AQA

.CG Maths.
Worked Solutions

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
MATHEMATICS

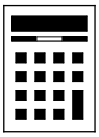
F

Foundation Tier Paper 3 Calculator

Monday 11 November 2019 Afternoon 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.
- 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	
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 On a circle, which of these is **not** a straight line?

Circle your answer.

[1 mark]

circumference radius chord diameter

Circumference is the curve around the outside of a circle. Radius is a straight line from the centre of a circle to the outside. Chord is straight line connecting two points on the outside of the circle. Diameter is a chord which goes through the centre

2 Circle the expression that can be written as $3cd$

[1 mark]

$3 + c + d$ $c + c + c + d$ $c \times c \times c \times d$ $3 \times c \times d$

Writing numbers and letters next to each other means that they are multiplied

3 Which two numbers, when added together, make a cube number?

Circle your answer.

[1 mark]

1 and 8 2 and 4 9 and 18 8 and 64

9 + 18 = 27, which is 3^3

.CG Maths.

Do not write outside the box

4 Convert $2\frac{1}{2}$ kilograms into grams.

Circle your answer.

[1 mark]

25 grams 250 grams 2500 grams 25 000 grams

There are 1000 grams in a kilogram. So multiplying the $2^1/_2$ by 1000 converts it into 2500 grams

5 (a) Convert $\frac{47}{8}$ to a mixed number.

[1 mark]

The calculator can be used to convert the improper fraction to a mixed fraction

Answer $5\frac{7}{8}$

5 (b) Convert $\frac{61}{128}$ to a decimal.

Give your answer to 2 decimal places.

[2 marks]

The calculator can be used to convert the fraction to a decimal. 0.4765625 is rounded to 2 decimal places

Answer 0.48

7

Do not write outside the box

6 George buys some food for £16.55

He pays the exact amount with two notes and four coins.

List the notes and coins.

[2 marks]

The £10 and the £5 makes £15. There is £1.55 left to make. First trying a £1 coin but this doesn't work as it is not possible to make the remaining 55p with three coins. So trying two 50p coins instead of a £1 coin. The remaining 55p can be made with a 50p coin and a 5p coin

Notes £10 £5

Coins 50p 50p 50p 5p

7 Choose **one** of the following to make a correct statement each time.

[4 marks]

	is less than	is equal to	is greater than
When $a = 3$	$4a$ 12	is greater than	$a + 7$ 10
When $b = 8$	$2b - 6$ 10	is equal to	$18 - b$ 10
When $c = 0.5$	$3c$ 1.5	is equal to	$c + 1$ 1.5
When $d = -1$	d −1	is less than	d^2 1

Make sure to put the -1 in brackets when squaring it in the calculator. It should be $(-1)^2$

.CG Maths.

Do not write outside the box

8 Write down **all** the whole numbers that

are between 20 and 50

and

have a difference of 4 between their digits.

[2 marks]

Difference = largest - smallest. The 2 and 6 in 26 have a difference of 4 as 6 - 2 = 4. The 3 and 7 in 37 have a difference of 4 as 7 - 3 = 4. The 4 and 0 in 40 have a difference of 4 as 4 - 0 = 4. The 4 and 8 in 48 have a difference of 4 as 8 - 4 = 4

Answer 26,37,40,48

9 (a) Rearrange $m = p + 2$ to make p the subject.

[1 mark]

Subtracting 2 from both sides of the equation eliminates the +2 on the right and gets p on its own

Answer P=m-2

9 (b) Simplify $5x^2 - x^2$

[1 mark]

