2019 national curriculum tests

Key stage 2

Mathematics

Paper 2: 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

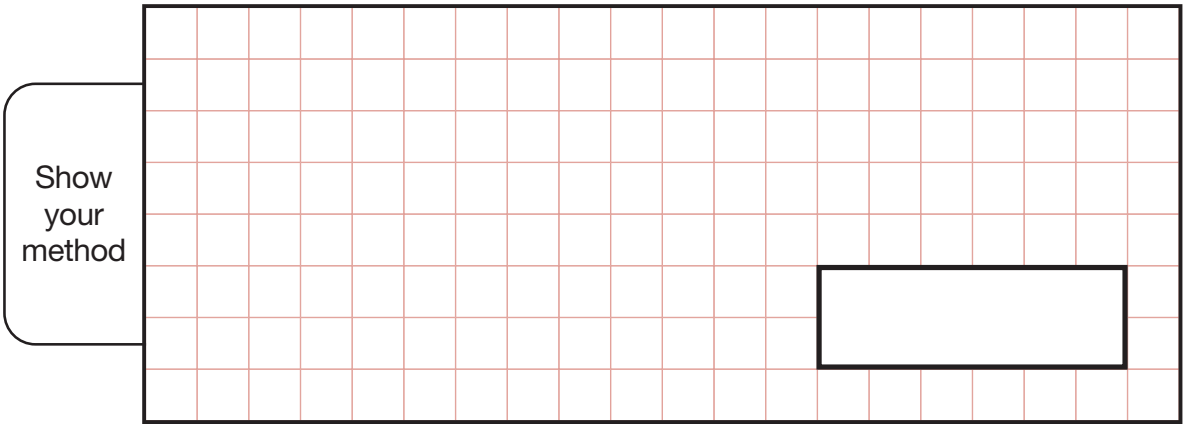
You have **40 minutes** to complete this test.

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 In this grid, there are four multiplications.

Write the **three** missing numbers.

4	×	8	=	32
×		×		
3	×	7	=	21
=		=		
12		56		

1 mark

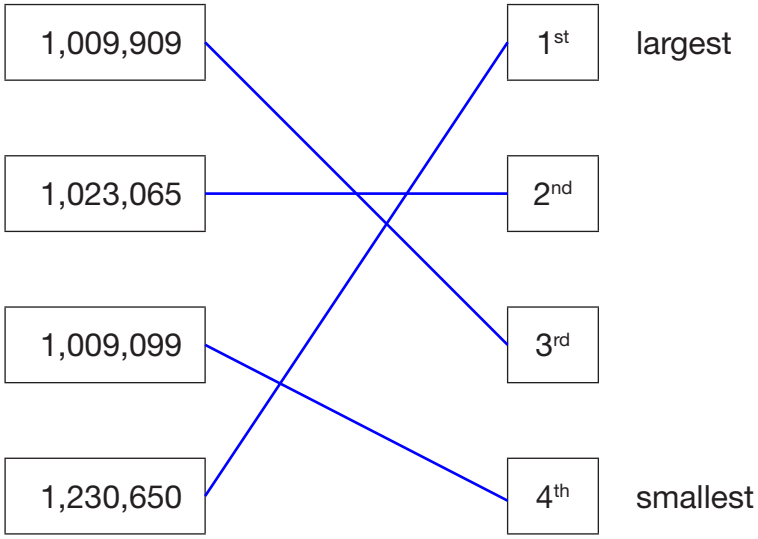
2 What number is 1,000 **less** than 9,072?

