AQA

.CG Maths.
Worked Solutions

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

# GCSE MATHEMATICS

**F**

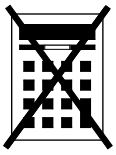
Foundation Tier Paper 1 Non-Calculator

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.**

*Do not write outside the box*

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

$5\overline{)3.^{3}0}$ ← Dividing the 3 by the 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

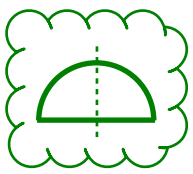
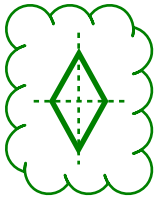
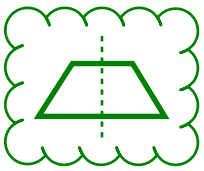
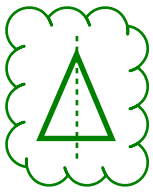
There are 10 mm in 1 cm so multiplying 7.5 cm by 10 works out how many millimetres it is

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

Circle your answer.

**[1 mark]**

Semicircle Rhombus Trapezium Isosceles triangle



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**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



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**6 (a)** Work out 9174 ÷ 11

**[2 marks]**

0834
11 | 9 ⁹1 ³7 ⁴4

Using short division

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

35
+18
53
-42
11

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 $1\frac{11}{42}$

The 1 must be the whole number and leaving the remainder of 11 in the fraction



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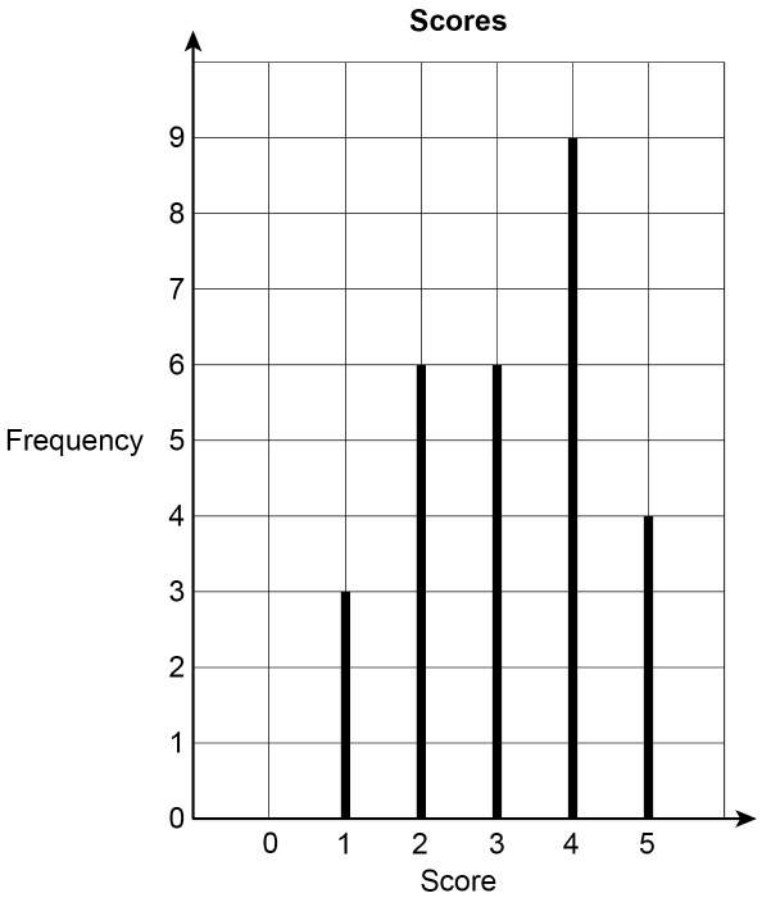
**7** The diagram shows the scores given by judges during a television show.