5 lots of x^2 takeaway 1 lot of x^2 gives 4 lots of x^2

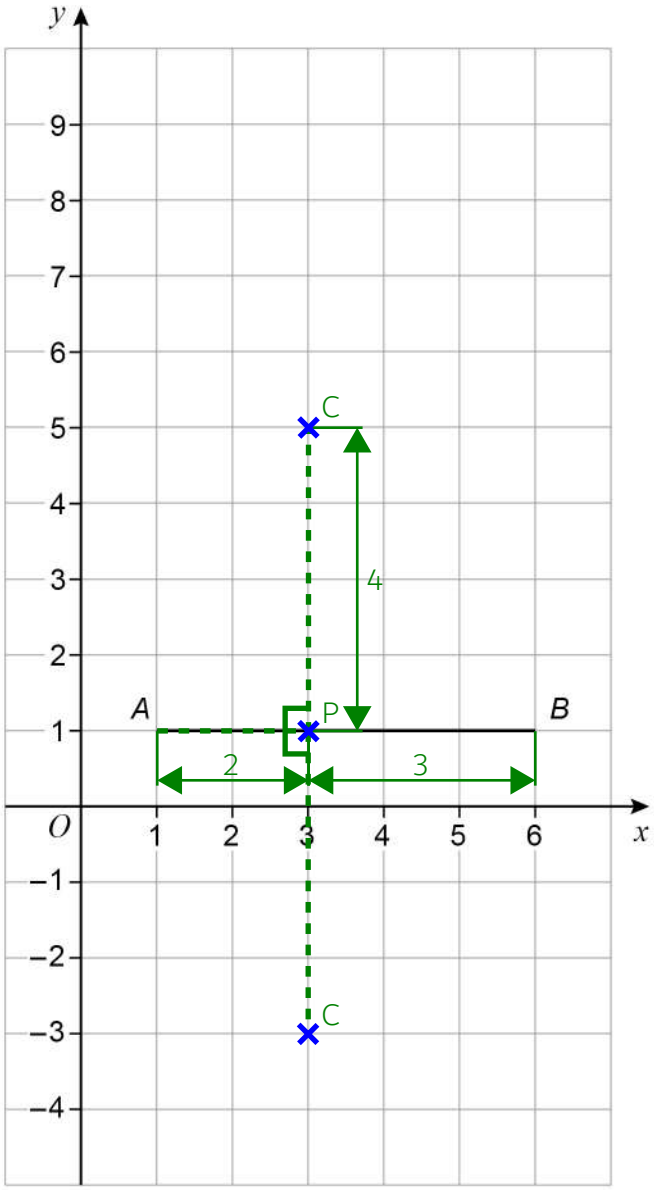
Answer $4x^2$

10

.CG Maths.

Do not write outside the box

10 A line joins A (1, 1) and B (6, 1) on a centimetre grid.



P is a point on the line AB such that

$AP : PB = 2 : 3$

C is a point such that

angle APC is 90°

and

$PC = 4$ cm

Write down the coordinates of the **two** possible points for C.

[3 marks]

Answer (3 , 5) and (3 , -3)

.CG Maths.

Do not write outside the box

11 At a school there are six lessons in a day.

In total, the six lessons last for five hours.

11 (a) Assume that each lesson lasts the same amount of time.

How many minutes long is the final lesson?

[2 marks]

5×60 ← There are 60 minutes in an hour so multiplying the 5 hours by 60 converts to into 300 minutes

300÷6 ← Dividing the 300 minutes by the 6 lessons

Answer 50 minutes

11 (b) In fact, the first lesson of the day lasts longer than the other lessons.

The other lessons last the same amount of time.

What does this tell you about the length of the final lesson?

Tick **one** box.

[1 mark]

- [✓] It is shorter than the answer to part (a)
- [ ] It is the same as the answer to part (a)
- [ ] It is longer than the answer to part (a)

The other lessons must be shorter in order for one of them to be longer

6

Do not write outside the box

12 A bottle contains 1.5 litres of water.

650 millilitres of the water is poured into a jug.

How much water is left in the bottle?

State the units of your answer.

[3 marks]

1.5×1000 ← There are 1000 millilitres in a litre. So multiplying the 1.5 litres by 1000 converts it into 1500 millilitres

1500−650 ← Subtracting the 650 millilitres from the 1500 millilitres works out how much is left

Answer 850ml

13 The cost of 5 kg of potatoes is £3.20

The cost of $\frac{1}{2}$ kg of carrots is 29p

Work out the **total** cost of 12 kg of potatoes and $1\frac{1}{2}$ kg of carrots.

