AQA

.CG Maths.
Worked Solutions

Please write clearly in block capitals.

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

Surname _____

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Candidate signature _____

# GCSE MATHEMATICS

**F**

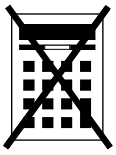
Foundation Tier Paper 1 Non-Calculator

Thursday 2 November 2017 Morning Time allowed: 1 hour 30 minutes

## Materials

For this paper you must have:
- mathematical instruments

You must **not** use a calculator.



## Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- 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 | |
| 24–25 | |
| 26–27 | |
| 28–29 | |
| **TOTAL** | |

**Please note that these worked solutions have neither been provided nor approved by AQA and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.**

Any writing in blue indicates what must be written in order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

Anything written in green in a cloud doesn't have to be written in the exam.

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

**.CG Maths.**

Answer **all** questions in the spaces provided

**1** Circle the decimal which has the same value as $\frac{3}{5}$

**[1 mark]**

0.06 0.35 0.6 3.5

$5\overline{)3.^{3}0}$ 0.6

Dividing 3 by 5 converts the fraction into a decimal

**2** How many millimetres are there in 7.5 centimetres?

Circle your answer.

**[1 mark]**

0.75 70.5 75 750 7500

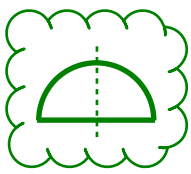
There are 10mm in 1cm so multiplying 7.5 by 10 works out how many millimetres it is

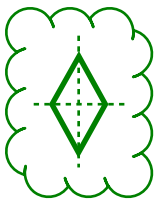
**3** Which of these shapes has two lines of symmetry?

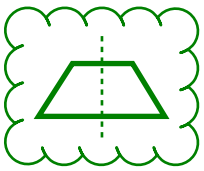
Circle your answer.

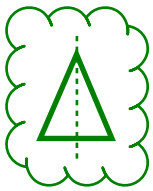
**[1 mark]**

Semicircle Rhombus Trapezium Isosceles triangle









**4** Circle the number that is 7 less than –12

**[1 mark]**

–19 –5 5 19

-12 - 7 = -19. Subtracting from a negative makes it more negative

**5 (a)** Solve $x - 3 = 14$

**[1 mark]**

Adding 3 to both sides eliminates the -3 on the left and gets x on its own

$x =$ 17

**5 (b)** Solve $5y = 45$

**[1 mark]**

Dividing both sides by 5 eliminates the 5 on the left and gets y on its own

$y =$ 9

**5 (c)** Solve $8 + w = 6$

**[1 mark]**

Subtracting 8 from both sides eliminates the 8 on the left and gets w on its own

$w =$ -2

7

**6 (a)** Work out 9174 ÷ 11

**[2 marks]**

$$11\overline{)9^{9}1^{3}7^{4}4} \quad 0834$$

Answer 834

**6 (b)** Work out $\frac{5}{6} + \frac{3}{7}$

Give your answer as a mixed number.