**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 that there were 28 scores in total

28÷4 ← Dividing the 28 scores by the 4 scores per round works out that there were 7 rounds

Answer 7

9



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**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
5

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 that the total fine is 136p

Answer £ 1.36

There is 100p in £1 so dividing 136p by 100 converts it into £1.36



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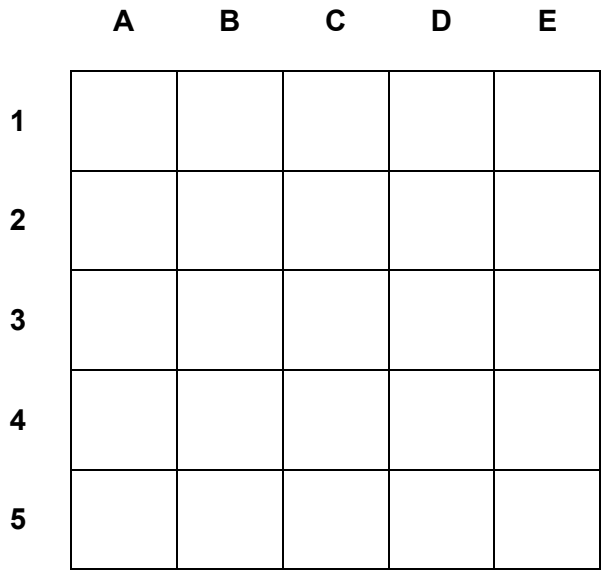
**9** In a game, three stars are hidden at random.

Each star is behind a different square on this board.




**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



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

**[3 marks]**

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

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

B: Percentage is out of 100.

C: 1/2 is 50% so 5/2 must be 5 x 50% = 250%



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**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 that 1/9 of 72 is 8

8 × 5 ← Multiplying the 8 by 5 works out that 5/9 of 72 is 40

Answer 40

**Turn over for the next question**

6



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

Circle your answer.

**[1 mark]**

4 5 (8) 12

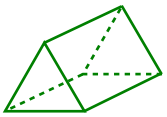
4 edges around the square base then another 4 edges connecting up to the top corner

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

Circle your answer.

**[1 mark]**

(2) 3 4 5



There is a triangular face at each end

**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 _____



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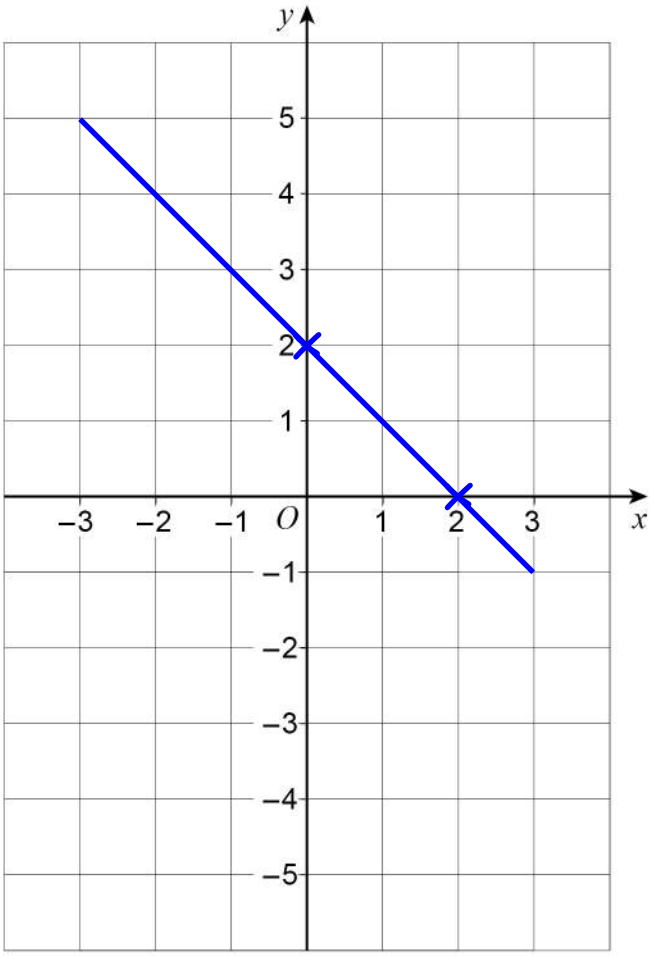
**14** On the grid, draw the graph of $x + y = 2$ for values of $x$ from –3 to 3

**[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



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**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



