2018 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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Please do not write on this page.

Instructions

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

Questions and answers

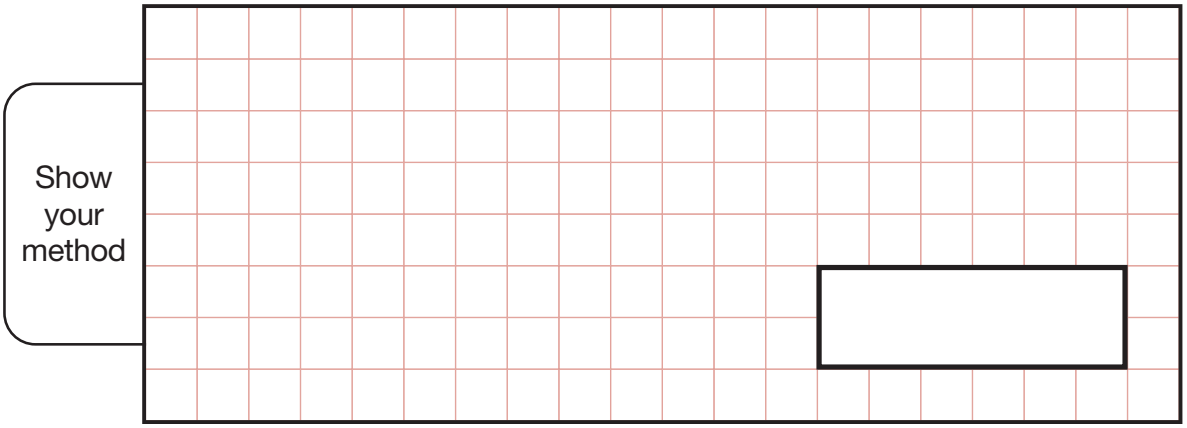
You have **40 minutes** to complete this test.

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**.

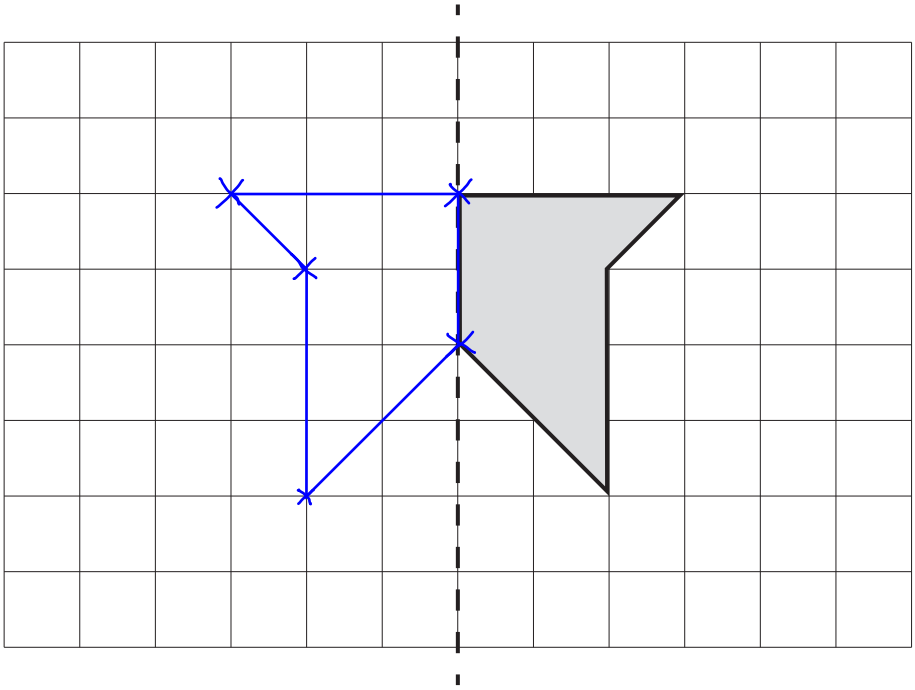
Marks

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

1 Here is a shape on a grid.

Complete the design so that it is symmetrical about the mirror line.

Use a ruler.



