2019 national curriculum tests

Key stage 2

Mathematics

Paper 3: reasoning

First name						
Middle name						
Last name						
Date of birth	Day		Month		Year	
School name						
DfE number						

.CG Maths.
Worked Solutions

Please note that these worked solutions have neither been provided nor approved by the Standards and Testing Agency 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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Instructions

You **must not** use a calculator to answer any questions in this test.

Questions and answers

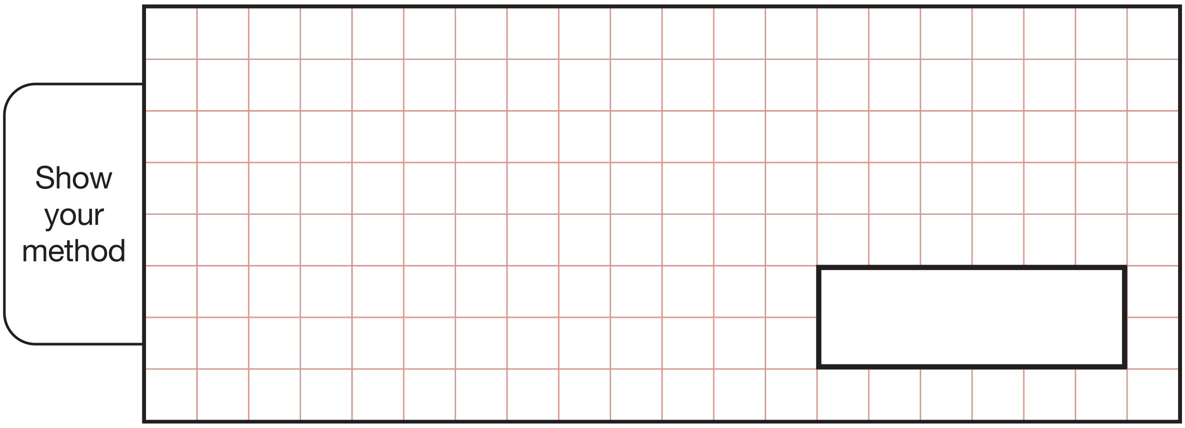
You have **40 minutes** to complete this test.

Follow the instructions for each question.

Work as quickly and as carefully as you can.

If you need to do working out, you can use the space around the question.
Do not write over any barcodes.

Some questions have a method box like this:



For these questions, you may get a mark for showing your method.

If you cannot do a question, **go on to the next one**.
You can come back to it later, if you have time.

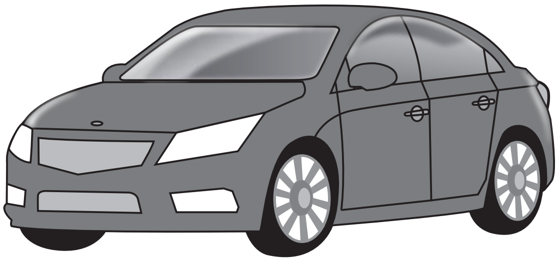
If you finish before the end, **go back and check your work**.

Marks

The number under each line at the side of the page tells you the number of marks available for each question.

1 The **original** price of this car is £8,999

Sale
£1,100 off



What is the **sale** price of the car?

$$\begin{array}{r} 8999 \\ -\ 1100 \\ \hline 7899 \end{array}$$

£ 7899

1 mark

2

3,576,219

This is the ten thousands place

Which digit is in the **ten thousands** place?

7

1 mark

Round 3,576,219 to the **nearest million.**

The 3 is in the millions place. The 5 in the next place causes the 3 to round to a 4. All the digits after the 4 become 0

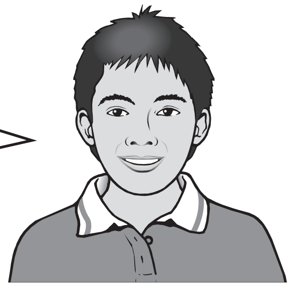
4,000,000

1 mark

3 Dev says,

I had £10

I gave some money away.



