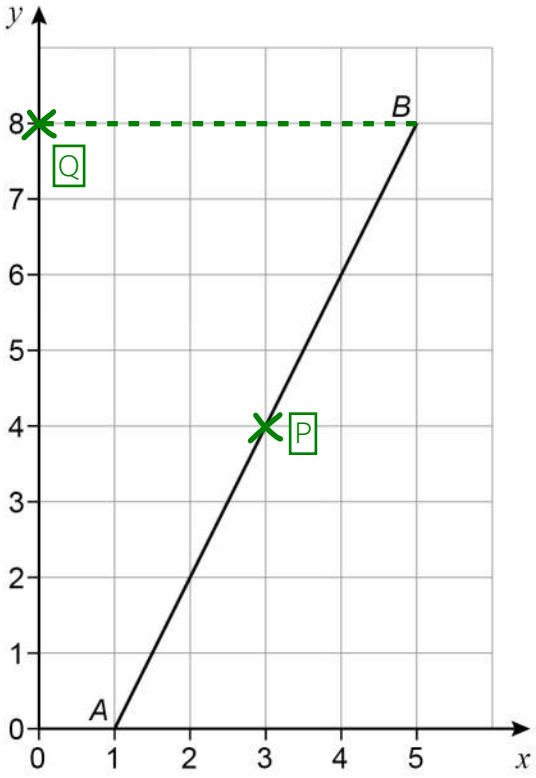
7 Line AB is shown where A is the point (1, 0) and B is the point (5, 8)



7 (a) P is a point on AB.

The distance AP is half the distance AB.

Work out the coordinates of P.

[1 mark]

x-coordinate y-coordinate

Answer (3 , 4)

P is halfway between A and B

7 (b) A line is drawn from B that is

parallel to the x-axis ← So the line must be horizontal as it is in the same direction as the x-axis

meets the y-axis at point Q.

Work out the coordinates of Q.

[1 mark]

Answer (0 , 8)

5

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8 (a) Write down an even whole number that is also a square number.

[1 mark]

Answer 4

4 is an even whole number and is a square number as $2^2 = 4$

8 (b) Write down **all** the cube numbers between 100 and 400

[2 marks]

Using table mode on the calculator. Set $f(x) = x^3$. Start: 1. End: 30. Step: 1. This lists out all of the cube numbers up to 30^3

Answer 125, 216, 343

$5^3 = 125$ and $6^3 = 216$ and $7^3 = 343$

8 (c) Write down **two** numbers that

are multiples of 3

and

multiply to make 216

[1 mark]

Try dividing 216 by multiples of 3 until we get a multiple of 3 as the answer. 3 is the first multiple of 3. 216 ÷ 3 = 72 so 72 x 3 = 216. 72 ÷ 3 = 24 so 72 is a multiple of 3 as it is divisible by 3

Answer 3 and 72

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9 Members of a club are Senior, Adult or Junior.

9 (a) Here is a report about the members of the club.

> 18% are Senior
> 54% are Adult
> 38% are Junior

Give a reason why there **must** be a mistake in the report.

[1 mark]

There is more than 100% ← Percentage is out of 100 and 18 + 54 + 38 = 110

9 (b) An Adult membership fee is £120

A Junior membership fee is $\frac{1}{5}$ of the Adult fee.

Work out the **total** membership fee for 2 Adults and 3 Juniors.

[3 marks]

120×2=240 ← Multiplying the Adult membership fee by 2 works out that the membership fee for 2 Adults is £240

$\frac{1}{5}$×120 ← Doing 1/5 of the Adult membership fee works out that the Junior membership fee is £24

24×3 ← Multiplying the Junior membership fee by 3 works out that the membership fee for 3 Juniors is £72

240+72 ← Adding the membership fee for 2 Adults and 3 Juniors works out that the total membership fee for 2 Adults and 3 Juniors is £312

Answer £ 312

8

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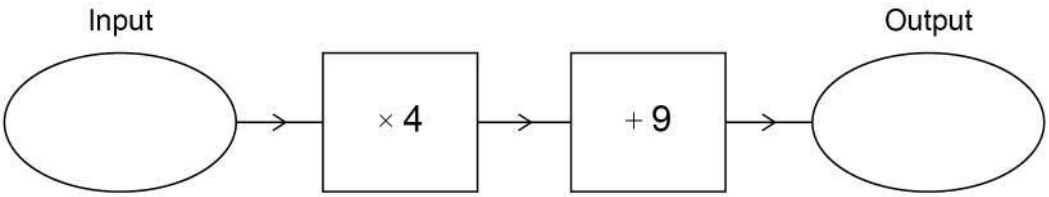
10 (a) Here is a number machine.