**[3 marks]**

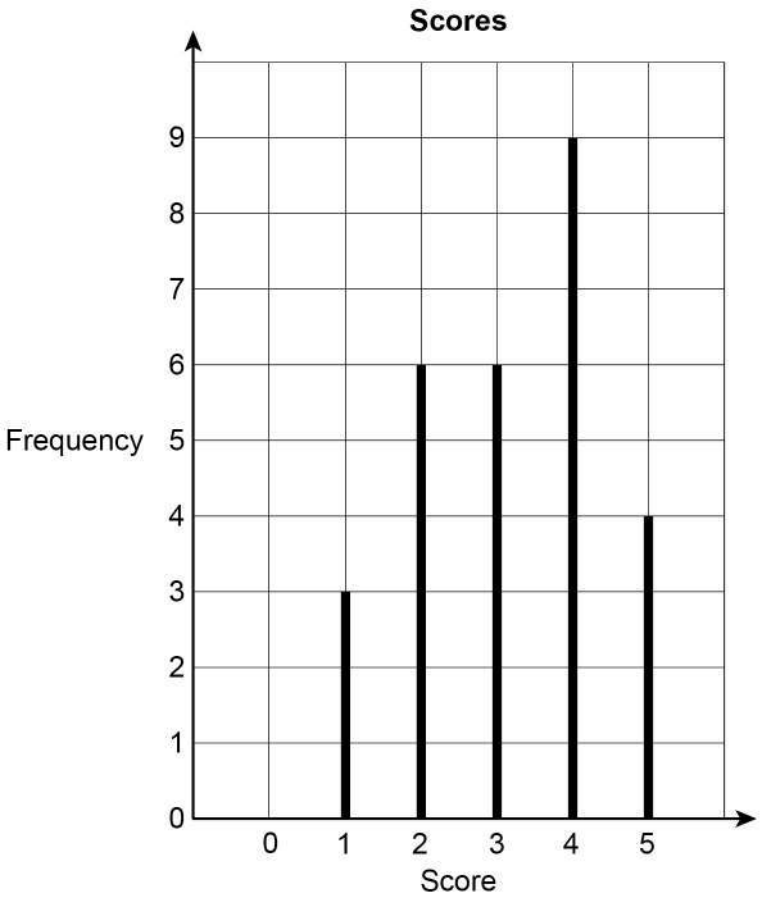
$\frac{35}{42} + \frac{18}{42}$ ← Multiplying both the numerator and denominator of 5/6 by 7 converts it into 35/42. Multiplying both the numerator and denominator of 3/7 by 6 converts it into 18/42. They both now have the same denominator

$$\begin{array}{r} 35 \\ +18 \\ \hline 53 \\ -42 \\ \hline 11 \end{array}$$

← Adding the numerators gives 53/42. Subtracting 42 from 53 works out that 1 lot of 42 goes into 53 with a remainder of 11

Answer $1\frac{11}{42}$

**7** The diagram shows the scores given by judges during a television show.




**7 (a)** Which score was the mode?

**[1 mark]**

Answer 4

The score of 4 had the highest frequency

**7 (b)** There were 4 judges.

Each judge gave one score in each round.

How many rounds were there?

**[3 marks]**

3+6+6+9+4 ← Adding the frequency for each score works out the total number of scores

28÷4 ← Dividing the total number of scores by the number of scores per round works out the number of rounds

Answer 7

9

**8** A library book was due to be returned on 27 September.

It was actually returned on 14 October.

There is a fine of 8p for every day the book is late.

Work out the total fine.

**[3 marks]**

17
× 8
136
s

There are 30 days in September. There are 3 days after the 27th September and another 14 days until the 14th October. 3 + 14 = 17 so the book was 17 days late. Multiplying this by the 8p fine for each day the book is late works out the total fine in pence

There is 100p in £1 so dividing 136 by 100 converts it into pounds

Answer £ 1.36

**9** In a game, three stars are hidden at random.

Each star is behind a different square on this board.

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |

**9 (a)** A square is chosen at random.

What is the probability that there is a star behind it?

**[1 mark]**

Answer $\frac{3}{25}$

3 out of the 25 total squares have a star behind them

**9 (b)** In one game, the stars are behind three consecutive squares.

The squares are in one row or one column.

One of the squares is E2

Write down **all** the possible pairs for the other two squares.

**[2 marks]**

Consecutive means that the squares are next to each other

Answer E1, E3 E3, E4 C2, D2

6

**10** Complete the table to show equivalent fractions and percentages.

**[3 marks]**

| Fraction | Percentage |
|---|---|
| $\frac{1}{2}$ | 50% |
| $\frac{3}{10}$ | 30% |
| $\frac{43}{100}$ | 43% |
| $\frac{5}{2}$ | 250% |

Percentage is out of 100

Multiplying a fraction by 100 converts it into a percentage. 3/10 x 100 = 300/10 = 30

Multiplying a fraction by 100 converts it into a percentage. 5/2 x 100 = 500/2 = 250

**11 (a)** Cards in a pack are red or blue in the ratio

red : blue = 2 : 3

What fraction of the cards are **red**?
Circle your answer.

**[1 mark]**

$\frac{5}{6}$ $\frac{2}{3}$ $\frac{2}{5}$ $\frac{3}{5}$

2 + 3 = 5 so there are 5 parts in total in the ratio. Out of these, 2 parts are red

**11 (b)** A different pack has 72 cards.

$\frac{5}{9}$ are yellow.

Work out the number of yellow cards.