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

1/20 x 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

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**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 × 8 ← Multiplying the first term by 8 gives -8

-8 + 11 ← Then adding 11 gives 3, which is the second term. -8 + 11 is the same as 11 - 8

3 × 8 ← Multiplying the second term by 8 gives 24

24 + 11 ← Then adding 11 gives 35, which is the third term

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]**

Answer Subtract 11 and then divide by 8

Doing the exact opposite operations in the opposite order



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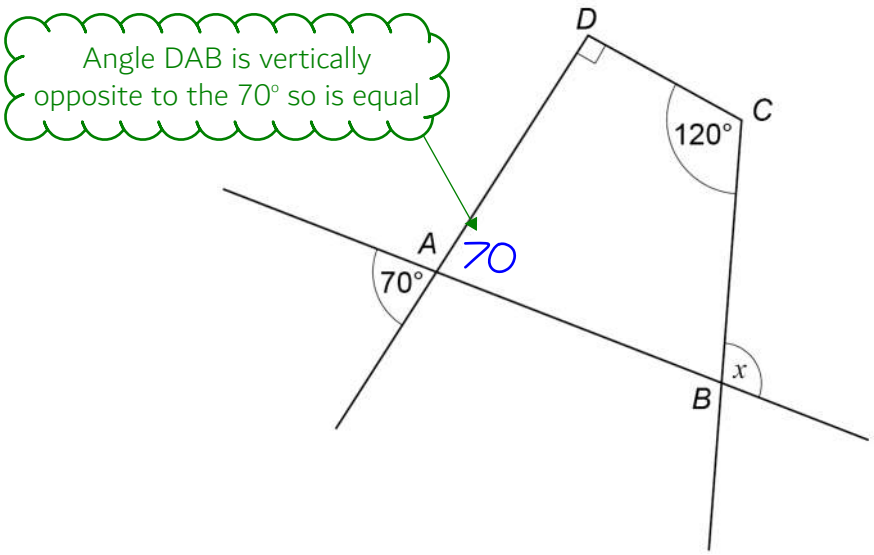
**18** *ABCD* is a quadrilateral.

Sides are extended as shown.




Not drawn accurately

Show that $x = 100°$

**[3 marks]**

70
+ 90
+120
280

Adding the angles so far in the quadrilateral ABCD work out that there are 280 degrees so far in the quadrilateral

360
-280
80

Angles in a quadrilateral add up to 360 degrees so subtracting the 280 degrees from 360 degrees works out that angle ABC is 80 degrees

180
- 80
100

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

**Turn over for the next question**

6



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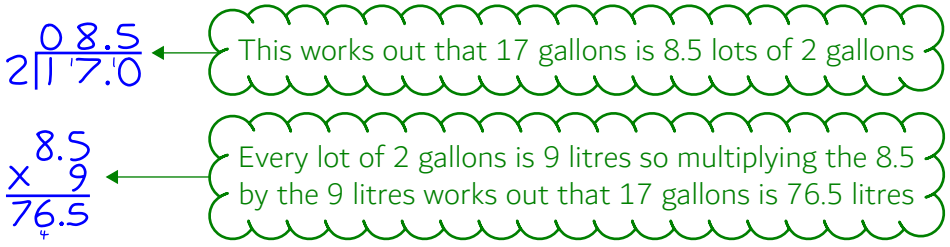
**19** Use 2 gallons = 9 litres to convert 17 gallons into litres.

**[3 marks]**




Answer 76.5 litres



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**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]**

A square number is the result of multiplying a number by itself. So picking a prime number which is also odd then using this for both n and p will result in a square number. 3 x 3 = 9, which is $3^2$