Which expression shows how much money Dev has left?

a is the amount of money, in pounds, that Dev gave away.

Tick **one**.

- [ ] $10 + a$
- [ ] $10 \div a$
- [ ] $a - 10$
- [x] $10 - a$
- [ ] $a \times 10$

If Dev gave £2, we would do £10 - £2 to work out how much money he has left. £2 is *a*

1 mark

4 Write these masses in order, starting with the **lightest.**

1.25 kg 0.99 kg 1.025 kg 0.009 kg

0.009 kg	0.99 kg	1.025 kg	1.25 kg

lightest

1 mark

Compare the digits in each number starting with the units, then the tenths, then the hundredths then the thousandths

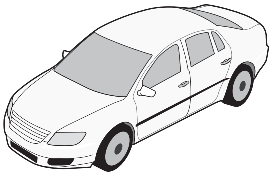
5 Write the missing digits to make this **addition** correct.

A		B		C			
1	2	8	+	7	2	=	200

1 mark

Starting with digit B, the only way we can add a digit to 2 to end in a 0 is 2 + 8 = 10 so B must be 8. 1 ten is carried over. Next, adding the tens, 2 + 1 = 3 (the 1 is carried over from the previous calculation) and the only digit which can added to 3 to end in a 0 is 7 so C must be 7. 3 + 7 = 10 so 1 hundred is carried over. Next, adding the hundreds, 1 must be added to the 1 carried over to get 2 so A is 1

6 John buys one toy car and one pack of stickers.



£1.49

£1.64

He pays with a **£10** note.

How much change does John get?

Show your method

$$\begin{array}{r} 1.49 \\ +\ 1.64 \\ \hline 3.13 \end{array}$$

First, add together the £1.49 and £1.64 to get the total cost

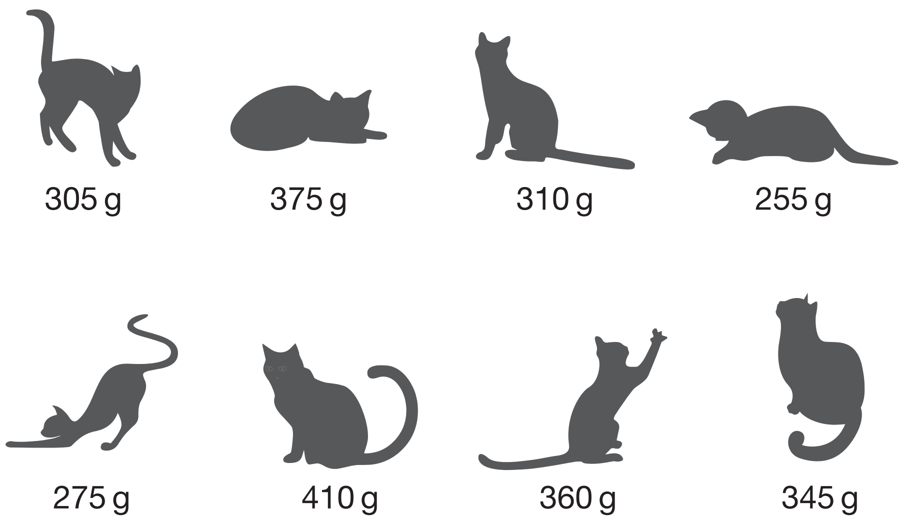
$$\begin{array}{r} 10.00 \\ -\ 3.13 \\ \hline 6.87 \end{array}$$

Subtracting £3.13 (the total cost) from £10 (what he gave) works out how much change he gets

£ 6.87

2 marks

7 This picture shows the masses of eight kittens.



What is the difference in mass between the heaviest kitten and the lightest kitten?

$$\begin{array}{r} {}^{3}\cancel{4}{}^{1}\cancel{0}{}^{1}0 \\ -\,2\,5\,5 \\ \hline 1\,5\,5 \end{array}$$

Difference is the largest subtract the smallest. The largest is 410g and the smallest is 255g

155 g

1 mark

The masses of the kittens are to be put in four groups.

Write the missing numbers in the table.