[3 marks]

3.20÷5 ← Dividing the £3.20 by the 5 kg works out that 1 kg of potatoes cost £0.64

0.64×12=7.68 ← Multiplying the cost of 1 kg of potatoes by 12 works out that the cost of 12 kg of potatoes is £7.68

0.29÷$\frac{1}{2}$ ← Dividing the £0.29 by the 1/2 kg works out that 1 kg of carrots cost £0.58

0.58×$1\frac{1}{2}$ ← Multiplying the cost of 1 kg of carrots by $1^1/_2$ works out that the cost of $1^1/_2$ kg of carrots is £0.87

0.87+7.68 ← Adding the cost of the 12 kg of potatoes to the cost of the $1^1/_2$ kg of carrots works out the total cost

Answer £ 8.55

.CG Maths.

Do not write outside the box

14 (a) The term-to-term rule for a sequence is

add 4 then divide by 2

The 1st term of the sequence is 36

Work out the 3rd term.

[2 marks]

36+4
40÷2 ← So the 2nd term is 20
20+4
24÷2

Answer 12

14 (b) The term-to-term rule for a different sequence is

divide by 3 then add 10

The 2nd term of this sequence is 60

Work out the 1st term.

[2 marks]

60−10
50×3 ← Doing the opposite operations in the opposite order goes from the 2nd term to the 1st term. The opposite of adding 10 is subtracting 10. Then the opposite of dividing by 3 is multiplying by 3

Answer 150

10

Do not write outside the box

15 The table shows the cost of hiring a concrete mixer for up to 5 days.

Number of days	1	2	3	4	5
Cost	£14	£24	£34	£44	£54

This is increasing in £10s

Eva hires the concrete mixer for 5 days.

She says,

"The rate is £14 per day because the cost for 1 day is £14"

Is she correct?

Give a reason for your answer.

[2 marks]

No, it goes up £10 each extra day

16 x is a **negative** number.

Which statement is correct?

Tick **one** box.

[1 mark]

☐ $x + 10$ is always positive

☐ $x + 10$ is always negative

☐ $x + 10$ cannot be zero

☑ $x + 10$ could be positive or negative or zero

-11 + 10 = -1
-10 + 10 = 0
-9 + 10 = 1

.CG Maths.

Do not write outside the box

17 The table shows the number of films watched one week by 30 people.

Number of films	Frequency	
0	5	0
1	9	9
2	8	16
3	6	18
4	2	8
	Total = 30	51 ÷ 30

17 (a) Write down the modal number of films watched.

[1 mark]

Answer 1

1 had a frequency of 9, which is the highest frequency so it appeared the most

17 (b) Work out the mean number of films watched per person.

[3 marks]

Multiplying the number of films by the frequency works out the total number of films watched in each category. Adding up these totals works out that the overall total number of films watched was 51. Dividing this by the 30 people works out the mean. Mean = total/number, where total is the total number of films watched and number is the number of people