$n =$ 3 $p =$ 3

**Turn over for the next question**

5



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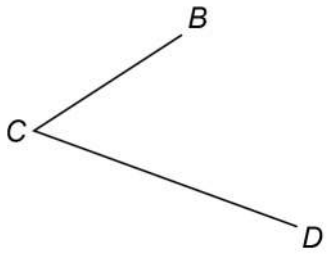
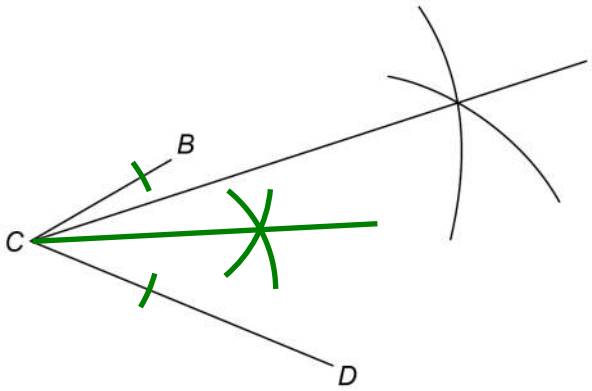
**21 (a)** Joe wants to bisect angle *BCD*.




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 ← The correct method is shown in green



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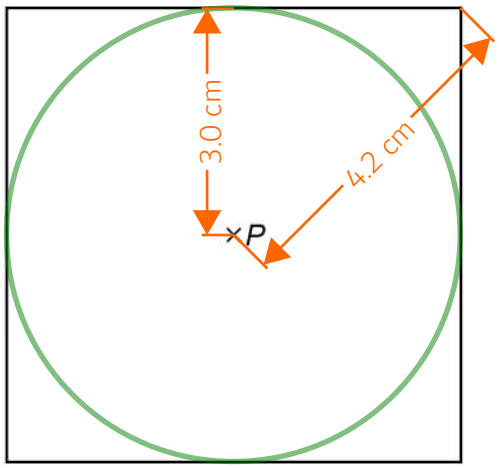
**21 (b)** Kay wants to show all the points 3 km from point *P*.

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

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

**Question 21 continues on the next page**

2



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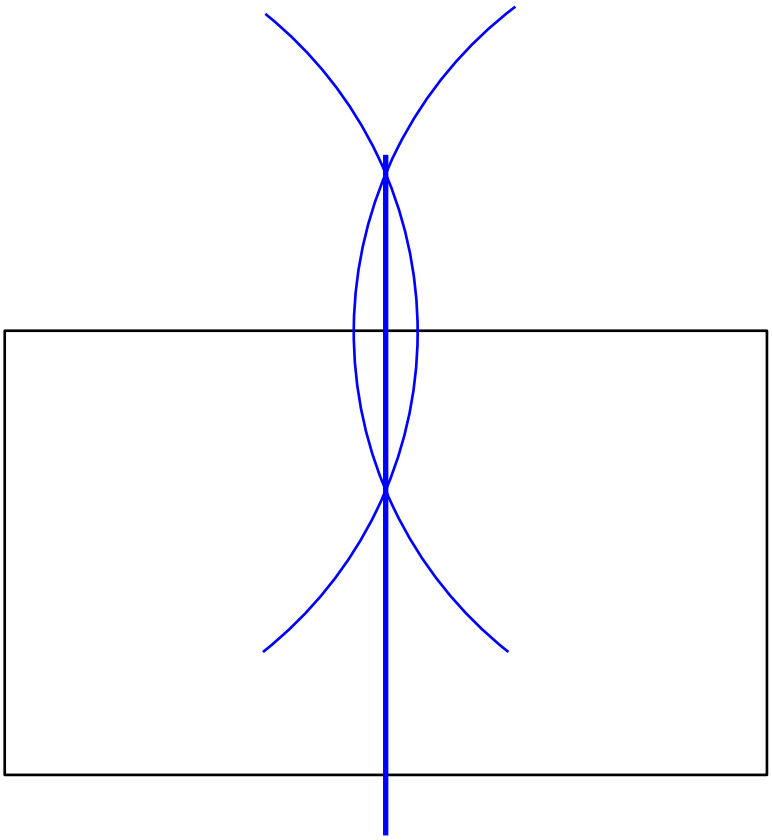
**21 (c)** Here is a rectangle.