One has been done for you.

Mass in g	Number of kittens
250–299	2
300–349	3
350–399	2
400–449	1

Between 250g and 299g

255g and 275g

305g, 310g and 345g

375g and 360g

410g

1 mark

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8 Ken is playing a game. He has 4,289 points.

Then he scores another 355 points.

Ken's target is 6,000 points.

How many **more** points does Ken need to reach his target?

Show your method

$$\begin{array}{r} 4289 \\ +\ \ 355 \\ \hline 4644 \end{array} \qquad \begin{array}{r} {}^{5}\cancel{6}{}^{1}\cancel{0}{}^{9}\cancel{0}{}^{1}0 \\ -\ 4644 \\ \hline 1356 \end{array}$$

This works out the total amount of points he has scored so far

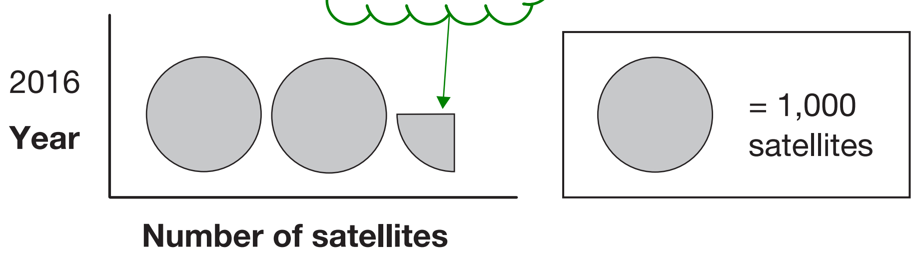
This works out the difference between the number of points he has and the target, which is how many more points he needs

$\boxed{1356}$

2 marks

9 This pictogram shows the number of satellites above the Earth in 2016.

1/4 of a circle



How many satellites were above the Earth in 2016?

$$\begin{array}{r} 250 \\ 4\overline{)1\,0{}^{2}00} \end{array} \qquad \begin{array}{r} 1000 \\ +1000 \\ +\ \ 250 \\ \hline 2250 \end{array}$$