**[2 marks]**

72÷9 ← Dividing by 9 works out 1/9 of 72

8×5 ← Multiplying the value of 1/9 of 72 by 5 works out 5/9 of 72

Answer 40

**Turn over for the next question**

6

**12 (a)** How many edges are there on a square-based pyramid?

Circle your answer.

**[1 mark]**

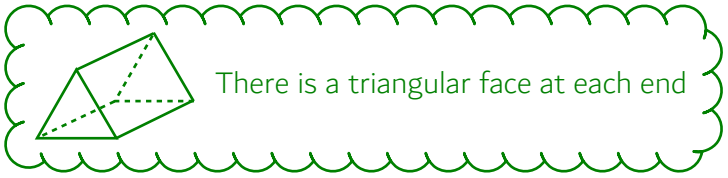
4 5 (8) 12


**12 (b)** How many faces of a triangular prism are triangles?

Circle your answer.

**[1 mark]**

(2) 3 4 5




**13** A bus can be early, on time or late.

The probability that the bus is early is 0.1

The probability that the bus is on time is 0.6

Work out the probability that the bus is late.

**[2 marks]**

1.0
−0.1
−0.6
0.3

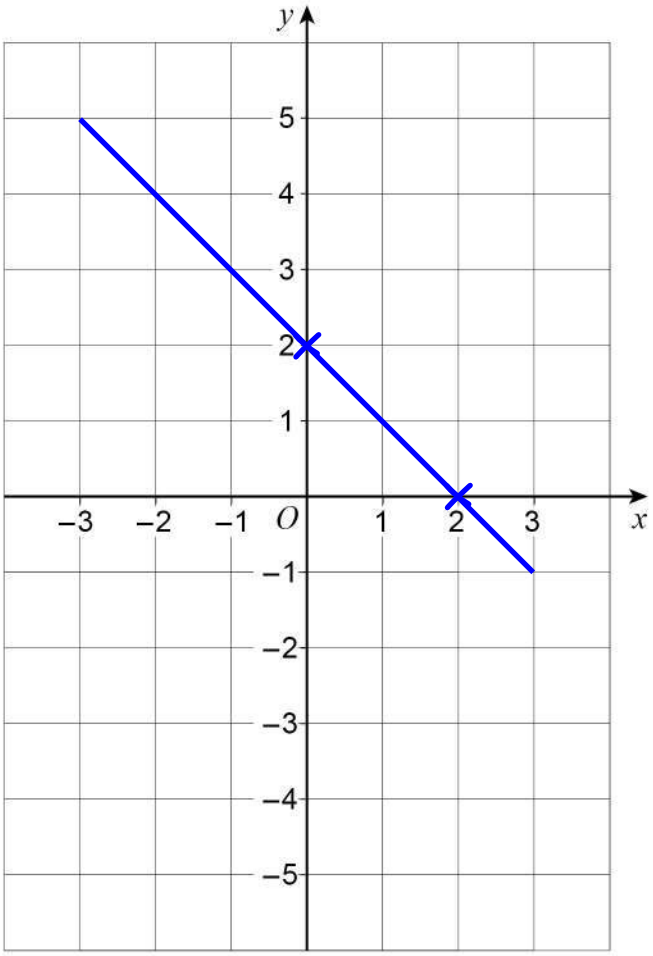
It is certain that it is either early, on time or late. Therefore the probabilities must add up to 1. Subtracting the other probabilities from 1 leaves the probability of it being late

Answer 0.3

**14** On the grid, draw the graph of $x + y = 2$ for values of $x$ from –3 to 3

**[2 marks]**

When x = 0, y = 2 as 0 + 2 = 2. Plotting the point (0 , 2). When y = 0, x = 2 as 2 + 0 = 2. Plotting the point (2 , 0). The graph is a straight line as there are no powers of x or y and they are not denominators so a straight line can be drawn through both of these points




**Turn over for the next question**

6

**15** 5% of a number is 31

1% of the same number is 6.2

Work out 13% of the number.

