AQA

.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
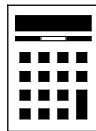
Monday 8 June 2020   Morning   Time allowed: 1 hour 30 minutes

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	
TOTAL	

JUN2083003F01   IB/M/Jun20/E7   **8300/3F**

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

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

1 What is 6.2819 to 2 decimal places?

Circle your answer.

[1 mark]

6.2   6.28   6.29   6.3

The 8 is in the 2nd decimal place. The 1 after it causes it to round down so it stays the same and everything after it is ignored

2 50% of a number is 40

Circle the number.

[1 mark]

20   80   800   2000

50% is half. The opposite of doing half of a number is multiplying it by 2. 40 x 2 = 80

3 Circle the correct statement.
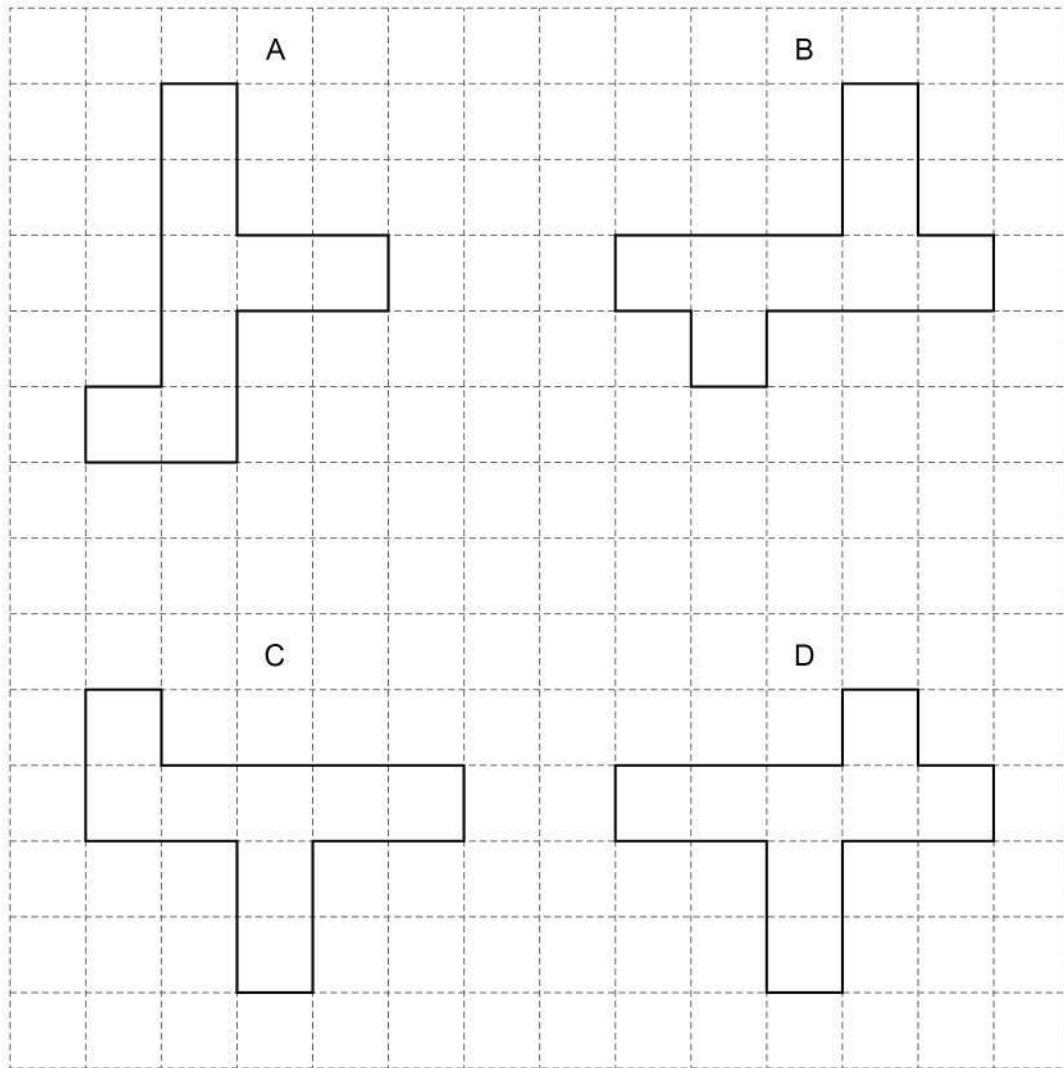
[1 mark]

$0.07 \geqslant 0.7$ $0.07 = 0.7$ $0.07 < 0.7$ $0.07 > 0.7$

0.07 is less than 0.7

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4   Shapes A, B, C and D are on a square grid.

Which two shapes are congruent?
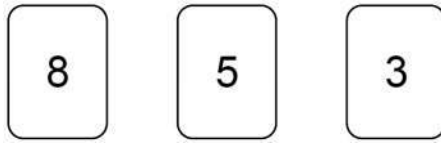
Circle your answer.

[1 mark]

A and C   B and A   C and D   D and B

A is identical to C except that it has been rotated

4

Turn over ▶

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5   Here are three number cards.

        8   5   3

5 (a)   Use all three cards to make the answer to this calculation a multiple of 10

[1 mark]

    3 5 × 8

A multiple of 5 multiplied by an even number gives a multiple of 10

5 (b)   Use all three cards to make the answer to this calculation a single-digit number.