9072
−1000
8072

8072

1 mark

3 Order the numbers starting with the **largest**.
Match each number with its order.



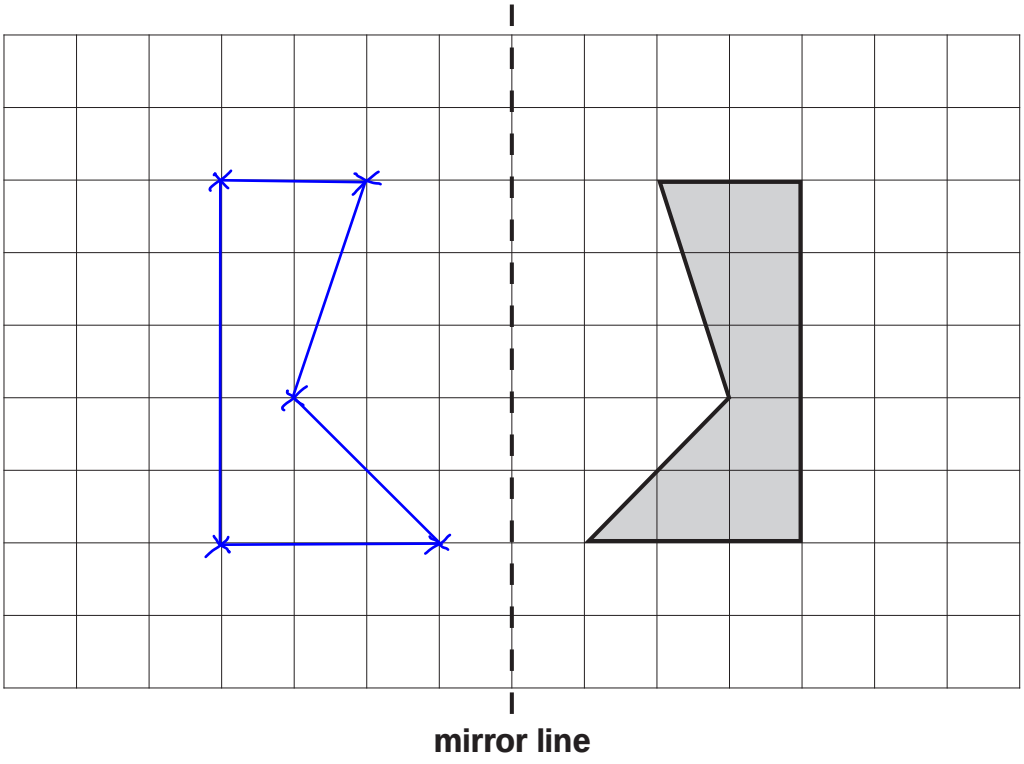
1 mark

Compare the numbers starting with the millions, then the hundred thousands, then the ten thousands, then the thousands

4 Here is a shaded shape on a square grid.

Reflect the shape in the mirror line.

Use a ruler.



1 mark

Reflect the corners first by counting the number of jumps to the mirror line then doing the same number of jumps on the other side. Then join up the corners with a ruler

5 The numbers in this sequence **increase** by 45 each time.

Write the missing numbers.

110	155	200	245	290	335

2 marks

$$\begin{array}{r} 155 \\ -\ 45 \\ \hline 110 \end{array} \qquad \begin{array}{r} 245 \\ +\ 45 \\ \hline 290 \end{array} \qquad \begin{array}{r} 290 \\ +\ 45 \\ \hline 335 \end{array}$$

Going forward in the sequence is adding 45 each time so going backward is the opposite; subtracting 45 each time

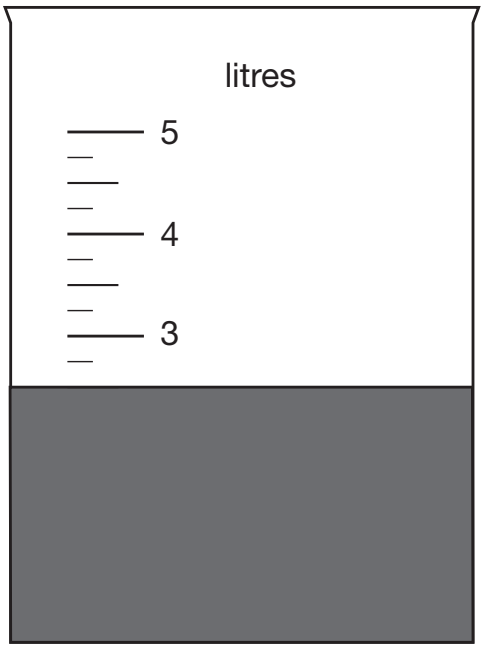
6 Write the missing number to make this **division** correct.

$$0.3 \div \boxed{10} = 0.03$$

1 mark

The decimal place has moved once to the left. Therefore it must be a division by 10

7 Jack pours some dark paint into a container.



In litres, how much paint is in the container?

Two lines below 4 is $3^1/_2$
so two lines below 3 is $2^1/_2$

$2\frac{1}{2}$ **litres**

1 mark

8 In this sequence, the rule to get the next number is

Multiply by 2, and then add 3

Write the missing numbers.