Answer 1.7

7

Turn over ►

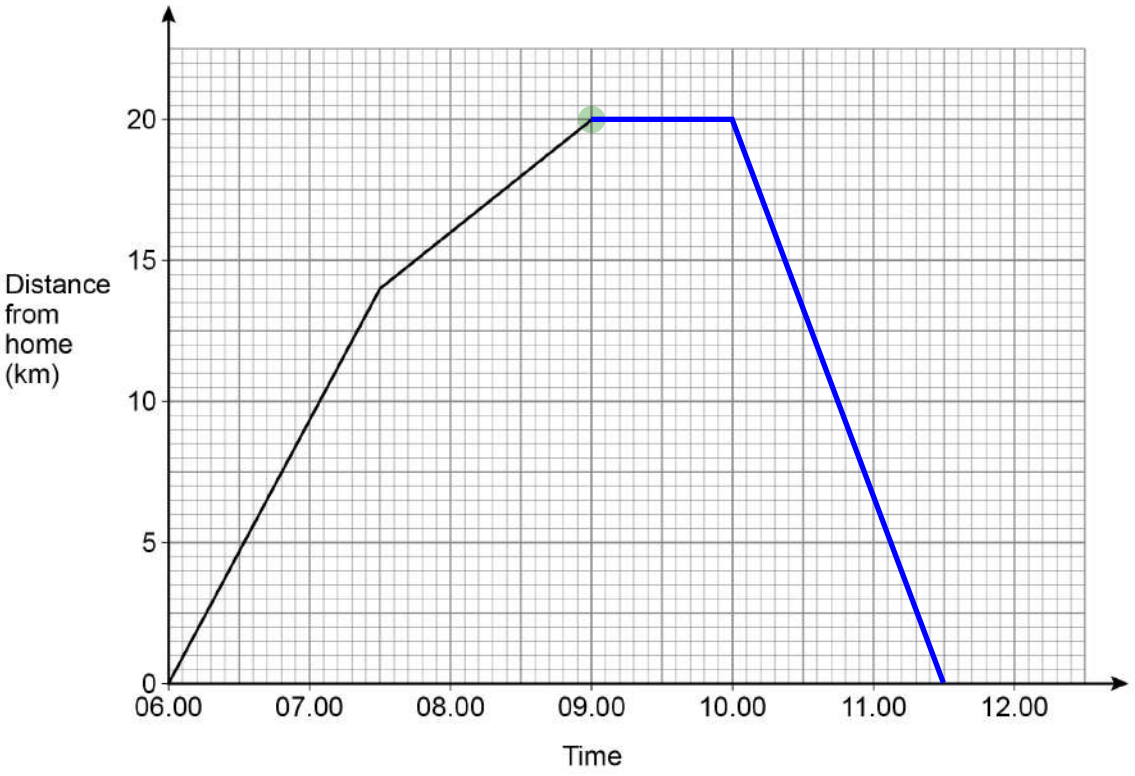
.CG Maths.

Do not write outside the box

18 Jenny leaves home at 06.00

She runs for 3 hours.

Here is a distance-time graph of her run.



18 (a) How far from home is she after 3 hours?

[1 mark]

09.00 is 3 hours after 06.00

Answer 20 km

18 (b) For the next hour she rests.

If she is resting this means the distance from home must not be changing

She then gets a bus home.

She arrives home at 11.30

So the distance from home will go back down to 0 by 11.30

Complete the distance-time graph.

Assume the bus travels at a constant speed.

[2 marks]

Constant speed means that it must be a straight line as the rate of change in distance must be constant

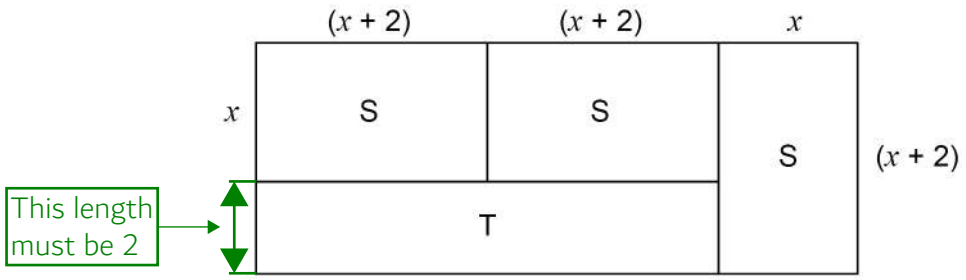
.CG Maths.

Do not write outside the box

19 S and T are rectangles.

S has dimensions $(x + 2)$ and x.

Some of these rectangles make the larger rectangle shown.



Not drawn accurately

Work out an expression for the perimeter of T.

Give your answer in its simplest form.

[3 marks]

4(x+2) ← There are 4 lots of (x + 2) on the perimeter of T as the length of T is double the length of S and there are 2 of these lengths

4x+8+2×2 ← Expanding the bracket. There are 2 lots of 2 on the perimeter of T so adding this on

Answer 4x+12

20 $a : b = 7 : 1$

Circle the correct equation.