[1 mark]

    3 × 5 − 8

3 x 5 - 8 = 7

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5 (c) Use all three cards to make this a correct calculation.

[1 mark]

$$\frac{6 + 5}{8 + 3} = 1$$

In order to equal to 1, the numerator must have the same value as the denominator

6 Greg wants to buy a games console that costs £267.50

He already has £125

He will save £7.50 each week.

In how many weeks will he have saved enough?

[3 marks]

$$\frac{267.50 - 125}{7.50}$$

Subtracting what he already has from the cost leaves how much he still needs to pay. Dividing this by the amount he saves each week gives how many weeks he will need
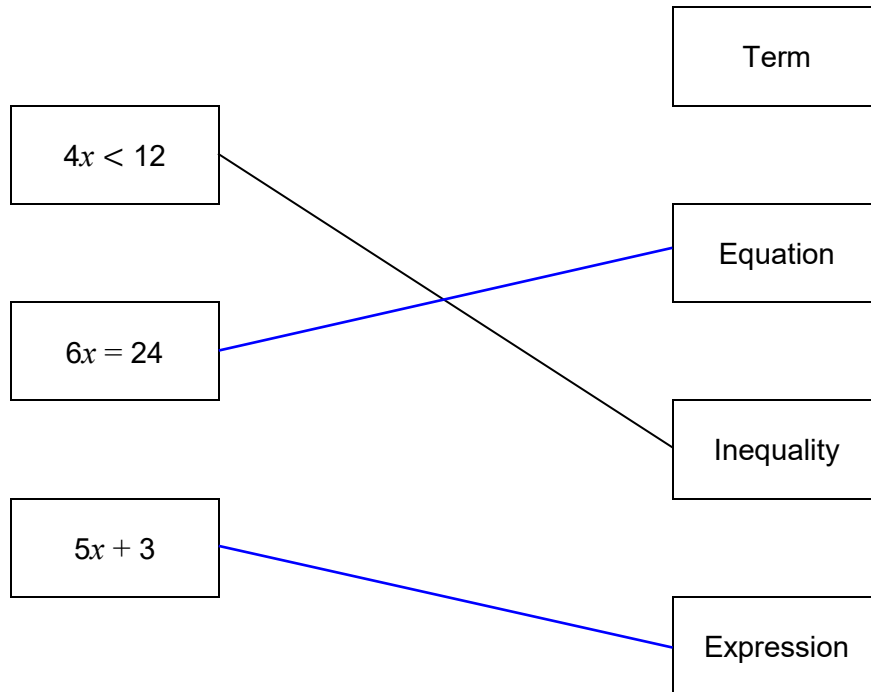
Answer _____ 19 _____

6

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7 Match the algebra to the correct description.

One has been done for you.

[2 marks]

Term

$4x < 12$

Equation

$6x = 24$

Inequality

$5x + 3$

Expression

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8 A team of two players is picked from these people.

Female	Amy (A) Laura (L)
Male	Erik (E) Rob (R) Tim (T)

The team **must** have one female player and one male player.

Complete this list to show **all** of the possible teams.

[2 marks]

Female player	Male player
A	E
A	R
A	T
L	E
L	R
L	T

Using systematic listing ensures all possibilities are listed

Turn over for the next question

4

Turn over ▶

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07

9 500 people started a race.

280 were men and the rest were women.

80% of the men finished the race.

30 women did **not** finish the race.

Complete the frequency tree.

[5 marks]