Work out the output when the input is 16

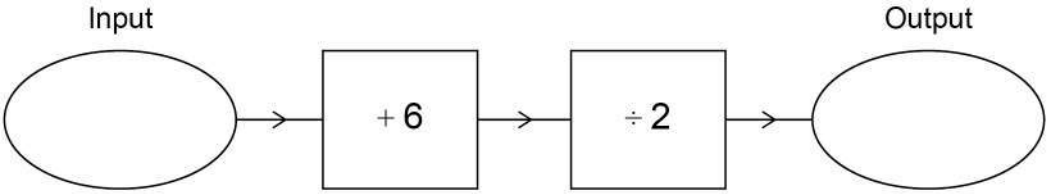
[1 mark]

16×4 ← First multiplying the input by 4 to get 64

64+9 ← Then adding 9 to the 64 to get the output of 73

Answer 73

10 (b) Here is a different number machine.



Work out the output when the input is –48

[1 mark]

-48+6 ← First adding 6 to the input to get -42

-42÷2 ← Then dividing the -42 by 2 to get the output of -21

Answer -21

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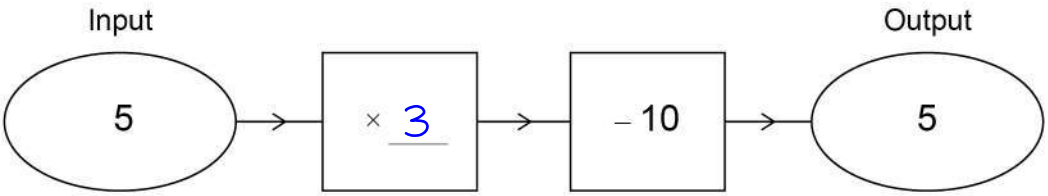
10 (c) Complete this number machine.

[1 mark]



Using the number machine backward: doing the opposite of subtracting 10 by adding 10 to the output of 5 gives 15. Then going forward: the input of 5 must be multiplied by 3 to get the 15

11 Here are two calculations.

A	**B**
$17^2 - 300$	$47 \times 21 - 10^3$
-11	-13

Which calculation has the smaller answer?

You **must** show the answer to each calculation.

[2 marks]

Typing the calculations for A and B into the calculator exactly how they are above gives the answers