[1 mark]

$a = 7b$ $\quad b = 7a \quad a = 6b \quad b = 6a$

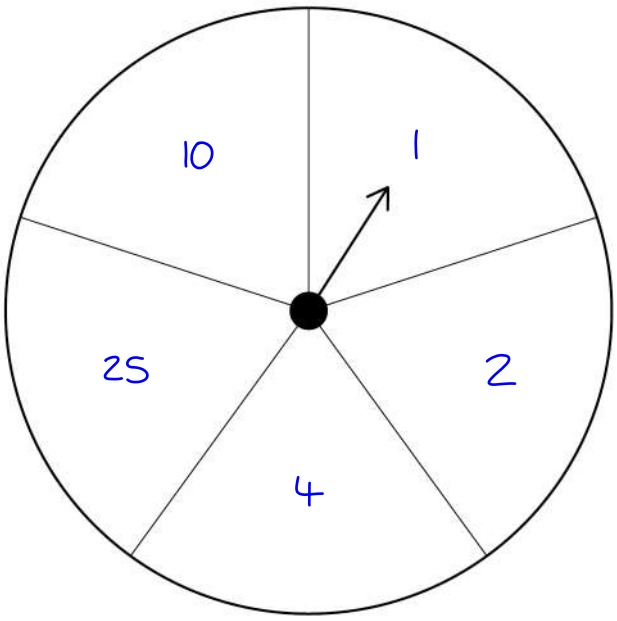
From the ratio, if a was 7 b would be 1. So a would be 7 times b

7

.CG Maths.

Do not write outside the box

21 A spinner has five equal sections.



Write a number in each section so that

the numbers are all different factors of 100

P(single-digit number) $= \frac{3}{5}$

P(multiple of 25) $= \frac{1}{5}$

[3 marks]

3 out of the 5 sections must be different single-digit factors of 100. Factors of 100 are whole numbers which 100 can be divided by to give a whole number result. 1, 2 and 4 are the first three single-digit factors of 100.

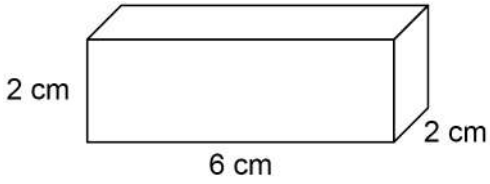
1 out of the 5 sections must be a multiple of 25 which is a factor of 100. The first number to meet this description is 25.

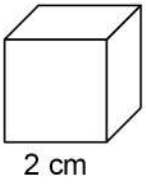
The other number must have more than one digit, not be a multiple of 25 and be a factor of 100. The first number to meet this description is 10

.CG Maths.

Do not write outside the box

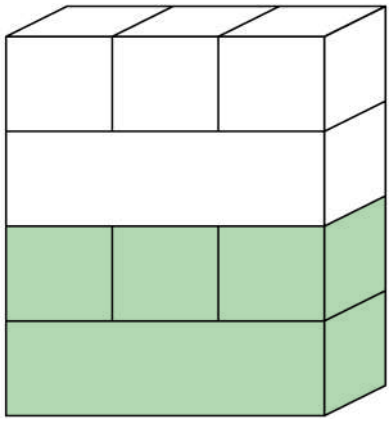
22 Here is a small cuboid and a cube.





Small cuboids and cubes are stacked in layers to make larger cuboids.

Here is a cuboid made with four layers.



Consider this as a block

The pattern is continued to make a cuboid with volume 336 cm^3

How many **cubes** are used?

[3 marks]

6x2x2 ← Volume of cuboid = length x width x height. The length of the cuboid is 6 cm, the width is 2 cm and the height is 2 cm. So the volume of the cuboid is 24 cm^3

24x2 ← The volume of the cubes above each cuboid is the same as each cuboid so multiplying the volume of each cuboid by 2 works out the volume of each block (as shown on the diagram)

336÷48 ← Dividing the 336 cm^3 by the volume of each block works out that there are 7 blocks

7x3 ← There are 3 cubes in each of the 7 blocks

Answer 21

6

.CG Maths.

Do not write outside the box

23 (a) Tom is tiling a wall.

He needs to buy at least 100 tiles.

The tiles are sold in large packs and small packs.

Large pack	40 tiles	£18
Small pack	28 tiles	£14

Special offer

25% reduction when you buy 3 or more **large** packs

Work out the cheapest cost for Tom to buy the packs of tiles he needs.

[3 marks]

$18 \times \frac{100-25}{100}$

Reducing the price of a large pack by 25% works out that each large pack would cost £13.50 using the special offer. This is cheaper than the small pack so the cheapest cost must be by using the special offer. Subtracting the 25% from 100% expresses the percentage it decreases to. Putting this over 100 converts it into a fraction, which when the £18 is multiplied by it is reduced by 25%

13.50×3

Buying 3 large packs gets 120 tiles as 40 x 3 = 120. This is at least 100 tiles. Multiplying the cost of each large pack in the special offer by 3 works out the cost of the tiles

Answer £ 40.50

.CG Maths.