Total number of people	Men or women	Result

280 were men

80% of the men finished the race.
0.8 x 280 = 224

280 — **280** — Men
Finished — **224**
Did not finish — **56**

The rest of the men must have not finished.
280 - 224 = 56

500

The rest were women.
500 - 280 = 220

Women — **220**
Finished — **190**
Did not finish — **30**

The rest of the women must have finished.
220 - 30 = 190

30 women did not finish the race

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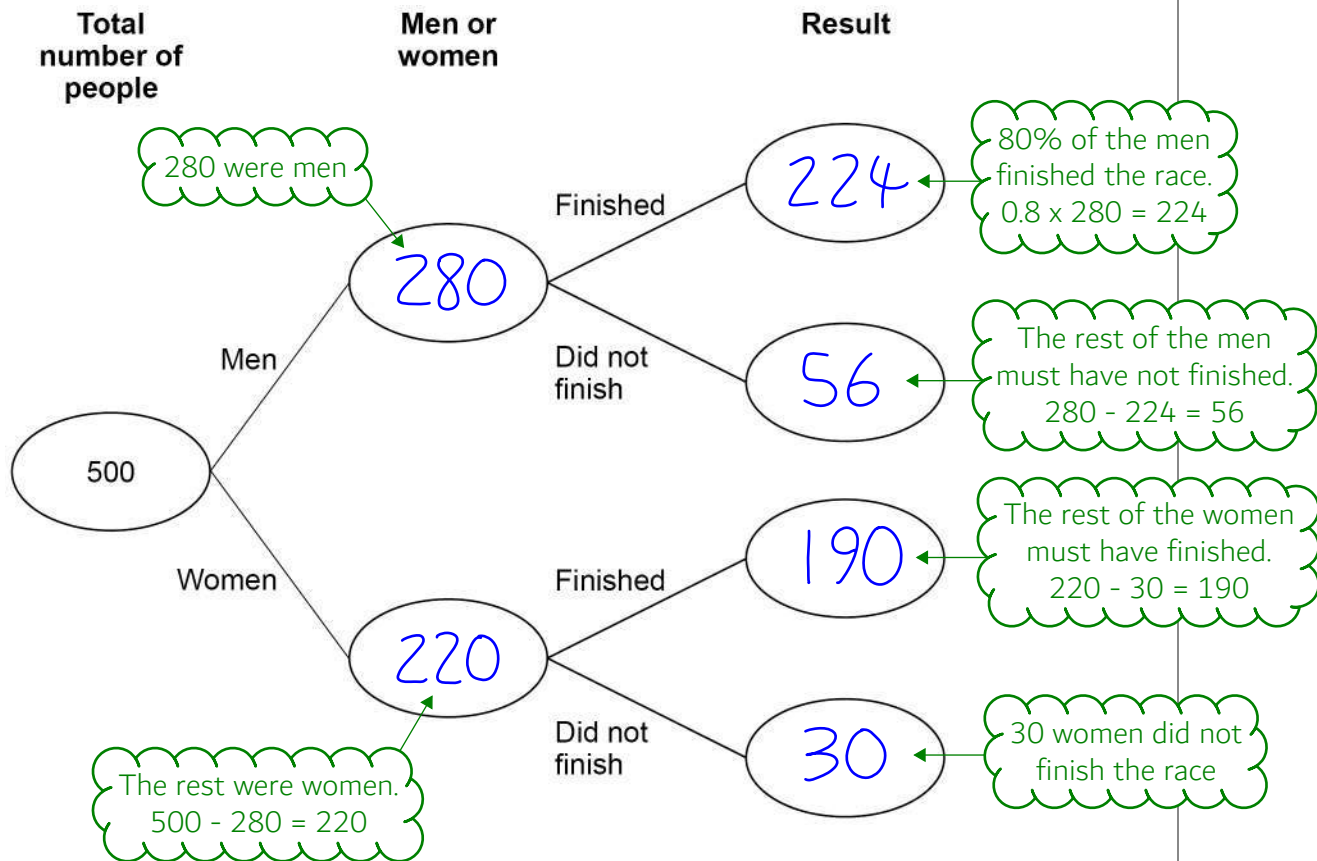
10 Put these three distances in order of size.

1.8 kilometres   1600 metres $1\frac{3}{4}$ kilometres

1.6

1.75

Start with the shortest.

[2 marks]

There are 1000 metres in a kilometre so dividing by 1000 converts the metres to kilometres

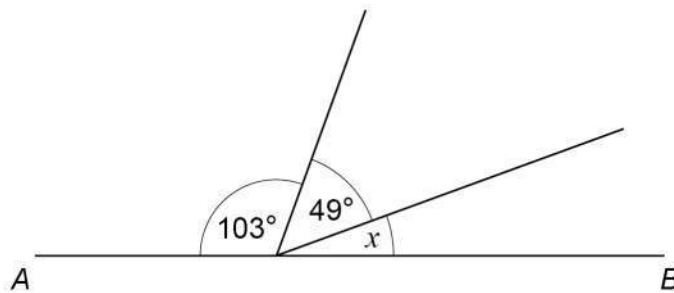*Entering the mixed fraction then pressing the SD button converts it to a decimal*

Shortest distance   1600 metres

$1^3/_4$ kilometres

Longest distance   1.8 kilometres

11 *AB* is a straight line.

Not drawn
accurately

103°   49°

x

A   *B*

Work out the size of angle *x*.

[2 marks]

180 − 103 − 49

*There are 180° around a point on a straight line so subtracting the other angles leaves angle x*

Answer   28   degrees

9

0 9

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12 Some players were asked the shirt colour of their football team.

Each answer was either White, Blue, Red or Green.

A pie chart is drawn to represent the answers.

Two of the sectors are shown.

The angle for green is drawn on using a protractor

Green

White

Red

75°

165°

Blue
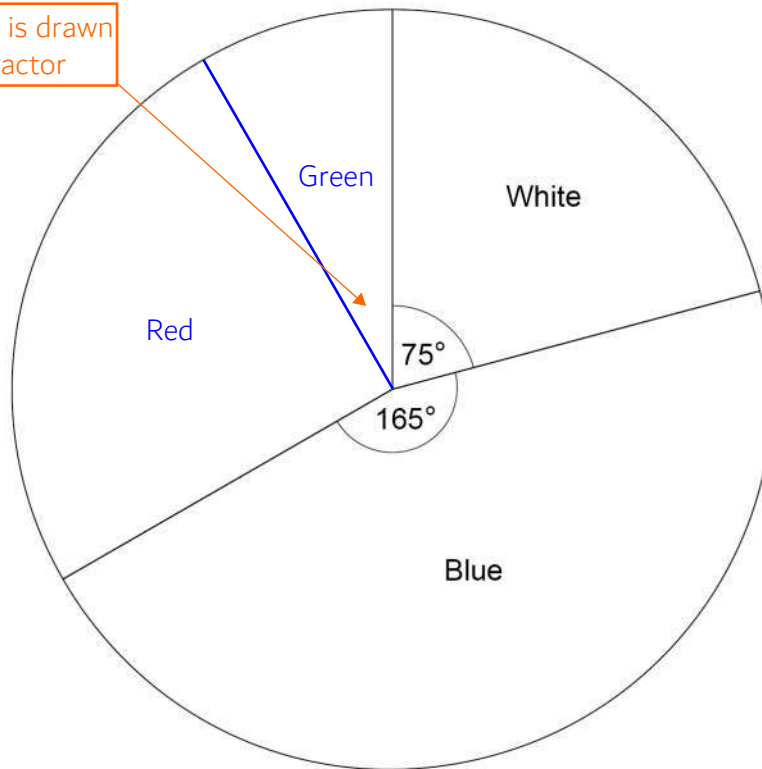
12 (a) The number who answered Red is three times the number who answered Green.