Answer B

B is more negative so is a smaller answer

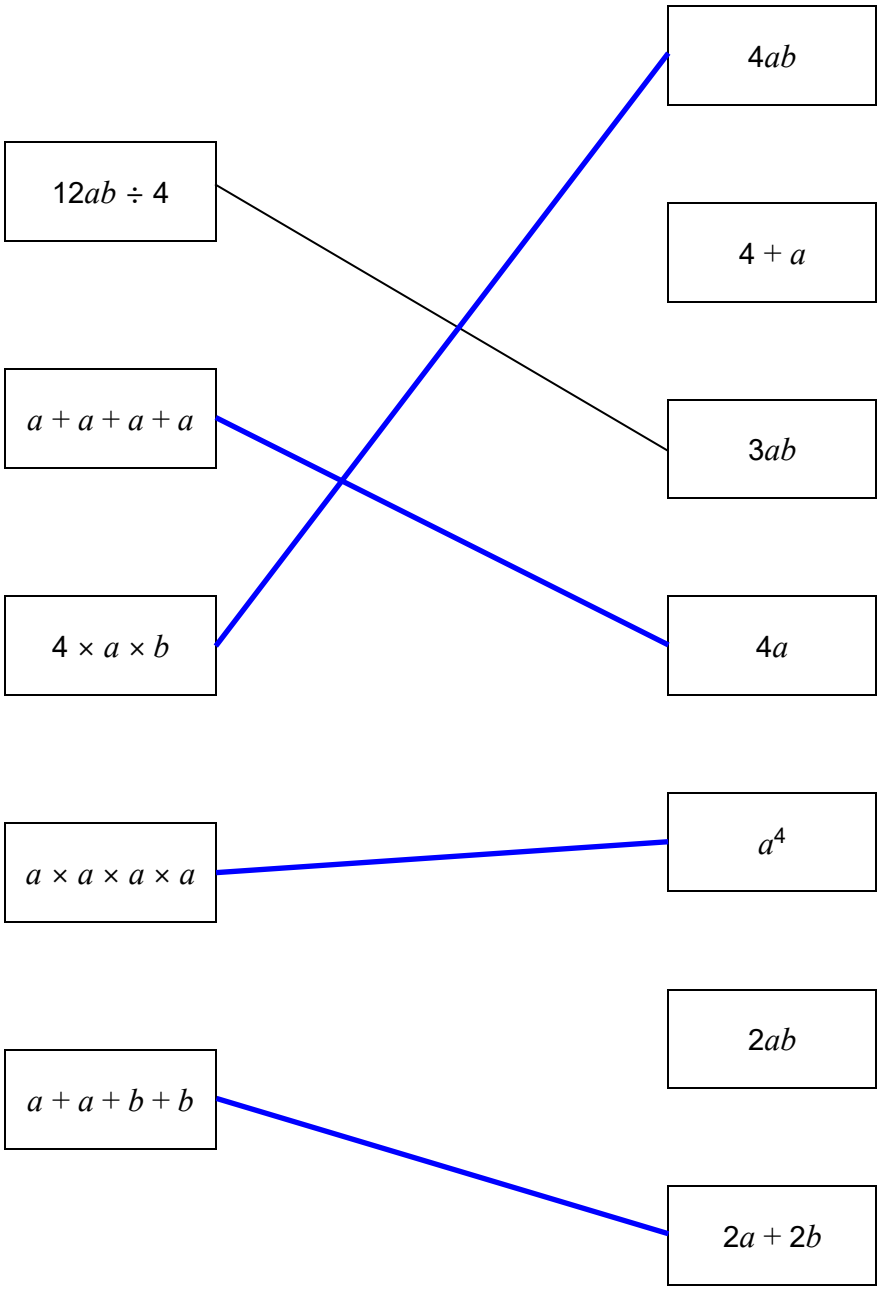
5

Do not write outside the box

12 Match each expression on the left with one on the right.

One has been done for you.

[4 marks]



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13 Jenny works for 30 hours and is paid £318

Calvin works for 28 hours and is paid £287

Jenny is paid more per hour than Calvin.

How much more?

[3 marks]

318÷30=10.60 ← Per means to divide so dividing Jenny's pay by the hours worked finds that Jenny is paid £10.60 per hour

287÷28 ← Per means to divide so dividing Calvin's pay by the hours worked finds that Calvin is paid £10.25 per hour

10.60−10.25 ← Subtracting Calvin's pay per hour from Jenny's pay per hour works out that Jenny is paid £0.35 more per hour than Calvin

Answer 35 pence

£0.35 is 35p

Turn over for the next question

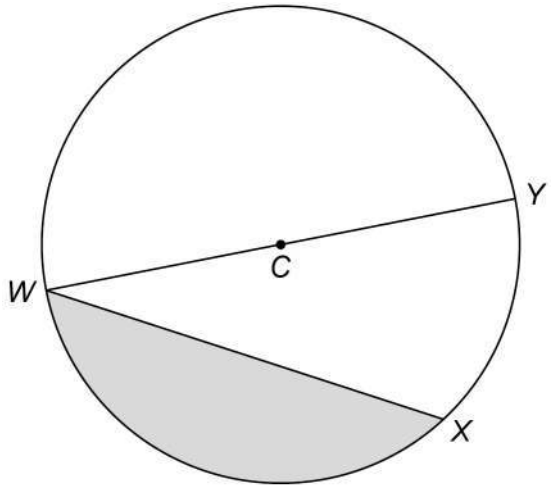
7

Do not write outside the box

14 This circle has centre *C*.

W, *X* and *Y* are points on the circle.

WY is a straight line.



Tick **one** box for each statement.

[3 marks]

	True	False
WY is a diameter.	✓	
WX is a radius.		✓
The shaded section is a sector.		✓
Arc *XY* is part of the circumference.	✓	

WY is a diameter as it is a straight line going from one side of the circle to the other and goes through the centre.

WX is not a radius as it does not go from the centre of the circle to the outside of the circle.

The shaded section is a segment, not a sector.

The circumference is the curve around the outside of the circle and arc XY is part of this

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15 Mortar is made by mixing cement and sand as shown.

For every 1 kg of cement used, add 4 kg of sand

Cement costs £0.19 per kg

Sand costs £0.07 per kg

Tomasz uses 150 kg of cement to make some mortar.