1 mark

11	25	53	109

1 mark

$25 - 3 = 22$ $\quad 11$ $\quad 53 \times 2 = 106$ $\quad 106 + 3 = 109$

$2\overline{)22}$

Going backward in the sequence is the opposite of going forward. The opposite of multiply by 2, and then add 3 is subtract 3, and then divide by 2

9 Jack chose a number.

He multiplied the number by 7

Then he added 85

His answer was 953

Start with 953 and then do the opposite operations in the opposite order

What number did Jack choose?

Show your method

$$\begin{array}{r} 953 \\ -\ 85 \\ \hline 868 \end{array}$$

Subtracting 85 is the opposite of adding 85

$$7 \overline{)\,868} = 124$$

Dividing by 7 is the opposite of multiplying by 7

124

2 marks

10 A theme park sells tickets online.

Each ticket costs £24

There is a £3 charge for buying tickets.

Which of these shows how to calculate the total cost, in pounds?

Tick **one**.

number of tickets × 3 + 24 ☐

number of tickets × 24 + 3 ✓

Imagine the number of tickets was 3. We would multiply £24 by 3 then add £3 to work out the total cost

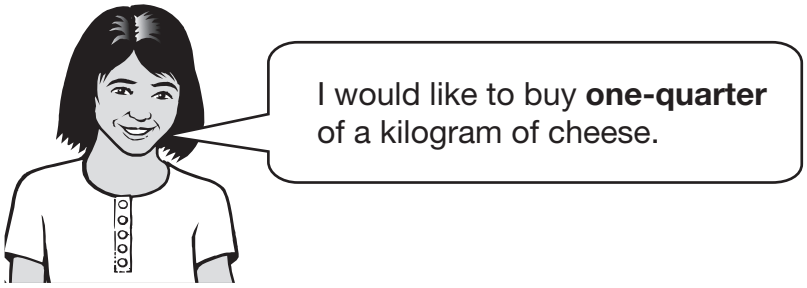
number of tickets + 3 × 24 ☐

number of tickets + 24 × 3 ☐

1 mark

11 Amina is shopping.

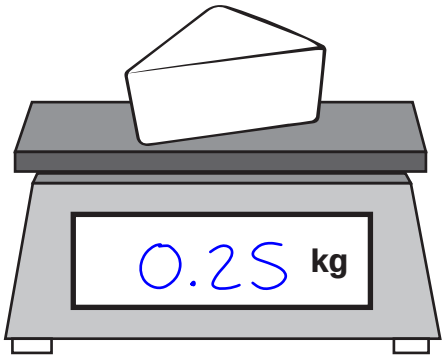
She says,



Write one-quarter on the scales as a decimal.

$$4 \overline{)1.0^{2}0} = 0.25$$

1/4 is a fraction we are meant to know as a decimal. But if we don't know, we can find it by doing 1 divided by 4



1 mark

The cheese costs £1.35

Amina pays with a £2 coin.

How much change should Amina get?

$$\begin{array}{r} {}^{1}\cancel{2}.{}^{9}\cancel{0}{}^{1}0 \\ -\ 1.35 \\ \hline 0.65 \end{array}$$

65p

1 mark

If she gives £2 she has given too much. The difference between what she gave and the cost is 65p so this is her change

12 Here are three symbols.

$<$ $>$ $=$

Write one symbol in each box to make the statements correct.

7 ÷ 10 = 0.7
0.7 is greater than 0.07

$\frac{7}{10}$ $>$ 0.07

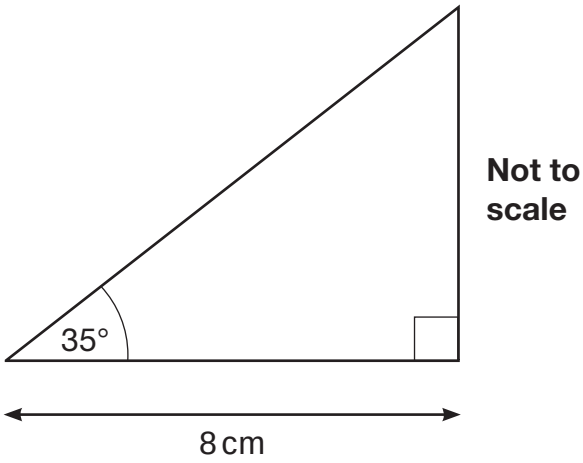
23 ÷ 1000 = 0.023
0.023 is less than 0.23