Complete the pie chart.

[3 marks]

$G + 3G = 360 - 75 - 165$

$4G = 120$

$G = 30$

Let G be the angle for Green. Red must be 3G. Adding these two angles gives the remaining number of degrees, which is also found by subtracting the number of degrees used so far from 360

So the angle for Green must be 30°. There is no need to work out the angle for Red as it will be the rest of the pie chart

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12 (b) There were 600 players altogether.

How many players answered White?

[2 marks]

$$\frac{75}{360} \times 600$$

There are 360° in total in a pie chart. Out of these, 75° are for White. So 75/360 of the 600 must have answered White

Answer _____125_____

13 Milly has an equal number of 20p coins and 50p coins.

The value of her 20p coins is £2.80

Work out the **total** value of her 20p and 50p coins.

[3 marks]

$$2.80 + \frac{2.80}{0.20} \times 0.50$$

Dividing the £2.80 by £0.20 works out how many 20p coins there are, and therefore how many 50p coins there are as there are an equal number of both. Multiplying this by £0.50 works out the value of the 50p coins. Adding this to the £2.80 gives the total value of the coins

Answer £ _____9.80_____

8

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14 Here are ticket prices for a theme park.

> **Single tickets**
>
> Adult £48   Child £26
>
> **Special offer tickets**
>
> 1 adult and 2 children   £82
>
> 2 adults and 2 children   £120

14 (a) Freya buys tickets for 3 adults and 4 children.

She pays the cheapest possible total cost.

How much does she save compared to buying all single tickets?

[4 marks]

$$48 \times 3 + 26 \times 4 - 120 - 82$$

£48 x 3 works out the cost of 3 adult single tickets. £26 x 4 works out the cost of 4 child single tickets. Adding these both together works out the cost of buying all the tickets with single tickets. She can buy one of the first special offer ticket and one of the second special offer ticket to buy the tickets as cheaply as possible. Subtracting both of these costs from the cost of buying all the tickets with single tickets works out the difference and therefore how much was saved

Answer £ _____ 46

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14 (b) Leroy buys 5 single adult tickets.

He uses a voucher that reduces the price of tickets by a quarter.

In total, how much does he pay?

[3 marks]

$$5 \times 48 \times \left(1 - \frac{1}{4}\right)$$

5 x £48 works out the normal cost of the 5 single adult tickets. 1 - 1/4 works out the fraction of the normal cost it goes down to. Multiplying by this works out this fraction of the price

Answer £ _____ 180

15 n is negative.

Circle the expression that is **positive**.

[1 mark]

$n - 1$ $\qquad$ $\boxed{n^2}$ $\qquad$ n^3 $\qquad$ $\dfrac{1}{n}$

n² means that the negative was multiplied by itself. A negative multiplied by a negative is a double negative so therefore becomes positive

Turn over for the next question

8

Turn over ▶

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16 Here is a formula.

$$y = 3.6x$$

16 (a) Draw the graph of $y = 3.6x$ for values of x from 0 to 20

[2 marks]

3.6 x 0 = 0. So when x is 0, y is also 0. The coordinate of (0 , 0) is on the line. 3.6 x 20 = 72. So when x is 20, y is 72. The coordinate of (20 , 72) is on the line. Plotting both of these points then joining them up gives the graph for the desired range of values of x. It is a straight line as it is in the form y = mx + c
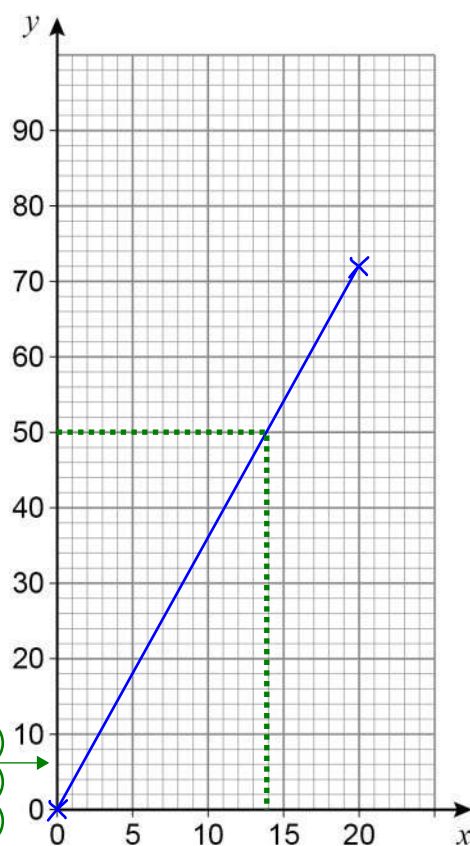
The scale goes up 10 over 5 boxes. 10/5 = 2. Therefore each box is worth 2

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In the formula $y = 3.6x$

      y is speed in kilometres per hour (km/h)

      x is speed in metres per second (m/s)

16 (b) Convert 50 km/h to m/s

Give your answer to the nearest whole number.