1/4 of a circle so it represents 1/4 of 1000

Each circle is 1000. There are 2 full circles and 1/4 of a circle

$\boxed{2250}$

1 mark

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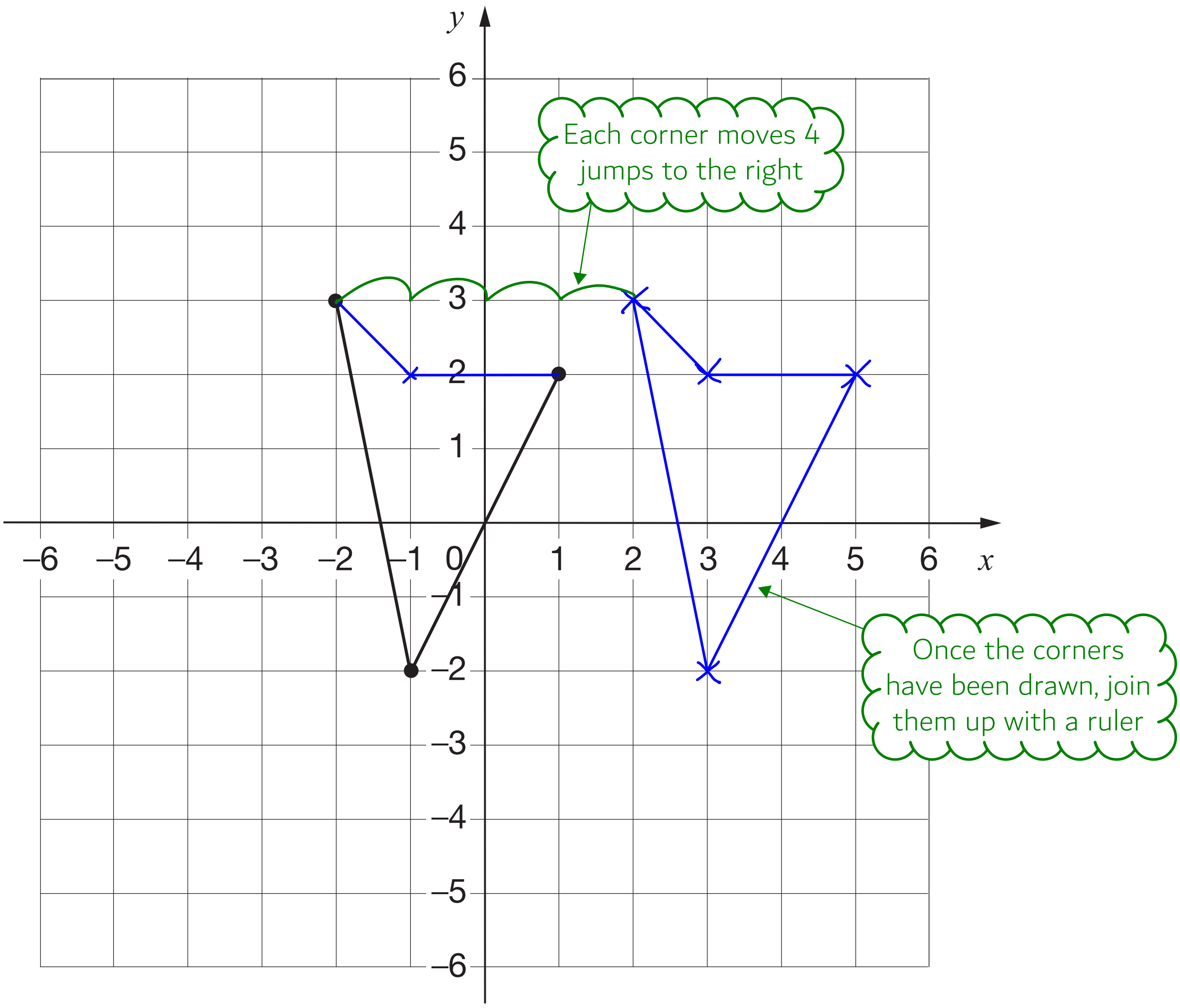
10 On the grid there are three points joined by two lines.



Lara plots **another point** on the grid at **(–1, 2).**

x-coordinate (across) then y-coordinate (up)

She joins the points to make a quadrilateral.

Complete Lara's quadrilateral on the grid.
Use a ruler.

1 mark

Then Lara translates the quadrilateral **4 squares to the right.**

Draw the quadrilateral in its new position on the grid.

1 mark

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11 Here are five numbers.

~~2~~ 3 4 5 6

Write each number on the correct cards.

The number 2 has been written on the correct cards for you.

Prime numbers	Factors of 12	Factors of 15
2 3 5	2 3 4 6	3 5

Numbers which are only divisible by themselves and 1

Numbers which 12 can be divided by

Numbers which 15 can be divided by

2 marks

12 Amina's bed is 190 cm in length and 91 cm in width.

She is making a **one-tenth** scale model of the bed.

What are the length and width of Amina's model?

Divide the length and width by 10 as it is a one-tenth scale model. Remove the 0 to divide 190cm by 10. Move the decimal place once to the left to divide 91cm by 10

length = 19 **cm**

width = 9.1 **cm**

1 mark

13

Kirsty says,

> When you double the size of an acute angle, you always get an obtuse angle.

Explain why Kirsty is **not** correct.

30 degrees is an acute angle
30 x 2 = 60
60 degrees is not an obtuse angle

Acute angles are less than 90 degrees. Obtuse angles are more than 90 degrees and less than 180 degrees

1 mark

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14 How many days are there in September, October and November altogether?