$\frac{23}{1000}$ $<$ 0.23

1 mark

13 Here is a sketch of a triangle.

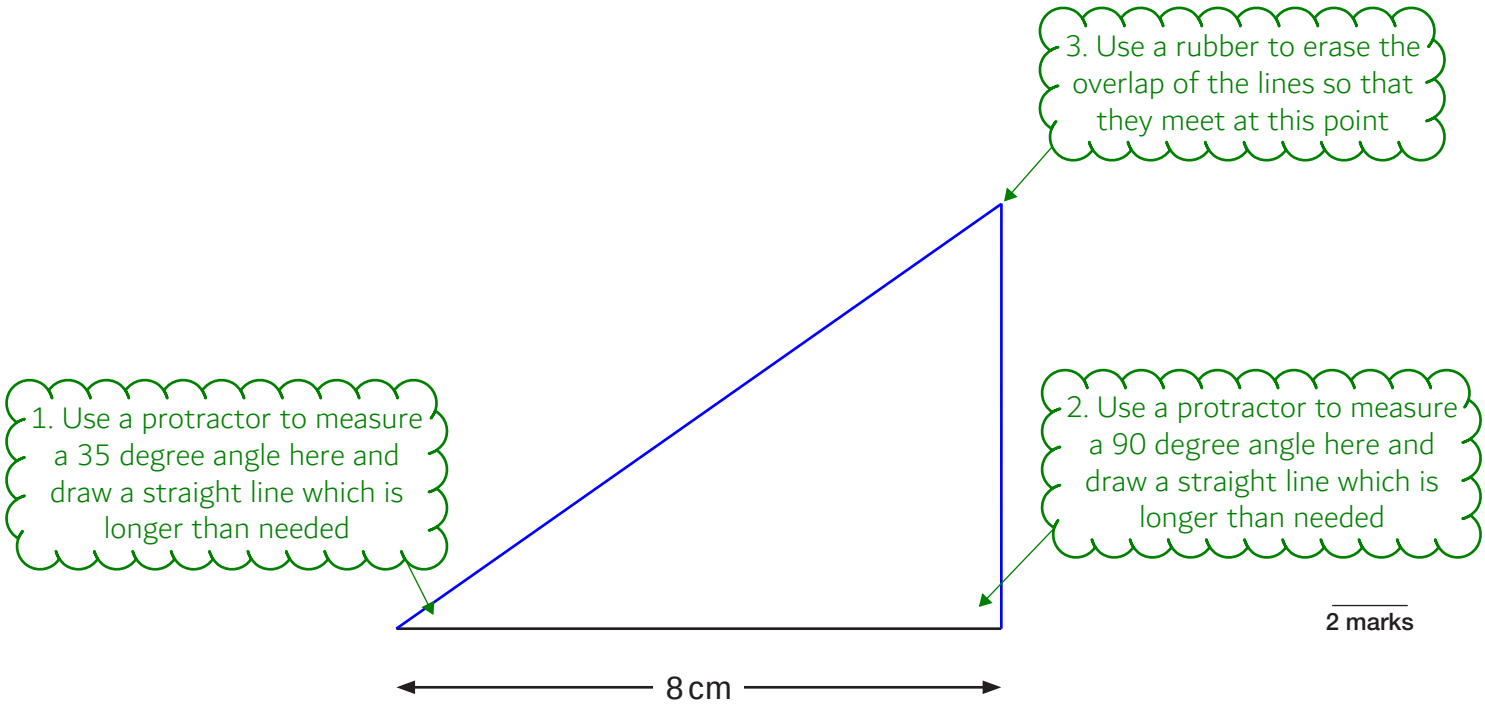
It is not drawn to scale.



Draw the full-size triangle **accurately** below.

Use an angle measurer (protractor) and a ruler.

One line has been drawn for you.