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]**



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

$x + y = 88$

Work out the value of $x - y$

**[3 marks]**

7+4 ← There are 11 parts in total which represent the total of 88

88÷11 ← Dividing the 88 by the 11 parts works out that 1 part of the ratio is worth 8

8X7 ← Multiplying the value of 1 part by 7 works out that x is 56

8X4 ← Multiplying the value of 1 part by 4 works out that y is 32

56
-32
24 ← Subtracting the value of y from the value of x finds that x - y = 24

Answer 24

**Turn over for the next question**

5



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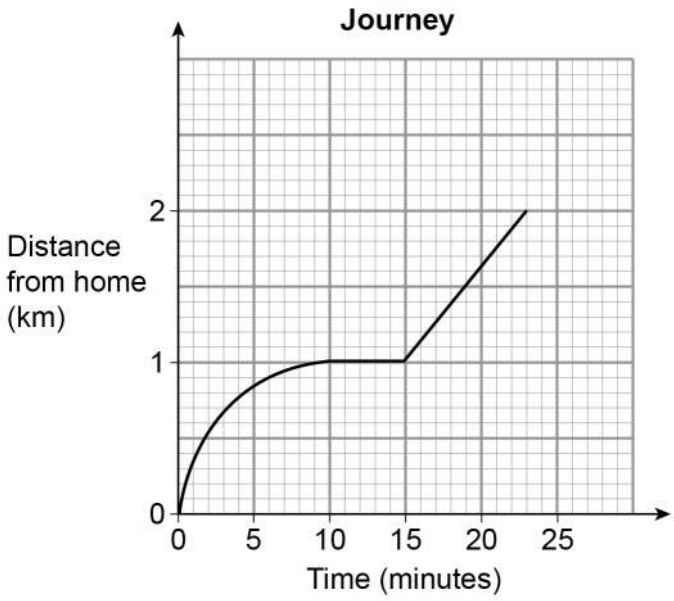
**23** Anil's home is 1 km from a shop.

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



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**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 ← These could be the three numbers when rounded to the nearest 10 as they add to 70

34+24+24 ← These are the highest the three whole numbers could be and still round down. They add to 82

It doesn't matter which values were picked for the three numbers when rounded to the nearest 10 as 4 will be added to each of them when working out the highest the three whole numbers could be and still round down. The result will always be 82

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 as 4 - 1 = 3

**Turn over for the next question**

5



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**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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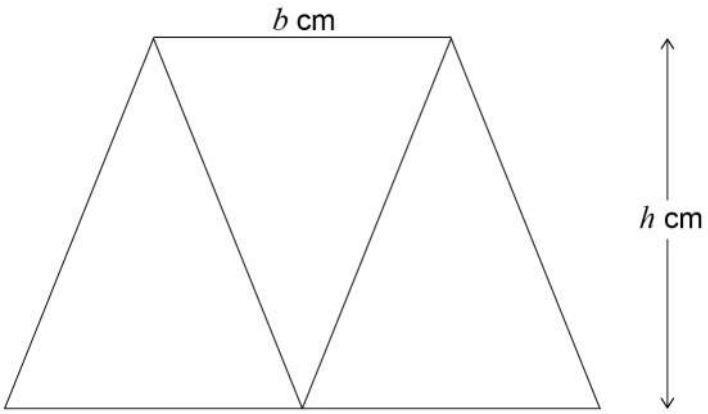


**26 (a)** Work out an expression, in terms of $b$ and $h$, for the area of the trapezium.

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

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

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



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

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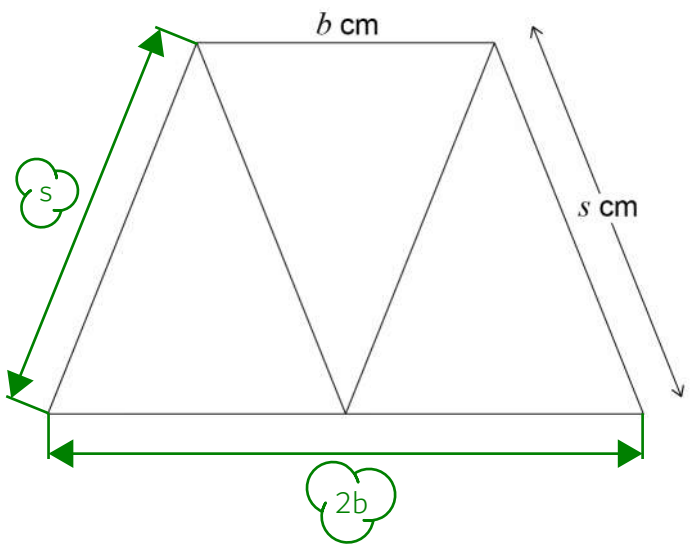