**[3 marks]**

6.2
×13
18.6
62.0
80.6

Multiplying the value of 1% by 13 works out 13%

Answer 80.6

**16** Complete the grid so that when you multiply the three numbers in any column, row or diagonal the answer is 1

**[3 marks]**

10 x 1/2 = 10/2 = 5, which must be divided by 5 to get 1. Multiplying by 1/5 does this

1/20 x 20 = 20/20 = 1, which must be multiplied by 1 to get 1

2 x 5 = 10, which must be divided by 10 to get 1. Multiplying by 1/10 does this

| | | |
|---|---|---|
| 10 | $\frac{1}{5}$ | $\frac{1}{2}$ |
| $\frac{1}{20}$ | 1 | 20 |
| 2 | 5 | $\frac{1}{10}$ |

**Turn over for the next question**

6

**17** A sequence has three terms.

The term-to-term rule for the sequence is

multiply by 8 and then add 11

**17 (a)** The first term of the sequence is –1

Work out the third term.

**[2 marks]**

$-1 \times 8$

$-8 + 11$ ← This is the same as 11 - 8

$3 \times 8$

$24 + 11$

Answer 35

**17 (b)** The order of the three terms is reversed to make a new sequence.

Work out the term-to-term rule for this sequence.

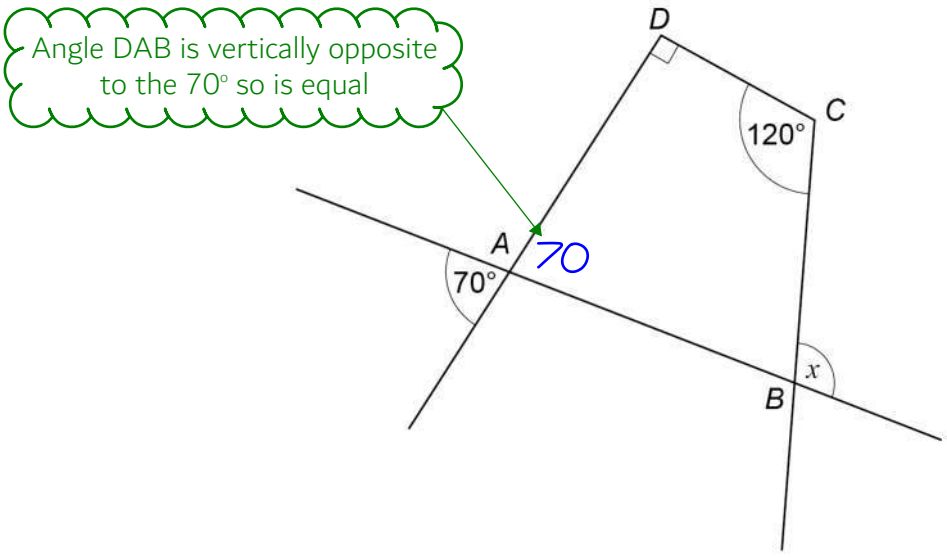
**[1 mark]**

Doing the exact opposite operations in the opposite order

Answer Subtract 11 and then divide by 8

**18** *ABCD* is a quadrilateral.

Sides are extended as shown.




Not drawn accurately

Show that $x = 100°$

**[3 marks]**

360
− 70
− 90
− 120
80

Angles in a quadrilateral add up to 360° so subtracting the other angles from 360 leaves angle ABC

180
− 80
100

Angles around a point on a straight line add up to 180° so subtracting angle ABC from 180 leaves angle x

**Turn over for the next question**

6

**19** Use 2 gallons = 9 litres to convert 17 gallons into litres.

**[3 marks]**

$$2\overline{)17.0} = 8.5$$

This works out how many lots of 2 gallons the 17 gallons is

$$8.5 \times 9 = 76.5$$

Every lot of 2 gallons is 9 litres

Answer 76.5 litres

**20** $n$ is an odd number.

$p$ is a prime number.