Work out the total cost of the mortar.

[3 marks]

150×0.19=28.50 ← Multiplying the 150 kg of cement by the £0.19 per kg of cement works out that the cement costs £28.50

150×4 ← There is 4 times as much sand as cement so multiplying the 150 kg by 4 works out that there is 600 kg of sand

600×0.07 ← Multiplying the 600 kg of sand by the £0.07 per kg of sand works out that the cost of the sand is £42

28.50+42 ← Adding the cost of the sand to the cost of the cement works out the total cost of the mortar

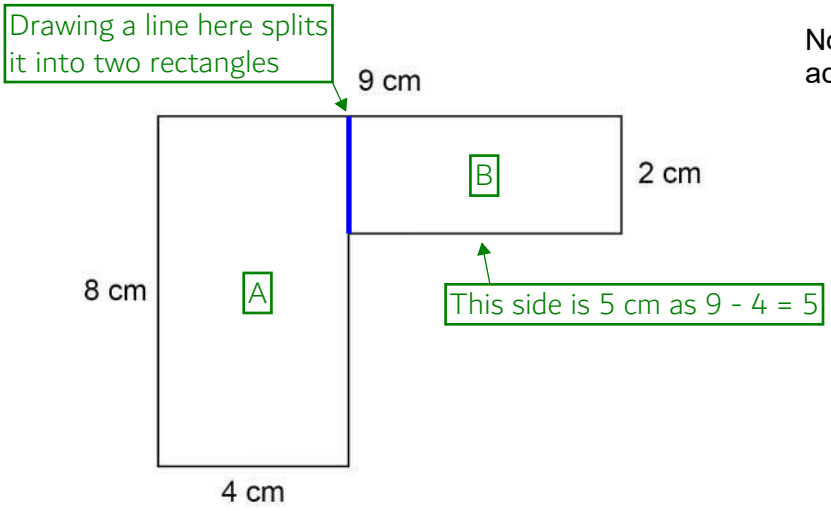
Answer £ 70.50

Turn over for the next question

6

Do not write outside the box

16 (a) Here is a shape made from rectangles.



Not drawn accurately

Work out the area.

[3 marks]

8x4=32 ← This works out that the area of rectangle A is 32 cm^2. Area of rectangle = length x width

5x2 ← This works out that the area of rectangle B is 10 cm^2. Area of rectangle = length x width

32+10 ← Adding the area of rectangles A and B gives the area of the shape

Answer 42 cm^2

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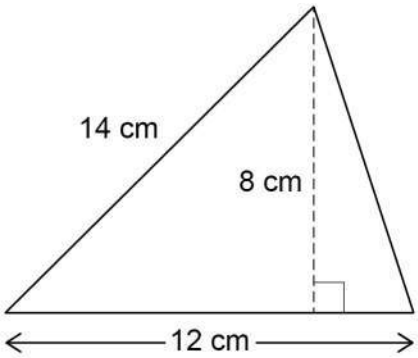
Do not write outside the box

16 (b) Zak wants to work out the area of this triangle.



Not drawn accurately

Here is his working.

$12 \times 8 = 96 \text{ cm}^2$

What is wrong with his method?

[1 mark]

Didn't half ← Area of triangle = 1/2 x base x height. Zak has just done base x height