Do not write outside the box

23 (b) Tom is also tiling a floor.

The floor is a rectangle with length 600 cm and width 240 cm

Each tile is a square with side 40 cm

Tom uses this method to work out the number of tiles he needs.

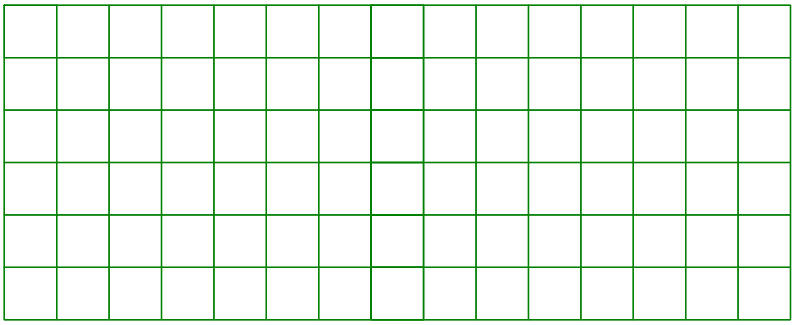
Number of tiles that will fit along the length	=	600 ÷ 40
	=	15
Number of tiles that will fit along the width	=	240 ÷ 40
	=	6
Total number of tiles needed	=	15 + 6
	=	21

Give a reason why Tom's method is wrong.

[1 mark]

Should be 15 x 6

The first two parts are correct. 15 tiles fit along the length and 6 tiles fit along the width. However adding them does not work out the total number of tiles needed. There are 6 rows of 15 so they should be multiplied



Turn over for the next question

4

.CG Maths.

Do not write outside the box

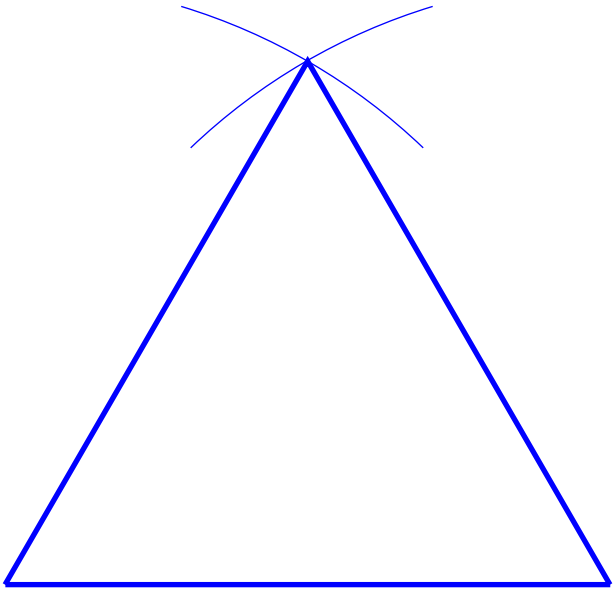
24 An equilateral triangle has side length 16 metres.

Using ruler and compasses only, construct a scale drawing of the triangle.

Use the scale 1 centimetre represents 2 metres.

[3 marks]

Scale: 1 cm represents 2 m



Every 2 metres is represented by 1 centimetre. So dividing the 16 metres by 2 works out that each side should be represented by 8 centimetres. First drawing a horizontal line which is 8 cm long using a ruler. Then scribing an arc with radius 8 cm from each end of the line. Drawing two lines from the ends of the first line to where the two arcs meet ensures that both of the other sides are exactly 8 cm

.CG Maths.

Do not write outside the box

25 In a choir there are 35 men and 48 women.

The probability that a man chosen at random wears glasses is $\frac{2}{5}$

The probability that a woman chosen at random wears glasses is $\frac{3}{8}$

25 (a) Work out the number of people in the choir who wear glasses.