In each part write down possible values of $n$ and $p$ so that

**20 (a)** $n + p$ is a square number.

**[1 mark]**

Go through the square numbers in order and subtract primes which are smaller than the square number until an odd result is found. 1 doesn't have any prime numbers less than it. 4 - 2 = 2, which isn't odd. 4 - 3 = 1, which is odd. Therefore 1 + 3 works as this makes 4, which is $2^2$

$n =$ 1 $p =$ 3

**20 (b)** $np$ is a square number.

**[1 mark]**

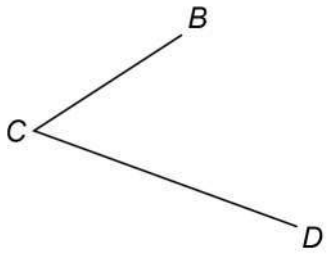
Go through the square numbers in order and divide by primes which are smaller than the square number until an odd result is found. 1 doesn't have any prime numbers less than it. 4/2 = 2, which isn't odd. 4/3 isn't a whole number. 9/2 isn't a whole number. 9/3 = 3, which is odd. Therefore 3 x 3 works as this makes 9, which is $3^2$

$n =$ 3 $p =$ 3

**Turn over for the next question**

5

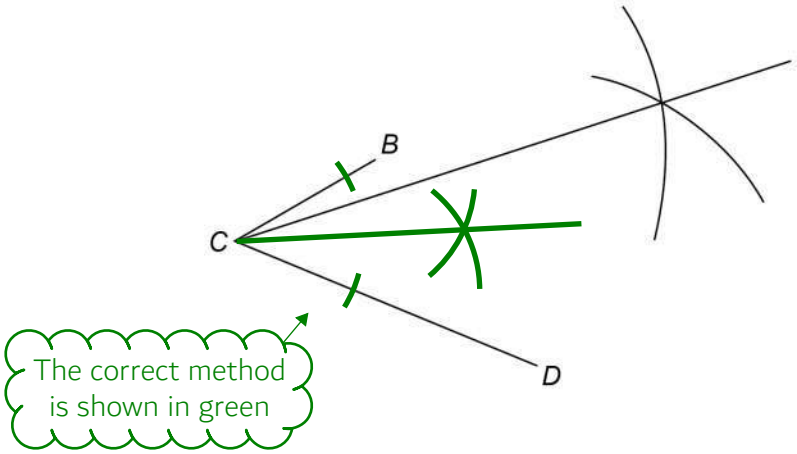
**21 (a)** Joe wants to bisect angle *BCD*.




Here is his method.

Use a pair of compasses to draw arcs of the same radius from *B* and *D*.

Draw a straight line from *C* through the intersection of the arcs.




Write down the error in his method.

**[1 mark]**

Should have drawn arcs from C first

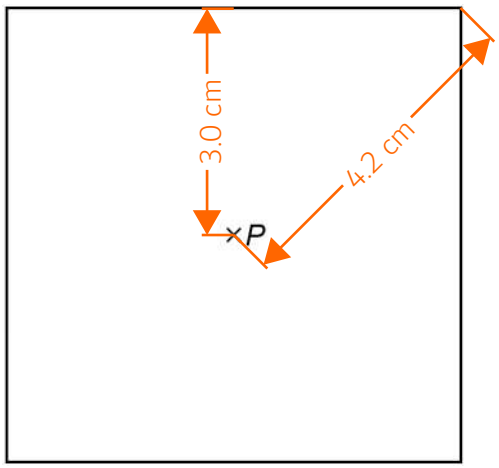
**21 (b)** Kay wants to show all the points 3 km from point *P*.

Scale: 1 cm represents 1 km

×*P*

Here is her answer.

Scale: 1 cm represents 1 km




What is wrong with her answer?