Turn over for the next question

4

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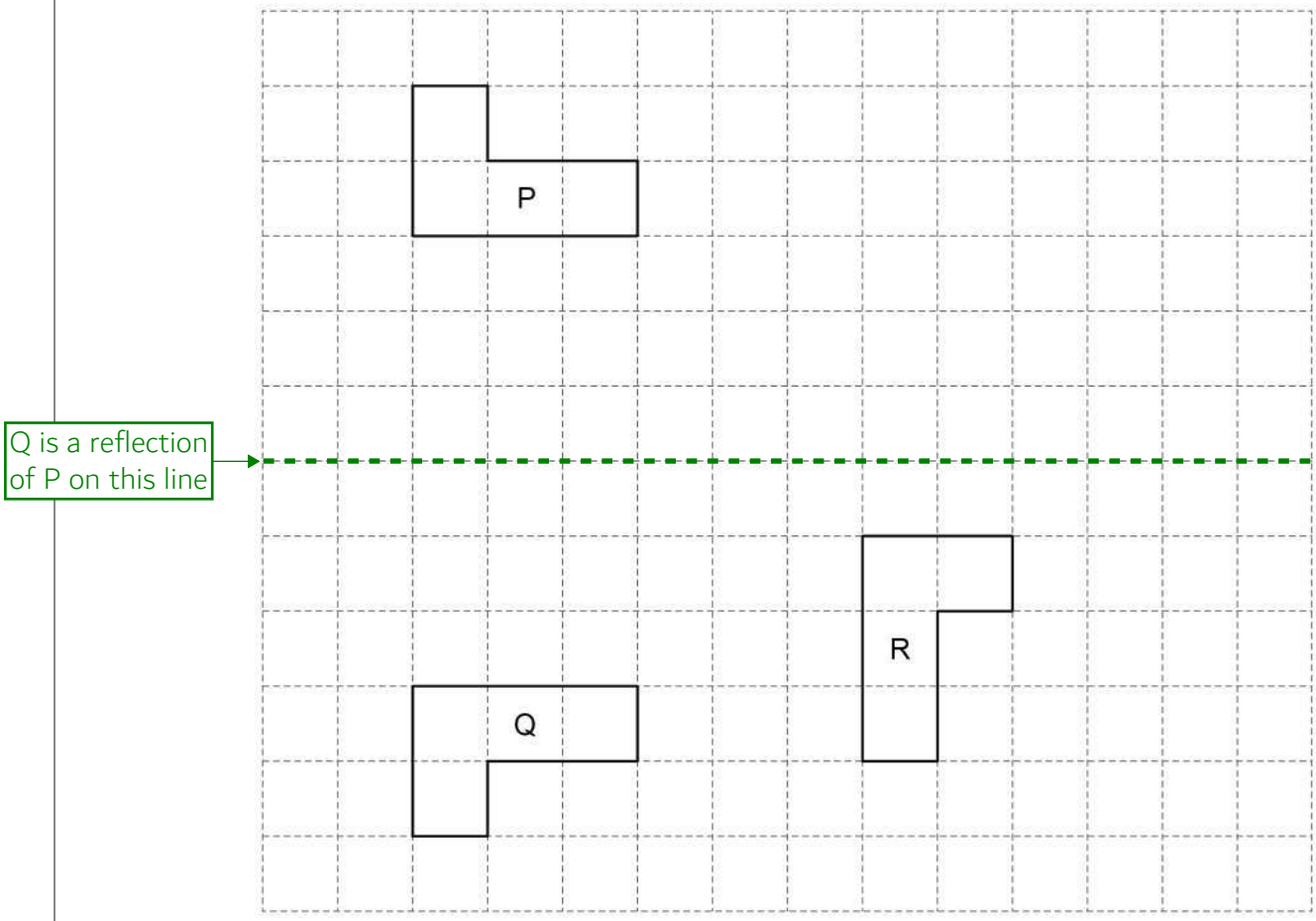
17 Here are shapes P, Q and R.



17 (a) P is mapped to Q by a single transformation.

Circle the type of transformation.

[1 mark]

rotation (reflection) translation enlargement

17 (b) P is mapped to R by a single transformation.

Circle the type of transformation.

[1 mark]

(rotation) reflection translation enlargement

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Do not write outside the box

18 Kim buys pet food in 1.5 kg packs.

Her pet needs 0.8 kg of food each week.

She wants to have enough food for the next 14 weeks.

She already has two 1.5 kg packs.

Work out the smallest number of packs she needs to buy.

You **must** show your working.

[4 marks]

14×0.8 ← Multiplying the 14 weeks by the 0.8 kg of food needed each week works out that 11.2 kg is needed

11.2÷1.5 ← Dividing the 11.2 kg needed by the 1.5 kg in each pack works out that 7.4... packs are needed. This needs to be a whole number so is rounded up to 8 as 7 would not be enough

8-2 ← Subtracting the 2 packs she already has from the 8 needed works out how many packs she needs to buy

Answer 6

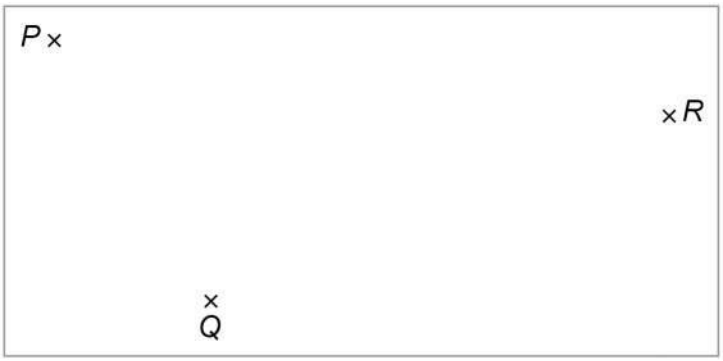
Turn over for the next question

6

Do not write outside the box

19 A scale drawing shows the positions of *P*, *Q* and *R*.

Not drawn accurately



On the scale drawing

PQ = 4 cm *QR* = 6.5 cm

The actual distance *PQ* is 50 metres less than the actual distance *QR*.