2 marks

14 Complete the table.

	Round 39,476
to the nearest 10,000	40000
to the nearest 1,000	39000
to the nearest 100	39500

2 marks

3 is in the 10,000 column. The 9 in the next column means the 3 rounds to a 4. All the other numbers become 0

4 is in the 100 column. The 7 in the next column means the 4 rounds to a 5. All the other numbers after the 5 become 0

9 is in the 1,000 column. The 4 in the next column means the 9 rounds to a 9. All the other numbers after the 9 become 0

15 Amina asked 60 children to choose their favourite flavour of jelly.

These were her results.

Flavour	Number of children
Raspberry	12
Lemon	8
Orange	15
Blackcurrant	25
Total	**60**

1/4 to percentage is 25%. This is one we should know but if we don't we can find 1/4 of 100, which is 25

What **percentage** of the 60 children chose orange?

$\frac{15}{60} \overset{\div 5}{=} \frac{3}{12} \overset{\div 3}{=} \frac{1}{4}$

25 %

1 mark

15 out of 60 chose orange. This fraction simplifies to 1/4. To simplify, divide the numerator and denominator by the same number

16 Write the missing number.

$$6 + 2 \times 2 - \boxed{4} = 6$$

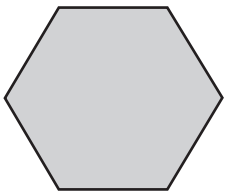
4
10

1 mark

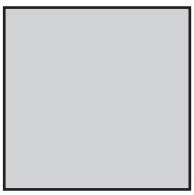
BIDMAS is the order of operations. 2 x 2 must be done first and this gives 4. 6 + 4 = 10. 4 must be subtracted from 10 to get 6

17 These two shapes have the **same** perimeter.

regular hexagon



square



Not actual size

The length of each side of the **hexagon** is **8** centimetres.

Calculate the **area** of the **square**.

Show your method

8 x 6 = 48
48 ÷ 4 = 12
12 x 12 = 144

There are 6 sides of 8cm giving a perimeter of 48cm. Each side of the square must be 12cm. Length squared gives the area of a square

144 cm²

2 marks

18 Circle the **prime** number.

95 89 87

Explain how you know the other numbers are **not** prime.

$$5\overline{)95} = 19 \qquad 3\overline{)87} = 29$$

97 and 87 can be divided by a number other than themselves and 1 to get a whole number so they aren't prime

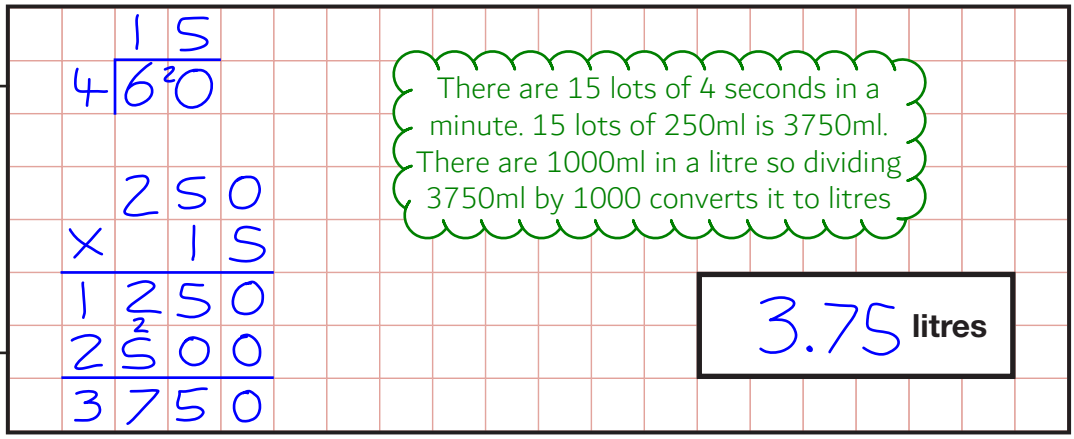
1 mark

Prime numbers are only divisible by themselves and 1

19 A machine pours 250 millilitres of juice every 4 seconds.

How many **litres** of juice does the machine pour every **minute**?