[3 marks]

$\frac{2}{5} \times 35 = 14$ ← This works out that 2/5 of the men is 14. 'of' means to multiply

$\frac{3}{8} \times 48 = 18$ ← This works out that 3/8 of the women is 18. 'of' means to multiply

$14 + 18$ ← Adding the 14 men wearing glasses and the 18 women wearing glasses works out that there are 32 people wearing glasses

Answer 32

25 (b) A person is chosen at random from the choir.

Work out the probability that the person does **not** wear glasses.

[2 marks]

$35 + 48$ ← Adding the 35 men and 48 women works out that there are 83 people in total

$83 - 32$ ← Subtracting the 32 who wear glasses from the 83 people works out that there are 51 who do not wear glasses

Answer $\frac{51}{83}$

51 out of the 83 people do not wear glasses

8

.CG Maths.

Do not write outside the box

26 Density = $\frac{\text{mass}}{\text{volume}}$

The mass is divided by 2 and the volume is multiplied by 4

What happens to the density?

Circle your answer.

[1 mark]

× 2 ÷ 2 × 8 (÷ 8)

Dividing the mass by 2 divides the density by 2. As it is the denominator, multiplying the volume by 4 divides the density by 4. Dividing by 2 then dividing by 4 is dividing by 8

27 Solve the simultaneous equations

$7x + 2y = 36$ ← First equation

$3x + 2y = 16$ ← Second equation

[3 marks]

$4x = 20$ ← Subtracting the second equation from the first equation cancels out the y terms leaving an equation just in terms of x. 7x - 3x = 4x. 2y - 2y = 0. 36 - 16 = 20

$x = 5$ ← Dividing both sides by 4 eliminates the 4 on the left and gets x on its own

$35 + 2y = 36$ ← Substituting 5 for x in the first equation. 7 x 5 = 35

$2y = 1$ ← Subtracting 35 from both sides eliminates the 35 on the left and gets the y term on its own

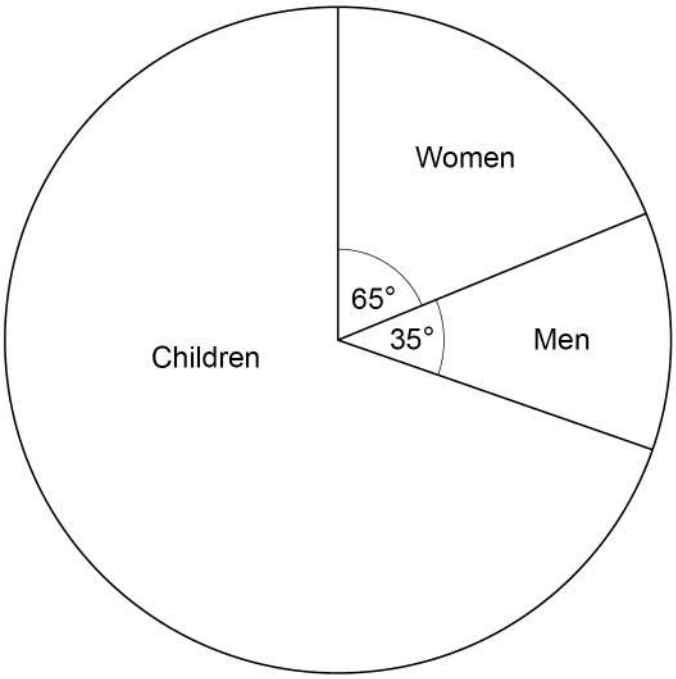
$x =$ 5 $y =$ 0.5

Dividing both sides by 2 eliminates the 2 on the left and gets y on its own

.CG Maths.

Do not write outside the box

28 The pie chart shows information about people at a theme park.



Not drawn accurately

There were 450 **more** women than men.

Work out the number of children.