Work out the scale.

[3 marks]

6.5 - 4 ← Subtracting PQ from QR works out that PQ is 2.5 cm less than QR on the drawing

50 ÷ 2.5 ← 2.5 cm represents the 50 m so dividing the 50 m by 2.5 works out that 1 cm represents 20 m

Answer 1 cm represents 20 metres

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Do not write outside the box

20 (a) a and b are whole numbers.

$a \leqslant 12$ $b < 9$

Work out the **largest** possible value of $2a + b$

[2 marks]

$2 \times 12 + 8$ ← Both a and b should be as large as possible. a can be 12 and b can be 8. Substituting 12 for a and 8 for b in 2a + b

Answer 32

20 (b) x and y are both **negative** numbers.

Show that $\frac{y}{x}$ could equal 4

[1 mark]

$\frac{-4}{-1} = 4$ ← y could be -4 and x could be -1

Turn over for the next question

6

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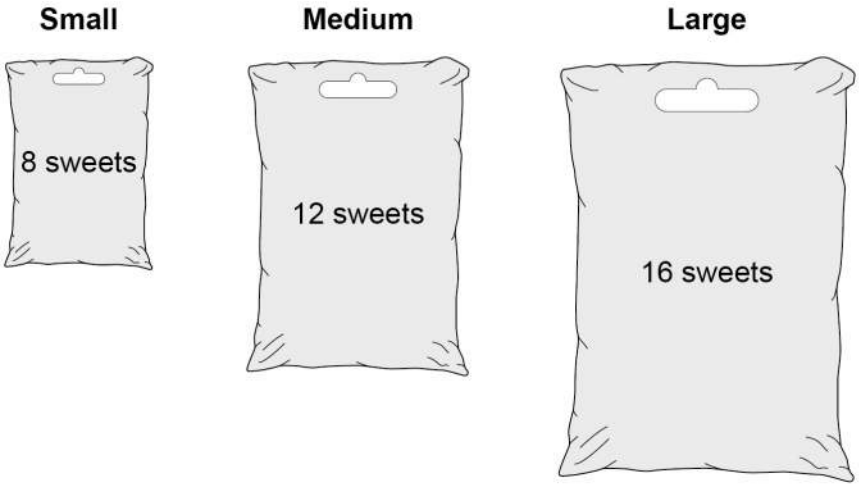
21 Jill puts 440 sweets into small bags, medium bags and large bags.



She uses

30 small bags

twice as many medium bags as large bags.

There are no sweets left over.

For the number of bags, work out the ratio small : medium : large

[4 marks]

30×8 ← Multiplying the 30 small bags by the 8 sweets in each small bag works out that there are 240 sweets in the small bags

440−240=200 ← Subtracting the 240 sweets in small bags from the total 440 sweets works out that there are 200 sweets in the medium and large bags

12×2L+16L ← Let L be the number of large bags. Multiplying L by the 16 sweets in each large bag gives 16L sweets in the large bags. As there are twice as many medium bags as large bags, there are 2L medium bags. Multiplying 2L by the 12 sweets in each medium bag expresses how many sweets are in the medium bags. Adding the expressions for the number of sweets in the medium bags and the number of sweets in the large bags gives an expression of the number of sweets in the medium and large bags

40L=200 ← Simplifying the expression. 12 x 2 + 16 = 40 so 12 x 2L + 16L = 40L. Setting the expression equal to the 200 sweets in the medium and large bags

L=5 ← Dividing both sides by 40 gets L on its own and finds that there are 5 large bags

5×2 ← There are twice as many medium bags as large bags so multiplying the number of large bags by 2 works out that there are 10 medium bags

Answer 30 : 10 : 5

There are 30 small bags, 10 medium bags and 5 large bags. Writing this as a ratio. There is no need to simplify