**[1 mark]**

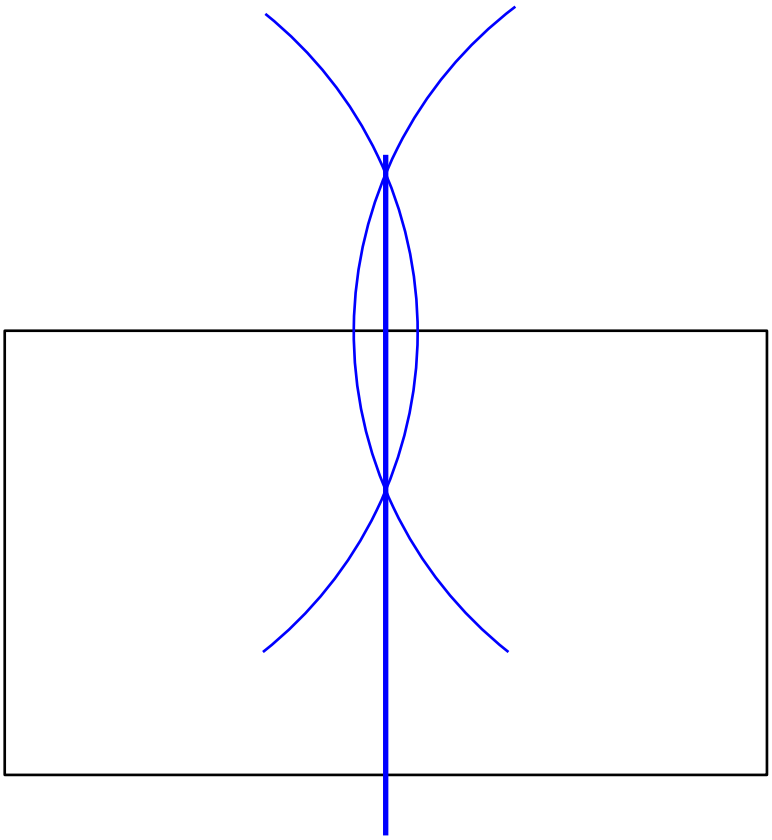
Not all points on the square are the correct distance away

3km is represented by 3cm. The middle of the sides of the square are 3cm away so these points are correct. However all of the other points are further than 3cm away

**Question 21 continues on the next page**

2

**21 (c)** Here is a rectangle.



Constructing a perpendicular bisector to the top edge

Using a pair of compasses and a straight edge, construct **one** line of symmetry.

Show clearly your construction arcs.

**[2 marks]**

**22** $x : y = 7 : 4$

$x + y = 88$

Work out the value of $x - y$

**[3 marks]**

7+4

88÷11

There are 11 parts in total and these represent a total of 88. Dividing 88 by 11 works out what 1 part is worth

8X7

8X4

Multiplying the worth of 1 part by 7 and 4 works out the value of x and y

56
-32
24

Subtracting the value of y from the value of x

Answer 24

**Turn over for the next question**

5

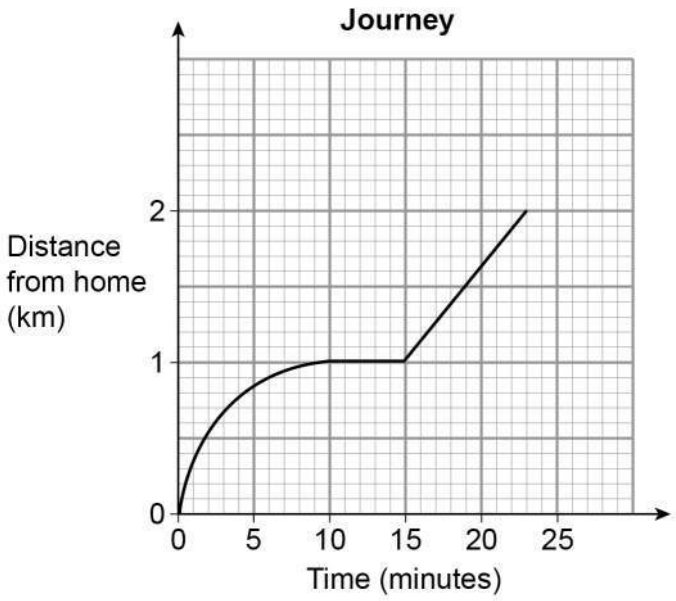
**23** Anil's home is 1 km from a shop.

He walked from home to the shop at a constant speed in 10 minutes.

He stayed at the shop for 5 minutes.

He walked home at a constant speed in 8 minutes.

Anil drew this distance-time graph to represent his journey.




Make **two** criticisms of his graph.

**[2 marks]**

Criticism 1 First 10 minutes isn't a constant speed

The line is a curve and it should be a straight line. Gradient on a distance-time graph represents the speed and the gradient of a curve is not constant

Criticism 2 Last 8 minutes shows increasing distance from home

As he walked home the distance from home should return to 0

**24** Three **whole** numbers are each rounded to the nearest 10

The sum of the rounded numbers is 70

Work out the **maximum** possible sum for the original three numbers.