Show your method



2 marks

Percent means out of 100 so 20% is 20/100. Simplifying this fraction gives 1/5

20 Tick the fractions that are **equal** to 20%. $= \frac{20}{100} \overset{\div 10}{=} \frac{2}{10} \overset{\div 2}{=} \frac{1}{5}$

$\frac{1}{20}$ ☐

$\frac{20}{40} \overset{\div 20}{=} \frac{1}{2}$ ☐

$\frac{1}{5}$ ✓

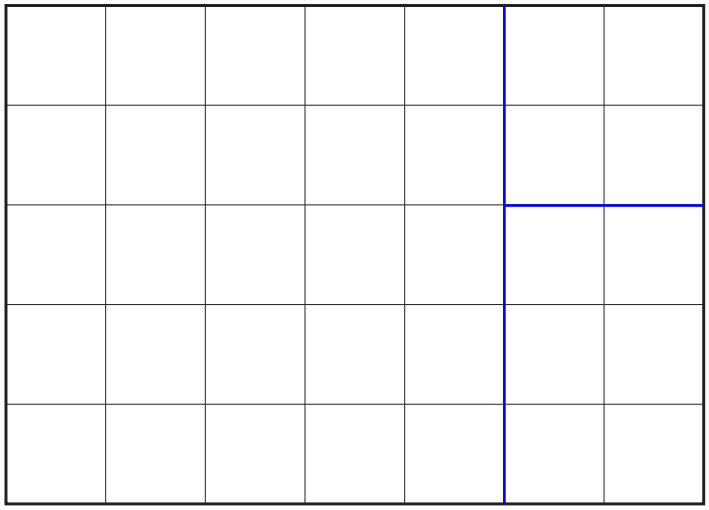
$\frac{3}{15} \overset{\div 3}{=} \frac{1}{5}$ ✓

$\frac{2}{100} \overset{\div 2}{=} \frac{1}{50}$ ☐

3/15 simplifies to 1/5 so this is also equivalent to 20%. The others simplify to fractions which aren't 1/5

2 marks

21 Adam has this rectangular piece of card. It is marked with grid lines.



1 mark

Adam makes two straight cuts along the grid lines.

The two cuts divide the rectangle into 3 shapes:

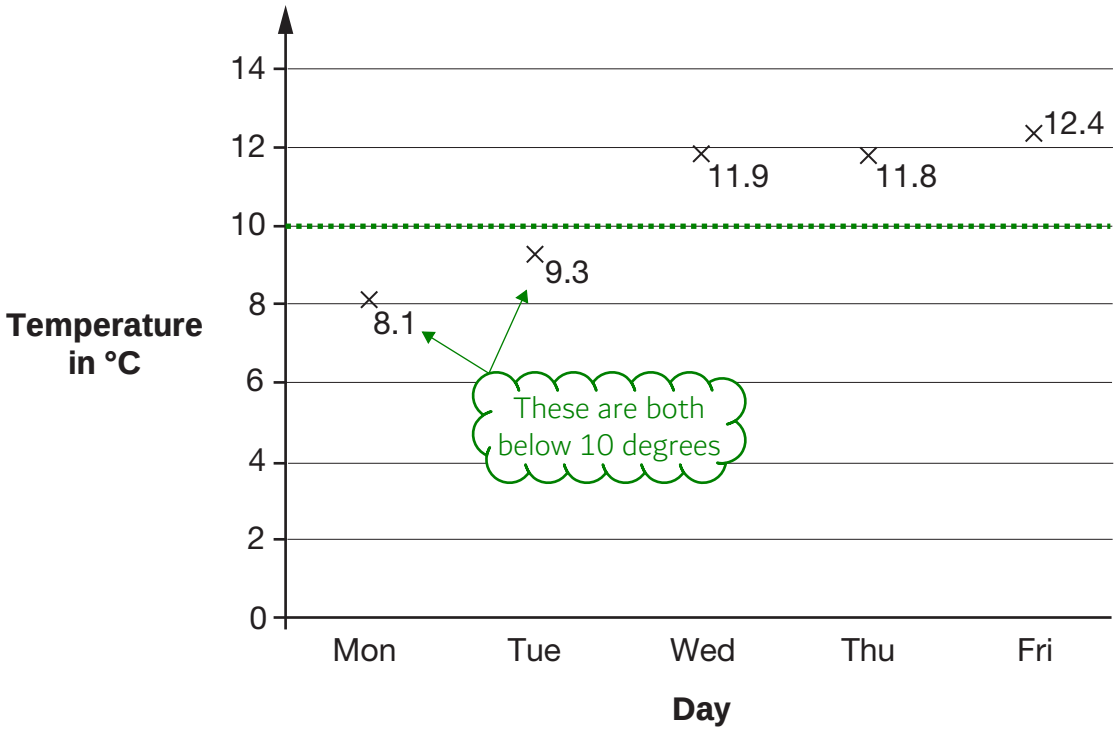
- 2 squares of **different** size, and
- 1 rectangle.