[1 mark]

Going across from 50 on the y axis to the line then down converts it to m/s

Answer _____ 14 _____ m/s

16 (c) Convert 30 m/s to miles per hour.

Use   1 mile per hour = 1.61 km/h
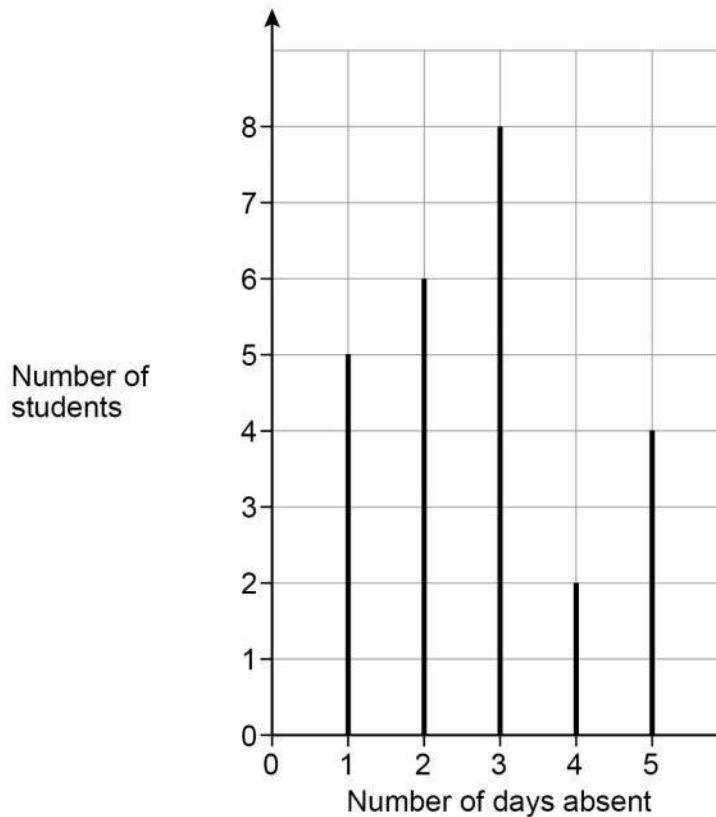
[3 marks]

$$\frac{3.6 \times 30}{1.61}$$

By using the formula y = 3.6x, 3.6 x 30 converts the m/s to km/h. Every 1.61km/h is 1mph so dividing by 1.61 works out how many lots of 1.61 the km/h is and therefore how many lots of 1mph it is

Answer _____ 67.1 _____ miles per hour

Turn over for the next question

6

Turn over ▶

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17 A record was kept of the number of days that 25 students were absent one term.

The chart represents the results.

Number of students

Number of days absent

17 (a) Work out the mean number of days absent.

[3 marks]

$$\frac{1 \times 5 + 2 \times 6 + 3 \times 8 + 4 \times 2 + 5 \times 4}{25}$$

Multiplying the number of days absent by the number of students for each bar then adding together all the results gives the total number of days absent for all of the students. Dividing this by the number of students gives the mean number of days absent

Answer   2.76

17 (b) One of the students is chosen at random.

Work out the probability that the student was absent for **less than** 4 days.

[2 marks]

$5+6+8$

The bars representing 1, 2 and 3 days are less than 4 days. Adding together the number of students these represent gives the number of students who were absent for less than 4 days

Answer $\dfrac{19}{25}$

19 out of the 25 students were absent for less than 4 days

18 Bobbi has these notes.

Note	Number of notes
£5	3
£10	x

The total value of her notes is £T

Write a formula for T in terms of x.

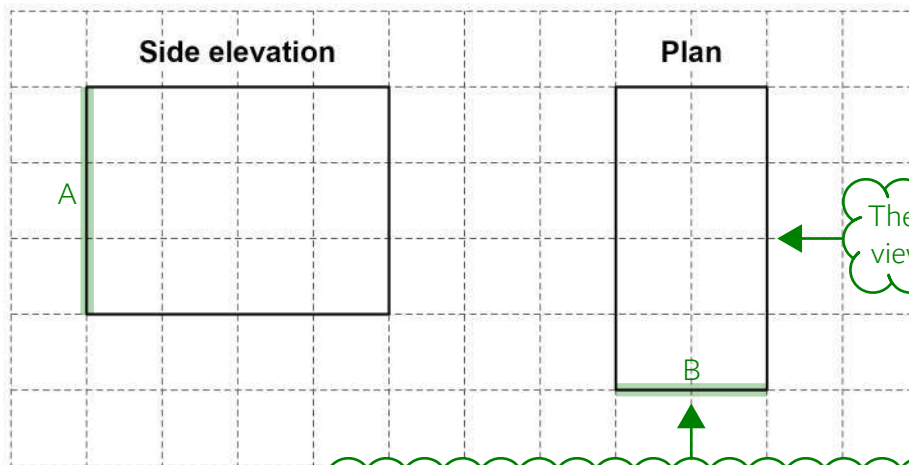**[2 marks]**

Answer $T = 15 + 10x$

There are 3 £5 notes and 3 x 5 = 15 so these are worth £15. The total value of her notes is £15 plus £10 times the number of £10 notes, which is x