**[2 marks]**

30+20+20=70 ← These could be the three numbers when rounded to the nearest 10

34+24+24=82 ← These are the highest the three whole numbers could be and still round down

Answer 82

**25** Circle the expression for the range of $n$ consecutive integers.

**[1 mark]**

$\frac{n+1}{2}$ $n-1$ $n$ $n+1$

Take for example the consecutive integers 4, 5, 6, 7. There are 4 of them so n is 4. The range is largest - smallest = 7 - 4 = 3. Only n - 1 works

**Turn over for the next question**

5

**26** Three identical isosceles triangles are joined to make this trapezium.

Each triangle has base $b$ cm and perpendicular height $h$ cm

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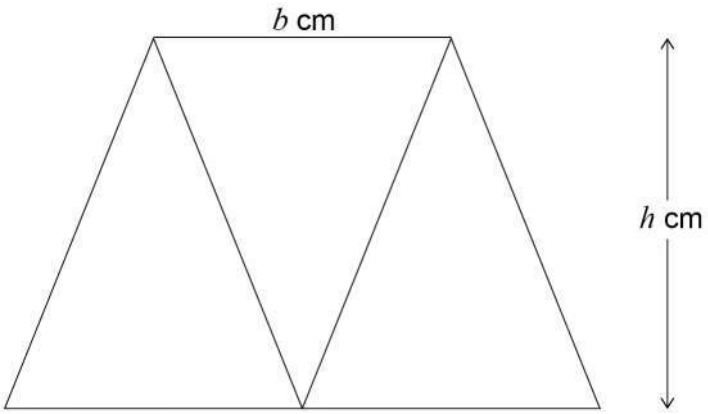



**26 (a)** Work out an expression, in terms of $b$ and $h$, for the area of the trapezium.

Give your answer in its simplest form.

**[2 marks]**

$\frac{1}{2}bh \times 3$

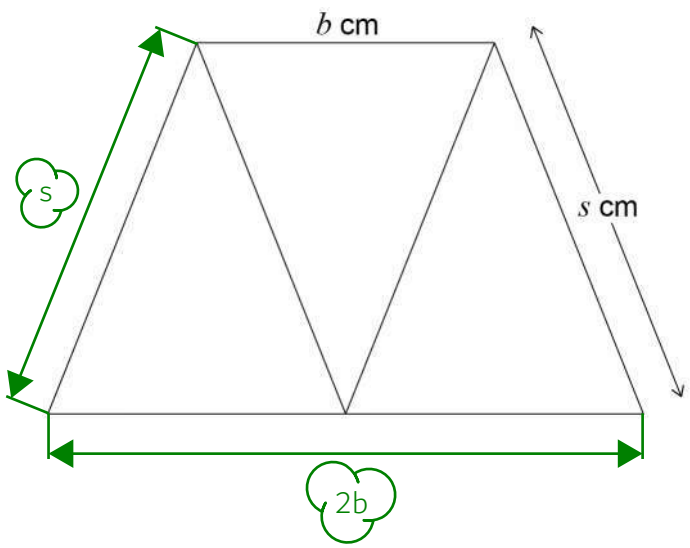
Area of triangle = 1/2 x base x height. b is the base and h is the height. Multiplying the area of one of the triangles by 3 expresses the area of the trapezium as it is made of 3 identical triangles

Multiplication can be done in any order so the 1/2 x 3 is done first to give 3/2

Answer $\frac{3}{2}bh$ $cm^2$

**26 (b)** This diagram shows the same trapezium.

Not drawn accurately




$b : s = 2 : 3$

Work out an expression, in terms of $b$, for the perimeter of the trapezium.

**[2 marks]**

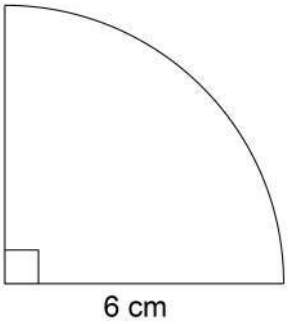
s is 3/2 x b as 3 is 3/2 x 2. Adding all of the outside edges together expresses the perimeter. There is no need to simplify the expression

Answer $b+2b+\frac{3}{2}b+\frac{3}{2}b$ cm

**Turn over for the next question**

4

**27** Here is a quarter circle of radius 6 cm




Not drawn accurately

Work out the area of the quarter circle.