Using the grid lines, draw **two** lines that show where Adam could have made his cuts.

Use a ruler.

First focus on creating a square with one cut as it is harder to create a square than a rectangle. The only way to do this is creating a 5 x 5 square. Next focus on another square by cutting a 2 x 2 out of the rectangle left by the last cut

22 This graph shows the maximum temperature for five days.



For what fraction of the five days was the maximum temperature below 10 °C?

Add them all up then divide by how many there are. Total divided by number

2 out of the 5 temperatures are below 10 degrees

$\frac{2}{5}$

1 mark

What was the **mean** maximum temperature, to one decimal place?

Show your method

12.4
11.8
11.9
9.3
8.1
53.5

1. Add them all up

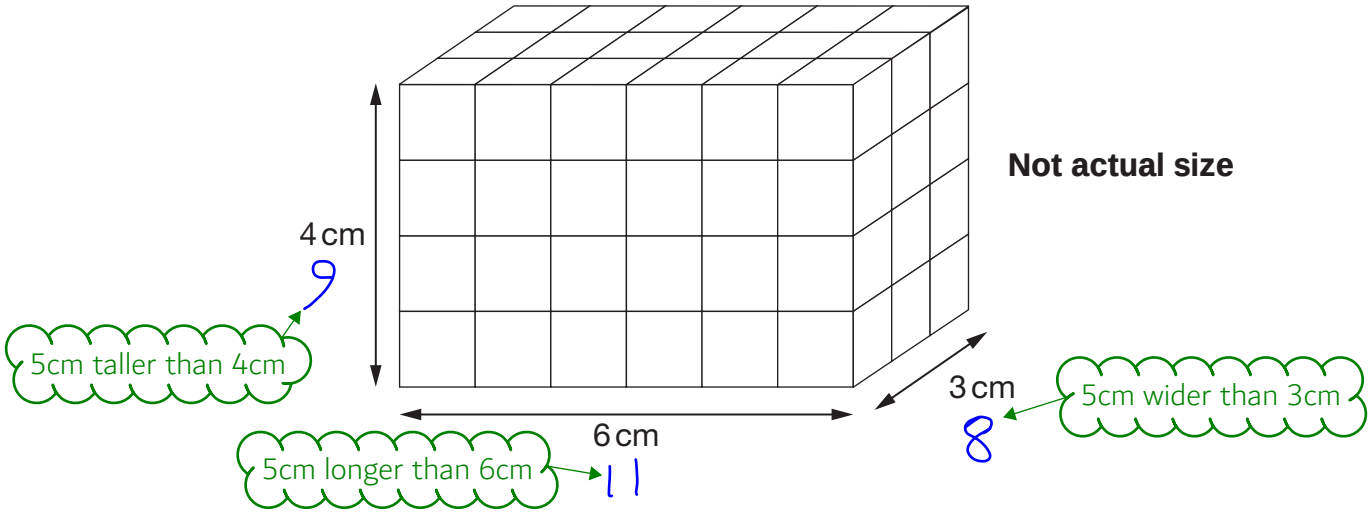
10.7
5 | 53.5

2. Divide the result by 5 as there are 5 temperatures

10.7 °C

2 marks

23 Amina made this cuboid using centimetre cubes.



Stefan makes a cuboid that is 5 cm longer, 5 cm taller and 5 cm wider than Amina's cuboid.

What is the **difference** between the number of cubes in Amina's and Stefan's cuboids?

Show your method

$6 \times 3 \times 4 = 72$
$11 \times 8 \times 9 = 792$

3 x 4 = 12
12 x 6 = 72

$88 \times 9 = 792$

$792 - 72 = 720$

720 cubes

2 marks

11 x 8 = 88

Length x width x height gives the volume of Amina's cuboid, which is equal to the number of cubes as they are centimetre cubes. Length x width x height also gives the number of cubes for Stefan's cuboid. Subtracting the results from each other gives the difference between the number of cubes

[END OF TEST]

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