7

Turn over ▶

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19 The side elevation and plan of a cuboid are shown on the centimetre grid.
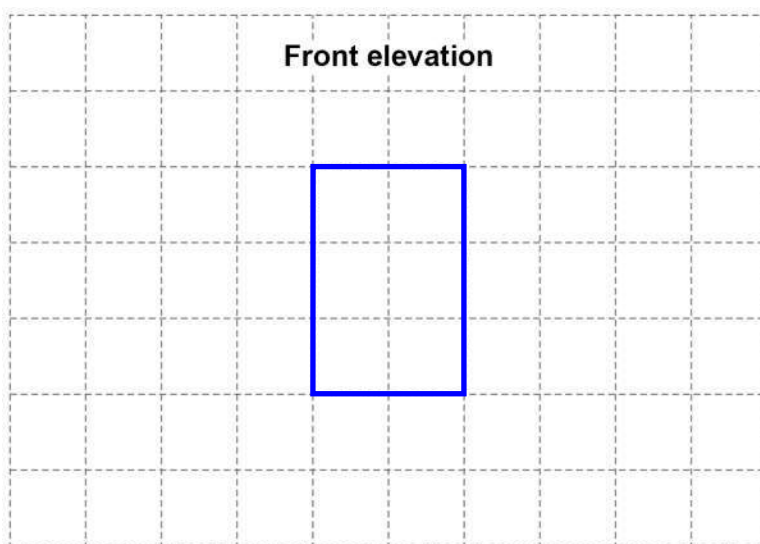
Side elevation

A

Plan

B

The side elevation could be viewing from this direction

The front elevation could be viewing from this direction

Draw the front elevation of the cuboid on this centimetre grid.

[2 marks]

Front elevation

Looking at the side elevation: it is 3cm tall as indicated by the side labelled as A. Therefore the cuboid must be 3cm tall. The other side is 4cm long so it must be the longer side on the plan which is also 4cm. Therefore the front elevation must be looking toward the shorter 2cm side of the plan, which is labelled as B. This is 2cm long so this must be the width of the cuboid

Plan
3cm
Front
Side
4cm
2cm

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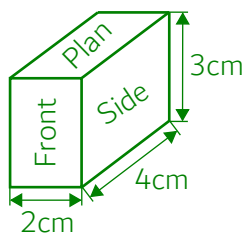
20 To the nearest 1000, there are 18 000 people at a festival.

20 (a) Write down the minimum possible number of people at the festival.

[1 mark]

Answer _____ **17500**

The resolution is 1000. Halving this and subtracting it from the 18000 gives the lower bound, which is the minimum possible number of people. 18000 - 1000/2 = 17500

20 (b) Write down the maximum possible number of people at the festival.

[1 mark]

Answer _____ **18499**

The resolution is 1000. Halving this and adding it from the 18000 gives the upper bound. 18000 + 1000/2 = 18500. However this rounds up to 19000 so it needs to be 1 fewer than this

21 Circle the equation of the line parallel to $y = 5x + 2$

[1 mark]

$y = 2x + 5$ $\quad$ $\boxed{y = 5x - 2}$ $\quad$ $y = -5x + 2$ $\quad$ $y = -2x - 5$
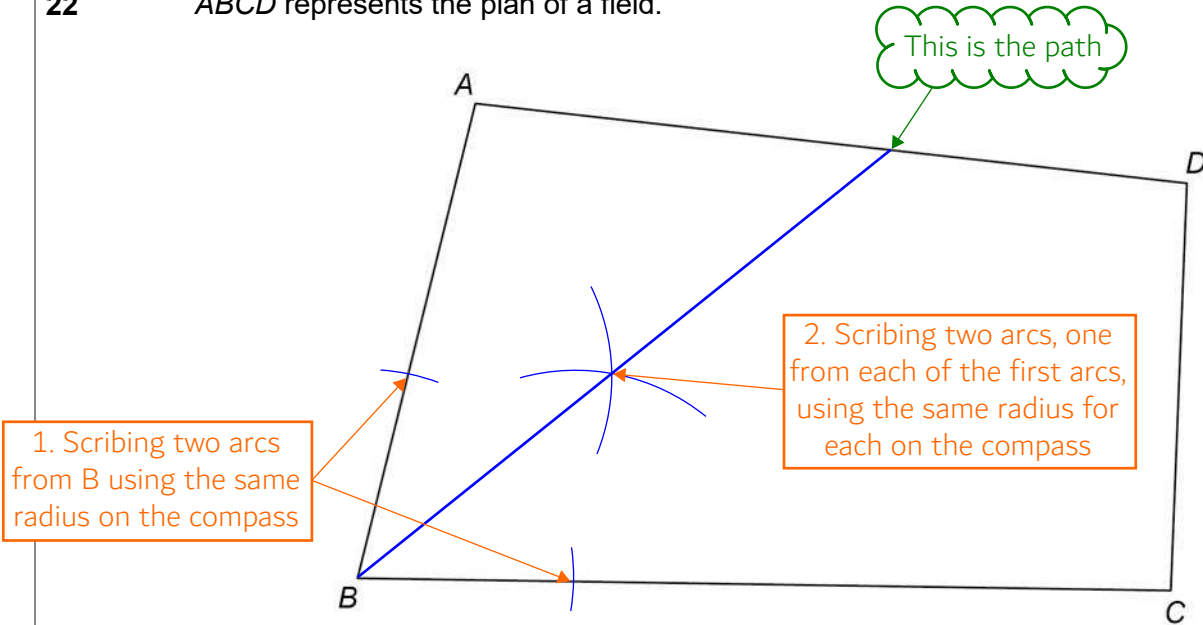
Each equation is in the form y = mx + c, where m is the gradient and c is the y intercept. The equation y = 5x + 2 has a gradient of 5 so to be parallel to this the gradient must be the same