Give your answer in terms of $\pi$.

**[2 marks]**

$\frac{1}{4}\pi \times 6^2$ ← Area of circle = π x radius$^2$. Doing a quarter of this as it is a quarter circle

Answer $9\pi$ cm$^2$

$6^2 = 36$. Multiplication can be done in any order so 1/4 x 36 = 36/4 = 9. π is left in the answer as it needs to be in terms of π

**28 (a)** Write in standard form 12 500

**[1 mark]**

Answer $1.25 \times 10^4$

12500 must be divided by 10 4 times to get a number between 1 and 10. So 1.25 must be multiplied by $10^4$ to keep it equal

**28 (b)** Write as an ordinary number $3.4 \times 10^{-2}$

**[1 mark]**

Answer 0.034

x $10^{-2}$ means to divide by 10 twice

**29** Work out the value of $\left(\sqrt{3}\right)^2 \times \left(\sqrt{2}\right)^2$

**[2 marks]**

$3 \times 2$ ← The square and the square root cancel out as they are opposites

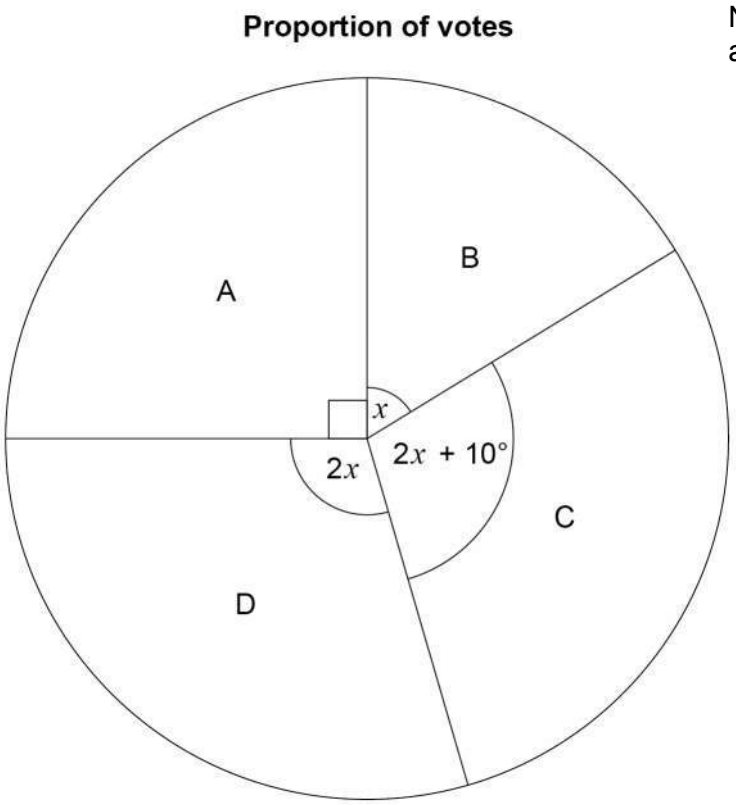
Answer 6

**Turn over for the next question**

6

**30** The four candidates in an election were A, B, C and D.

The pie chart shows the proportion of votes for each candidate.




Work out the probability that a person who voted, chosen at random, voted for C.

**[4 marks]**

$90 + x + 2x + 10 + 2x = 360$ ← Adding all of the angles must give 360

$5x + 100 = 360$

$5x = 260$ ← Collecting like terms to simplify and then subtracting 100 from both sides to get the x term on its own

$5\overline{)260}$ → $52$ ← Dividing 260 by 5 works out x

$52 \times 2$

$104 + 10$ ← Working out the angle for C

Answer $\frac{114}{360}$ ← 114 out of the 360 degrees represent C

**31 (a)** Factorise $x^2 - 100$

**[1 mark]**

Answer $(x+10)(x-10)$

Factorised using difference of two squares. $A^2 - B^2 = (A + B)(A - B)$

**31 (b)** Solve $7x + 6 > 1 + 2x$

**[2 marks]**

$5x > -5$

Subtracting 2x from both sides to get the x terms on the same side and subtracting 6 from both sides to get them on their own

Dividing both sides by 5

Answer $x > -1$

**END OF QUESTIONS**

7