$b : s = 2 : 3$

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 sides 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



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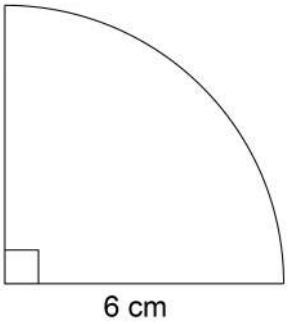
**27** Here is a quarter circle of radius 6 cm




Not drawn accurately

Work out the area of the quarter circle.

Give your answer in terms of π.

**[2 marks]**

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

Answer 9π cm$^2$

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



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**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 1.25, which is at least 1 and less than 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

$\times 10^{-2}$ 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





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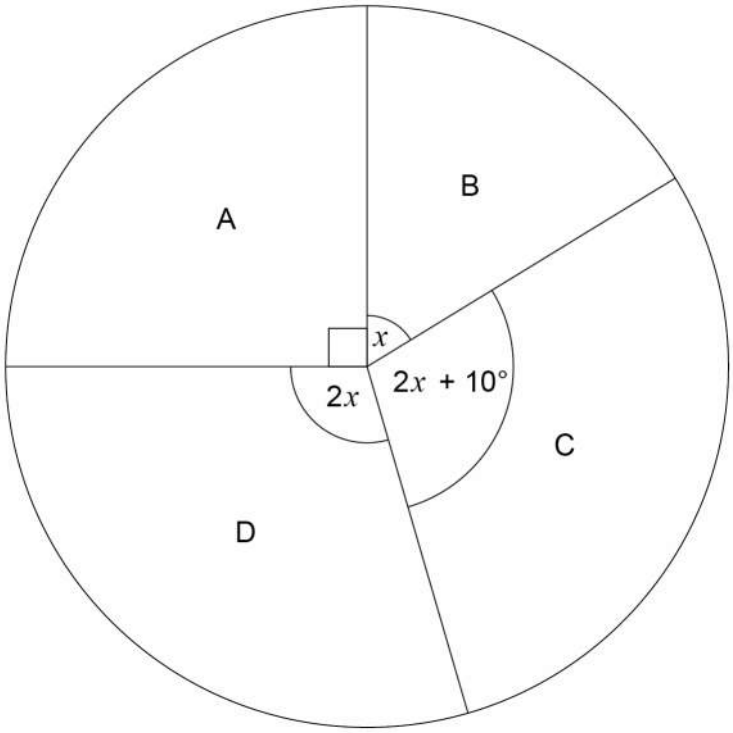
**30** The four candidates in an election were A, B, C and D.

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

**Proportion of votes**

Not drawn accurately




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

**[4 marks]**

$90+x+2x+10+2x$ ← Adding all the angles to express the total number of degrees

$5x+100=360$ ← Simplifying the expression by collecting like terms. Setting it equal to 360 as the total number of degrees in a pie chart is 360

$5x=260$ ← Subtracting 100 from both sides to get the x term on its own

$5\overline{)260}$ → $052$ ← Dividing both sides by 5 finds that x = 52

$52 \times 2 = 104+10$ ← Substituting 52 for x in 2x + 10 works out that the angle for C is 114 degrees

Answer $\frac{114}{360}$

114 out of the 360 degrees represent C



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

**[1 mark]**

Factorised using difference of two squares. $A^2 - B^2 = (A + B)(A - B)$. $A^2 = x^2$, so A = x. $B^2 = 100$, so B = 10

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

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

**[2 marks]**

$5x+6>1$ ← Subtracting 2x from both sides to get the x terms on the same side

$5x>-5$ ← Subtracting 6 from both sides to get the x term on its own

Answer $x>-1$

Dividing both sides by 5 gets x on its own

**END OF QUESTIONS**

7



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