Turn over for the next question

5

Turn over ▶

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22   *ABCD* represents the plan of a field.

This is the path

A

D

2. Scribing two arcs, one from each of the first arcs, using the same radius for each on the compass

1. Scribing two arcs from B using the same radius on the compass

B

C

There is a path across the field that

starts at *B*

is the same distance from *BA* and *BC*.

Using ruler and compasses, show the position of the path.

[2 marks]

23   *a* is two times *b*.

Circle the ratio $a : b$

[1 mark]

1 : 3   3 : 1   1 : 2   2 : 1
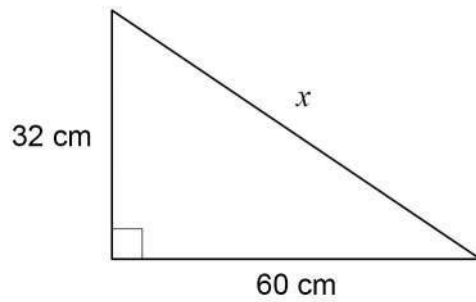
The number of parts for a needs to be twice as many as for b. 2 is double 1

24 Use Pythagoras' theorem to work out the value of x.

Not drawn accurately

[3 marks]

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

Pythagoras' Theorem where a and b are the shorter sides and c is the longest side

$$\sqrt{32^2 + 60^2}$$

Made c the subject by square rooting both sides. Then substituting 32 for a and 60 for b

Answer _____68_____ cm

Turn over for the next question

Turn over ▶

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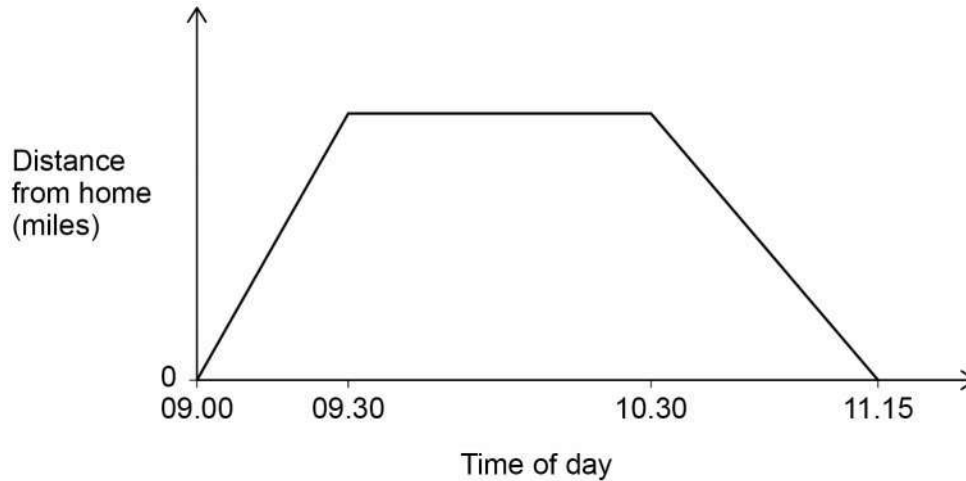IB/M/Jun20/8300/3F

6

25 Chris visits a library.

He cycles to the library in half an hour at a speed of 12 miles per hour.

He stays at the library for one hour.

He then cycles home.

The sketch graph represents his visit.

Work out the speed, in miles per hour, at which Chris cycles home.

[3 marks]

$$S \frac{d}{t}$$

Writing the formula triangle for speed, distance and time

$$\frac{12 \times (9{:}30 - 9{:}00)}{11{:}15 - 10{:}30}$$

Speed = distance/time. The distance on the way back is the same as the distance on the way there. Distance = speed x time. The speed on the way there is 12mph. The time on the way there is found by subtracting 9:00 from 9:30 as this works out the difference in time. The time on the way back is found by subtracting 10:30 from 11:15

Answer _____ 8 _____ mph

FACT B
[⊙ˌ ˌˌ] To enter time in the calculator: enter the hours, press the button on the left, enter the minutes, press the button on the left. 9:30 will appear as 9°30°