[3 marks]

360-65-35=260 ← There are 360° in total in a pie chart. Subtracting the angles for women and men works out that the angle for children is 260°

65-35 ← Working out that there are 30° more for women than men. This represents the 450 people

450÷30 ← Dividing the 450 people by the 30° representing it works out that 1° represents 15 people

15×260 ← Multiplying what 1° represents by the 260° for children works out that there were 3900 children

Answer 3900

7

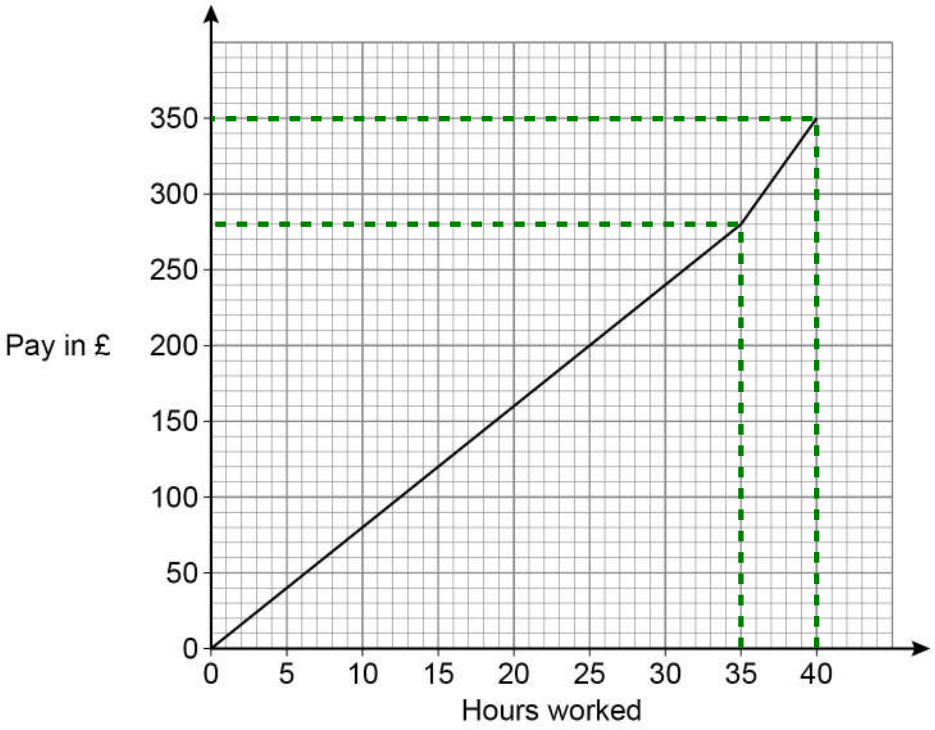
Do not write outside the box

29 The graph shows how much Molly is paid for working for up to 40 hours.

She receives

a basic rate of pay for the first 35 hours worked

a higher rate of pay for the next 5 hours worked.



Work out the difference between the higher rate of pay and the basic rate of pay.

Give your answer in £ per hour.

[3 marks]

280÷35=8 ← £280 was earned in the first 35 hours. £ per hour means to divide the pay in £ by the hours worked. So the basic rate of pay is £8 per hour

350-280 ← This works out that £70 was earned in the next 5 hours

70÷5 ← £ per hour means to divide the pay in £ per hour by the hours worked. So the higher rate of pay is £14 per hour

14-8 ← Difference = largest - smallest

Answer £ 6 per hour

.CG Maths.

Do not write outside the box

30 Work out

cube root of 512 : reciprocal of 0.4

Give your answer in the form n : 1

[3 marks]

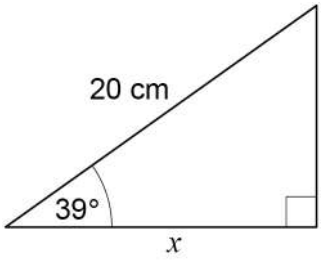
8:2.5 ← $\sqrt[3]{512}$ = 8 and 1/0.4 = 2.5. Reciprocal means 1 divided by

8÷2.5 ← The 2.5 has been divided by 2.5 to get 1. So the 8 must also be divided by 2.5

Answer 3.2 : 1

31 Use trigonometry to work out the value of x.

Not drawn accurately



[2 marks]

SOH CAH TOA ← Writing SOH CAH TOA as formula triangles. Ticking H as we have the hypotenuse and ticking A as we are looking for the adjacent. There are two ticks on the CAH formula triangle so this one can be used

COS39×20 ← From the formula triangle, adjacent = cos of the angle x hypotenuse

Answer 15.5 cm

END OF QUESTIONS

8

.CG Maths.