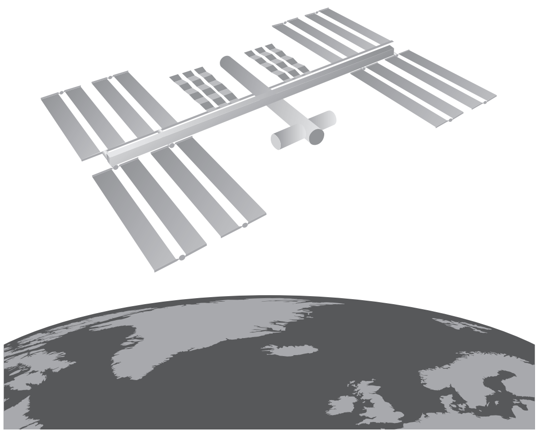
$30 + 31 + 30$

September has 30 days. October has 31 days. November has 30 days. Adding these numbers together works out how many days there are altogether

91 **days**

1 mark

15



The International Space Station orbits the Earth at a height of 250 miles.

What is the height of the International Space Station in **kilometres**?

Use 8 kilometres equals 5 miles.

$250 \div 5 = 50$

$50 \times 8 = 400$

400 **km**

1 mark

Every 5 miles is 8 kilometres. There are 50 lots of 5 miles in 250 miles. Therefore there are 50 lots of 8 kilometres

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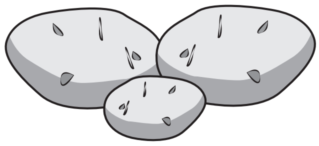
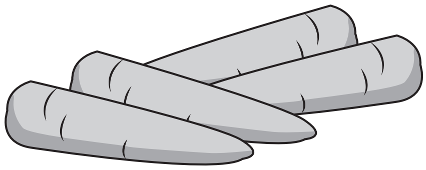
16



potatoes
£1.50 per kg



carrots
£1.80 per kg

Jack buys $1\frac{1}{2}$ kg of potatoes and $\frac{1}{2}$ kg of carrots.

How much **change** does he get from **£5**?

Show your method

$$2\,\overline{)\,1.50} = 0.75$$

$$\begin{array}{r} 1.50 \\ +\ 0.75 \\ \hline 2.25 \end{array}$$

$$2\,\overline{)\,1.80} = 0.90$$

$$\begin{array}{r} 2.25 \\ +\ 0.90 \\ \hline 3.15 \end{array}$$

$$\begin{array}{r} 5.00 \\ -\ 3.15 \\ \hline 1.85 \end{array}$$

£ 1.85

2 marks

£1.50 ÷ 2 works out 1/2 kg of potatoes
£1.50 + £0.75 works out $1^{1}/_{2}$ kg of potatoes
£1.80 ÷ 2 works out 1/2 kg of carrots
£2.25 + £0.90 works out the total cost
£5.00 - £3.15 works out the change

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17

$$x + 2y = 20$$

x and y are whole numbers **less than 10**

What could x and y be?

First pick a number for y. 2 x y needs to be more than 10 as x needs to be less than 10 and this is added to $2y$. 2 x 8 = 16 so 8 works for y. 4 needs to be added to 16 to get 20

x = 4

y = 8

1 mark

18

Tick the fractions **less than** $\frac{5}{8}$

$\frac{1 \times 4}{2 \times 4} = \frac{4}{8}$ ✓

$\frac{2}{8}$ ✓

$\frac{3 \times 2}{4 \times 2} = \frac{6}{8}$ ☐

$\frac{7 \div 2}{16 \div 2} = \frac{3.5}{8}$ ✓

$\frac{24 \div 4}{32 \div 4} = \frac{6}{8}$ ☐

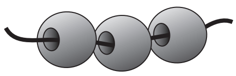
Convert the fractions into equivalent fractions which have 8 as the denominator. If the numerator is less than 5, the fraction is less than 5/8

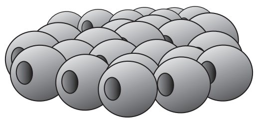
2 marks

19 Layla makes jewellery to sell at a school fair.

Each bracelet has **53** beads.

She makes **68** bracelets.





Each necklace has **105** beads.

She makes **34** necklaces.

How many beads does Layla use **altogether**?