26 These two triangles are similar.

Not drawn accurately

12 cm, y, 20 cm, x (larger triangle)

a, y, 16 cm, x (smaller triangle)
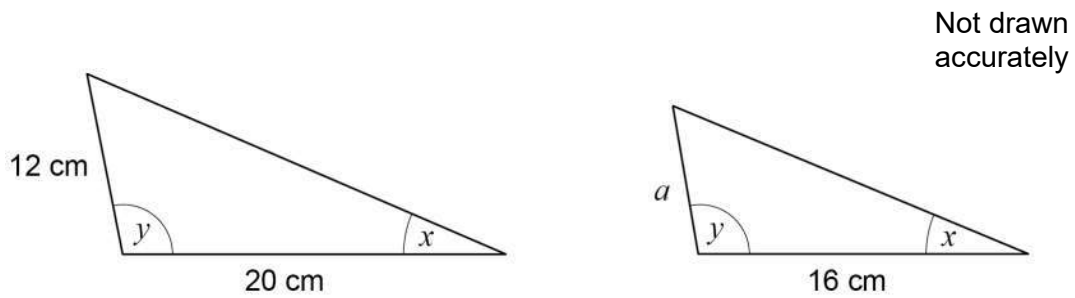
Work out the value of a.

[2 marks]

$\frac{16}{20} \times 12$ ← 16/20 is the fraction the smaller triangle is of the larger triangle. Working out this fraction of the 12

Answer _____ 9.6 _____ cm

27 Circle the expression that is equivalent to $(x-1)^2$

[1 mark]

$x^2 - 1$ $x^2 + 1$ $x^2 - 2x - 1$ $\boxed{x^2 - 2x + 1}$

To expand a square bracket: square the first term, double the product of the two terms, square the last term. x squared is x^2. The product of x and -1 is -x. Doubling this gives -2x. -1 squared is 1

Turn over for the next question

6

Turn over ▶

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28 Here is some information about 26 houses.

a, *b* and *c* are all **different** numbers.

Number of bedrooms	Number of houses
1	7
2	*a*
3	*b*
4	*c*
5	8

The median number of bedrooms is 3.5

Work out a possible set of values for *a*, *b* and *c*.

[3 marks]

$$\frac{26+1}{2} = 13.5$$

Using the formula (n + 1)/2, where n is the number of houses, tells us that the median is halfway between the 13th value, which must be 3, and 14th value, which must be 4, in order for the median to be 3.5

$$c = 13 - 8$$

$$a + b = 13 - 7$$

13 houses are after the median and 13 houses are before. Therefore subtracting the 8 5 bedroom houses from the 13 must leave c and subtracting the 7 1 bedroom houses from the 13 must leave a and b

a = _____ 2

b = _____ 4

c = _____ 5

c must be 5. a and b must not be 5, must add to 6 and b can't be 0 as the 13th value needs to be 3 bedrooms

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29 A rectangle has length 60 cm and width 40 cm

Not drawn accurately

40 cm

60 cm
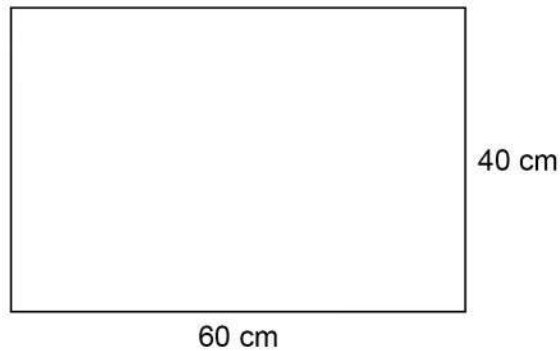
The length decreases by 15%

The width decreases by 10%

Sue says,

"The perimeter decreases by 25% because 15% + 10% is 25%"

Is she correct?

You **must** show calculations to support your answer.

[4 marks]

$$\frac{100-25}{100} \times (2 \times 60 + 2 \times 40) = 150$$

The original perimeter decreased by 25%

Percentage is out of 100. Subtracting 25 works out what percentage the perimeter goes down to when it is reduced by 25%. Dividing the result by 100 converts it into a multiplier which reduces anything by 25% when multiplied by it

The original perimeter. Perimeter is all of the outside sides added together. Adding two lots of the 60cm and two lots of the 40cm together

$$2 \times \frac{100-15}{100} \times 60 + 2 \times \frac{100-10}{100} \times 40 = 174$$

Adding two lots of the 60cm reduced by 15% and two lots of the 40cm reduced by 10% to get the new perimeter. The percentage decreases are converted into multipliers in a similar way to above

NO

The perimeter did not decrease by 25% as the new perimeter is 174cm, not 150cm

7

Turn over ▶

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2 5

30 Expand and simplify fully $4(2c + 3) - (5c - 1)$

[2 marks]

$8c + 12 - 5c + 1$

4 x 2c = 8c
4 x 3 = 12
-1 x 5c = -5c
-1 x -1 = 1

Answer $3c + 13$

Collecting like terms:
8c - 5c = 3c
12 + 1 = 13

31 $\mathbf{c} = \begin{pmatrix} 4 \\ 9 \end{pmatrix}$ $\qquad \mathbf{d} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$

Work out $4\mathbf{c} + 3\mathbf{d}$

[2 marks]

$4 \times 4 + 3 \times 2$

$4 \times 9 + 3 \times -5$

Dealing with the x components and y components separately

Answer $\begin{pmatrix} 22 \\ 21 \end{pmatrix}$

END OF QUESTIONS

4

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