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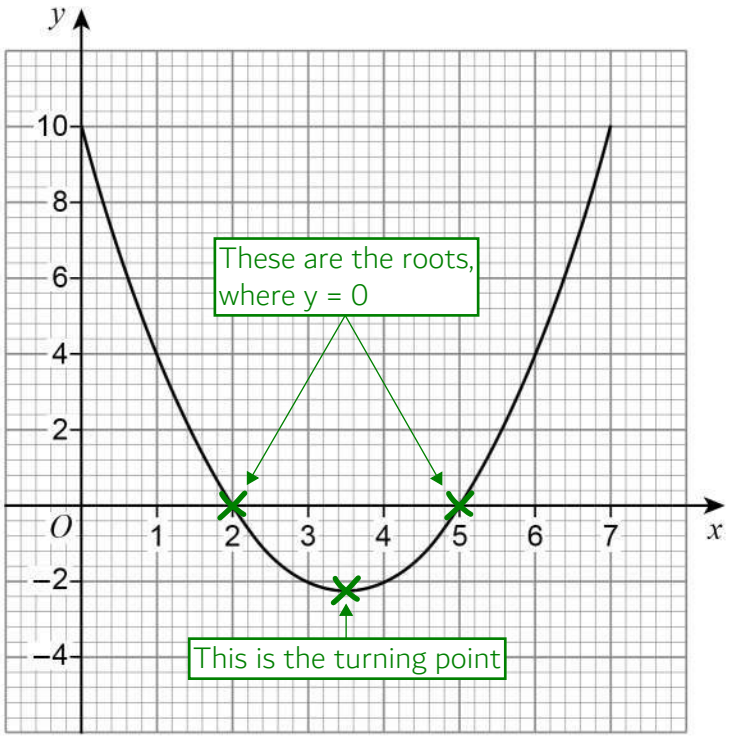
Do not write outside the box

22 Here is the graph of $y = x^2 - 7x + 10$ for values of x from 0 to 7



22 (a) Write down the roots of $x^2 - 7x + 10 = 0$

[2 marks]

Answer 2,5

22 (b) Write down the x-coordinate of the turning point of the curve.

[1 mark]

Answer 3.5

7

Do not write outside the box

23 The time students spent watching TV was recorded.

The table shows the average daily time per student each year from 2012 to 2019

Year	2012	2013	2014	2015	2016	2017	2018	2019
Time (minutes)	157	148	138	124	113	100	90	82

A time series graph is drawn to represent the data.

The first four points have been plotted.

The vertical scale increases by 10 over 5 small boxes. 10 ÷ 5 = 2 so each small box is worth 2. Half a small box is worth 1

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Do not write outside the box

23 (a) Complete the graph.

[2 marks]

23 (b) Use the graph to estimate the average daily time per student in 2020

[1 mark]

Answer 74 minutes

24 Work out the highest common factor (HCF) of 75 and 105

[2 marks]

3×5^2 ← Expressing 75 as a product of prime factors using the calculator

$3 \times 5 \times 7$ ← Expressing 105 as a product of prime factors using the calculator

3×5 ← The highest common factor is the lowest power of each prime factor multiplied together. The lowest power of the 3s is 1, of the 5s is 1 and there are no 7s in 75

Newer models of Casio calculators can calculate the highest common factor of two numbers without having to do this method

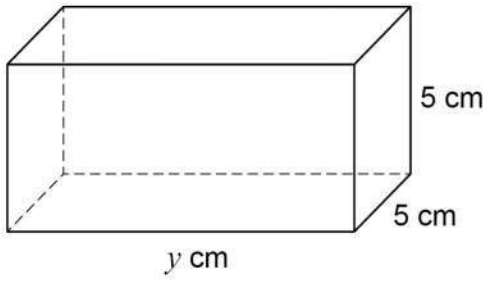
Answer 15

Turn over for the next question

5

Do not write outside the box

25 Here is a cuboid.



25 (a) Assume that the total surface area of the cuboid is 200 cm^2

Work out the volume of the cuboid.

[3 marks]

5x5x2=50 ← This works out that the total area of the left and right faces is 50 cm^2. Area of rectangle = length x width. Both the length and width are 5 cm. Multiplying by 2 as both the left and right are identical faces

5xyx4 ← This expresses the total area of the top, bottom, front and back faces. Area of rectangle = length x width. The length is y cm and the width is 5 cm for each of these faces. Multiplying by 4 as all 4 of them are identical faces. The expression simplifies to 20y

20y+50=200 ← Adding the area of all of the faces must give the surface area of 200 cm^2

20y=150 ← Subtracting 50 from both sides to get the y term on its own

y=7.5 ← Dividing both sides by 20 to get y on its own

7.5x5x5 ← Volume of cuboid = length x width x height. The length is 7.5 cm, the width is 5 cm and the height is 5 cm

Answer 187.5 cm^3

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Do not write outside the box

25 (b) In fact, the total surface area of the cuboid is smaller than 200 cm^2

What does this mean about the volume of the cuboid?