Show your method

```
   5 3        1 0 5         3 6 0 4
 × 6 8     ×    3 4      + 3 5 7 0
 -----     --------      ---------
   4 2 4      4 2 0        7 1 7 4
 3 1 8 0    3 1 5 0
 -------    -------
 3 6 0 4    3 5 7 0
```

68 lots of 53 beads for the bracelets

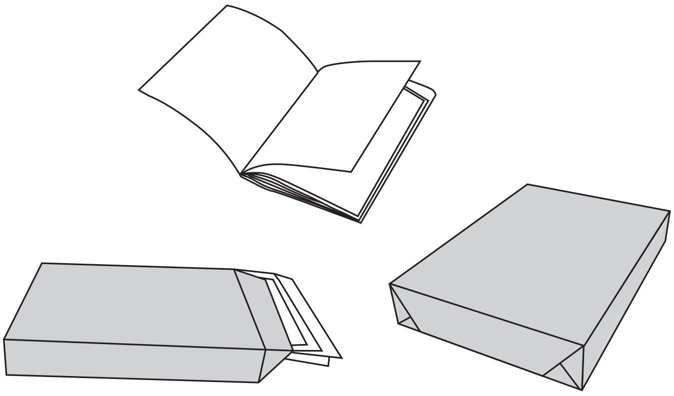
34 lots of 105 beads for the necklaces

Adding together the amount of beads needed for the bracelets and necklaces gives the number of beads Layla uses altogether

7174 beads

3 marks

20 Adam is making booklets.



Each booklet must have **34** sheets of paper.

He has **2** packets of paper.

There are **500** sheets of paper in each packet.

How many complete booklets can Adam make from **2** packets of paper?

This works out how many booklets of 34 pages can be made with 1000 sheets. There are 14 sheets left over and this isn't enough to make another booklet

Show your method

$$\begin{array}{r} 500 \\ \times\quad 2 \\ \hline 1000 \end{array}$$

$$34 \overline{)\,1\,0\,0^{3}0^{32}0} \quad = 29 \text{ R } 14$$

34, 68, 102, 136, 170, 204, 238, 272, 306, 340

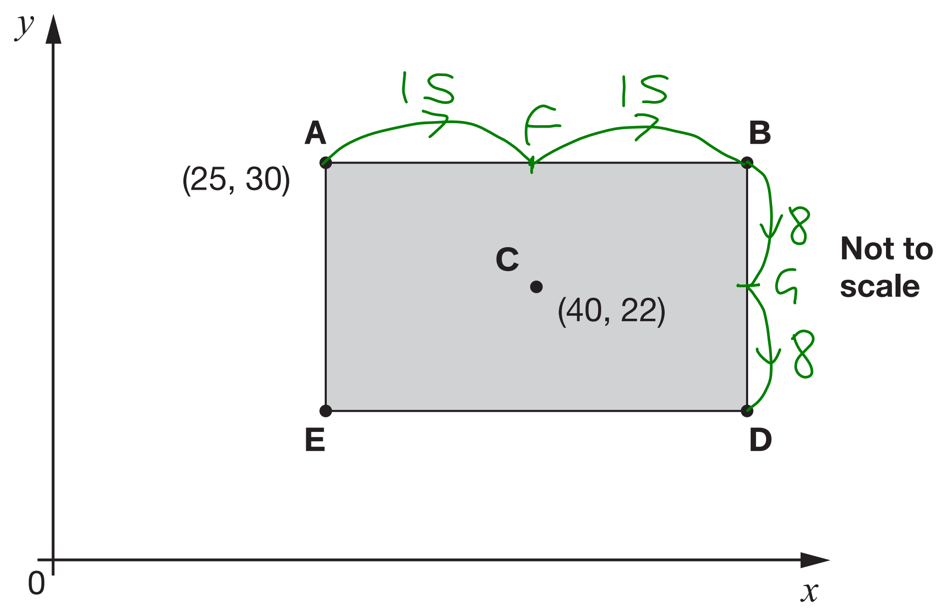
2 packets of 500 sheets. There are 1000 sheets altogether

29 **booklets**

2 marks

21 **ABDE** is a rectangle on coordinate axes.

The sides of the rectangle are parallel to the axes.