Tick **one** box.

[1 mark]

- [✓] It is smaller than the answer to part (a)
- [ ] It is bigger than the answer to part (a)
- [ ] It is the same as the answer to part (a)
- [ ] It could be any of the above

Both the width and height are still 5cm so y must be smaller. So the volume will be smaller

26 Here is some information about the time spent on social media by 50 people.

Time, t minutes	Number of people
$0 < t \leqslant 15$	2
$15 < t \leqslant 30$	9
$30 < t \leqslant 45$	31
$45 < t \leqslant 60$	8

Both of these categories are over 30 minutes

Circle the number of people who spent more than 30 minutes.

[1 mark]

9 11 31 (39)

Adding the number of people for $30 < t \leqslant 45$ and $45 < t \leqslant 60$ gives 31 + 8 = 39

5

Do not write outside the box

27 At a party there are 90 people.

48 are women and 42 are men.

Some women leave.

Some men arrive.

The ratio of women to men is now 10 : 11

Are there now more than 90 people at the party?

Tick **one** box.

☐ Yes ☑ No ☐ Cannot tell

Show working to support your answer.

[2 marks]

40÷10 ← The ratio of 10 : 11 cannot be simplified. So the number of women needs to be a multiple of 10. Some women leave so the number of women could now be 40, which is represented by 10 parts of the ratio. So dividing the 40 women by the 10 parts works out that 1 part of the ratio is worth 4 people

4×11 ← Multiplying the value of 1 part of the ratio by the 11 parts of the ratio which represent the men works out that there would be 44 men

40+44=84 ← Adding the 40 women and 44 men works out that there are now 84 people at the party. This is not more than 90

There are multiples of 10 which are less than 40 however these do not need to be tried for the number of women as if there were less than 40 women there would be less than 44 men. The 84 people is already less than 90 so we can be certain that there cannot be more than 90 people

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Do not write outside the box

28 Alex and Bev sat six tests, each with 50 marks.

The table shows their mean percentages after five tests.

Alex	60%
Bev	52%

After all six tests, their mean percentages were equal.

In the sixth test, Alex scored 24 out of 50

Work out Bev's score, out of 50, in the sixth test.

[4 marks]

50×5 ← Multiplying the 50 marks in each test by the first 5 tests works out that there are 250 marks in total in the first 5 tests

$\frac{60}{100} \times 250$ ← Putting the 60% over 100 converts it into a fraction, which finds 60% of the 250 marks when multiplied. So Alex got 150 marks in the first 5 tests

$150 + 24 = 174$ ← Adding the 24 marks in the sixth to the 150 in the first 5 tests works out that Alex scored 174 marks in all six tests

$\frac{52}{100} \times 250$ ← Putting the 52% over 100 converts it into a fraction, which finds 52% of the 250 marks when multiplied. So Bev got 130 marks in the first 5 tests

$174 - 130$ ← They both have the same mean percentages after all six tests, meaning that the total marks in all six tests must be the same. Subtracting the 130 marks Bev got in the first 5 tests from the 174 Bev needs to get in all six tests works out that Bev must have scored 44 marks in the sixth test

Answer 44 out of 50

Turn over for the next question

6

Do not write outside the box

29 A solid piece of silver has

mass 2.625 kilograms

volume 250 cm^3

Work out the density of the piece of silver.

Give your answer in grams per cubic centimetre.

[2 marks]

2.625×1000 ← There are 1000 grams in a kilogram so multiplying the 2.635 kilograms by 1000 converts it into 2625 grams

2625÷250 ← Per means to divide so dividing the grams by the cubic centimetres

Answer 10.5 g/cm^3

30 Work out the gradient of the straight line through (–2, 3) and (1, 9)

x y x y

[2 marks]

$\frac{9-3}{1--2}$ ← Gradient = (change in y)/(change in x). 9 - 3 works out the change in y. 1 - -2 works out the change in x

Answer 2

END OF QUESTIONS

4

.CG Maths.