Point **C** is the centre of the rectangle.

What are the coordinates of **B** and **D**?

The centre of the rectangle C is level with point F. A has an x-coordinate of 25 and there are 15 jumps to get to the x-coordinate of 40, which F has. As F is in the centre, there are another 15 jumps in the x direction to get to B. 40 + 15 = 55 There are no jumps in the y-direction to get to B from A

B is (55, 30)

1 mark

D is (55, 14)

1 mark

The centre of the rectangle C is level with point G. B has a y-coordinate of 30 and there are 8 jumps to get to the y-coordinate of 22, which G has. As G is in the centre, there are another 8 jumps in the y direction to get to D. 22 - 8 = 14 There are no jumps in the x-direction to get to D from B

(x , y)
The x-coordinate is the first number and the y-coordinate is the second number. The x direction is to the right and left. The y direction is up and down

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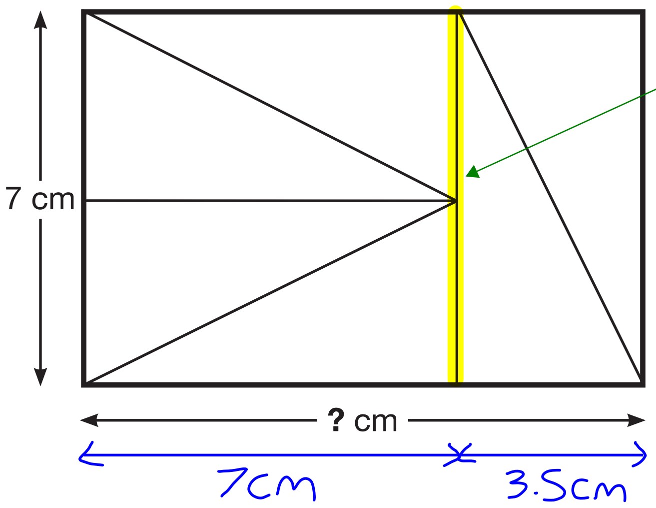
22 Six identical right-angled triangles are arranged to make a rectangle.



The shorter side of the triangle must be half of the 7cm side as two shorter lengths are the same length as 7 cm

Not actual size

Calculate the **length** of the rectangle.

$$2\overline{)7.0} = 3.5$$

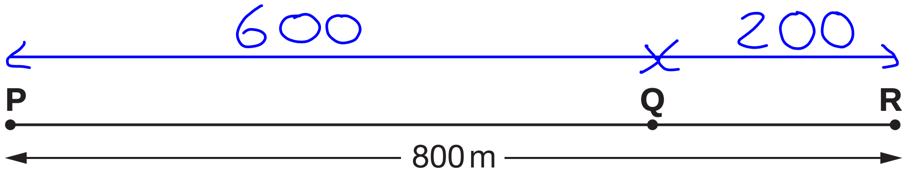
Half of 7cm

$$\begin{array}{r} 7.0 \\ +\,3.5 \\ \hline 10.5 \end{array}$$

$\boxed{10.5}$ **cm**

1 mark

23

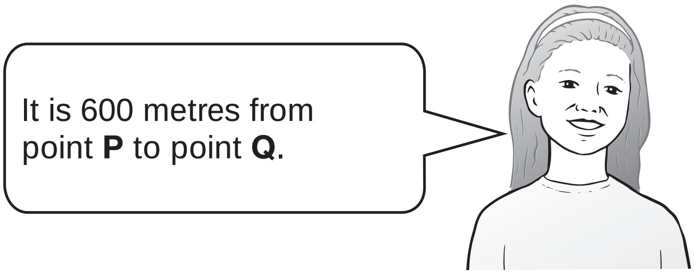


Not to scale

The distance from point **P** to point **R** is 800 metres.

The distance from point **P** to point **Q** is **4 times** the distance from point **Q** to point **R**.

Olivia says,



Explain why Olivia is **not** correct.

If P to Q is 600m, Q to R must be 200m as 800 - 600 = 200
600m is not 4 times 200m

1 mark

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[END OF TEST]

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