1 mark

First reflect the corners by counting the number of jumps to the mirror line and doing the same number of jumps on the other side. Then join up the corners with a ruler

2 Stefan completes this calculation.

$$\begin{array}{r} 95 \\ -\ 67 \\ \hline 28 \end{array}$$

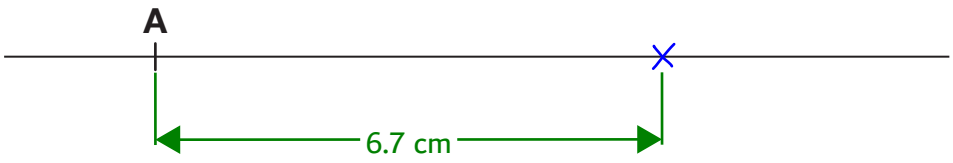
Write an **addition** calculation he could use to check his answer.

$$\begin{array}{r} 28 \\ +\ 67 \\ \hline 95 \\ 1 \end{array}$$

1 mark

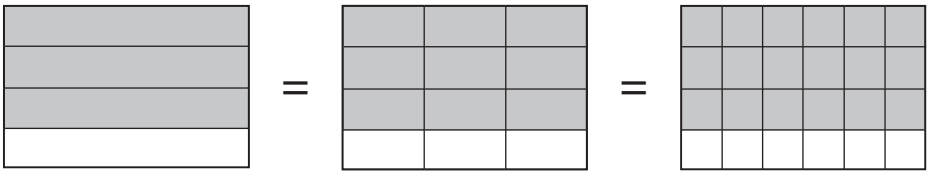
Addition is the opposite of subtraction. As we get back to 95, Stefan's answer must be correct

3 On the line below, mark the point that is 6.7 centimetres from A.



1 mark

4 These diagrams show three equivalent fractions.



Write the missing values.

$$\frac{3}{4} = \frac{9}{\boxed{12}} = \frac{\boxed{18}}{24}$$

9 shaded out of 12

18 shaded out of 24

1 mark

5 Here are the temperatures in four cities at midnight and at midday.

	Temperature	
City	**At midnight**	**At midday**
Paris	−4°C	−2°C
Oslo	−13°C	−7°C
Rome	3°C	10°C
Warsaw	−6°C	2°C

At **midnight**, how many degrees colder was Paris than Rome?

At midnight, Paris is -4 degrees and Rome is 3 degrees. Working out the difference: 3 - -4 = 3 + 4 = 7. When subtracting a negative number, this becomes an addition

7 **degrees**

1 mark

Which city was 6 degrees colder at midnight than at midday?

-13 is 6 below -7

Oslo

1 mark

6 The numbers in this sequence **decrease** by the same amount each time.

303,604 302,604 301,604 300,604 …

What is the next number in the sequence?

$$\begin{array}{r} 3\,\overset{2}{\cancel{0}}\,\overset{9}{\cancel{0}}\,0604 \\ -\quad 1000 \\ \hline 299604 \end{array}$$

$\boxed{299604}$

1 mark

The sequence is decreasing by 1000 each step

7 Tick the **two** numbers that are equivalent to $\frac{1}{4}$ = 0.25

Converting 1/4 to a decimal is one which we should know. But we can find it by dividing 1 by 4

Tick **two**.

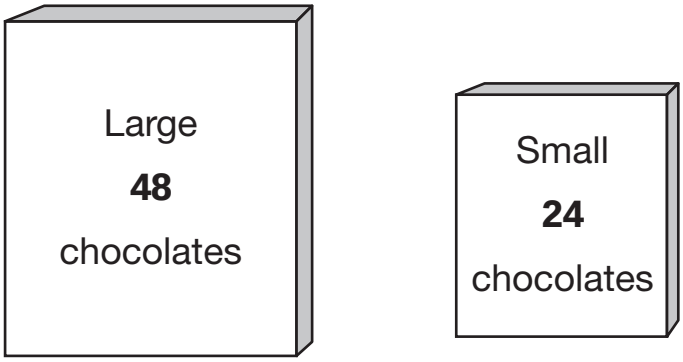
0.25	✓
0.75	
$\frac{25}{100} \frac{\div 25}{\div 25} = \frac{1}{4}$	✓
0.5	
$\frac{2}{5}$	

25/100 simplifies to 1/4

1 mark

8 Ken buys 3 large boxes and 2 small boxes of chocolates.

Each large box has 48 chocolates. Each small box has 24 chocolates.



How many **chocolates** did Ken buy altogether?

Show your method

$$\begin{array}{r} 48 \\ \times \quad 3 \\ \hline 1\,\overset{2}{4}\,4 \end{array} \qquad \begin{array}{r} 24 \\ \times \quad 2 \\ \hline 48 \end{array} \qquad \begin{array}{r} 144 \\ + \quad 48 \\ \hline 1\,\overset{1}{9}\,2 \end{array}$$

Working out the total of the chocolates in the large and small boxes

3 large boxes of 48 chocolates

2 small boxes of 24 chocolates

192 **chocolates**

2 marks

9 The list below shows the years in which the Cricket World Cup was held since 1992:

1992, 1996, 1999, 2003, 2007, 2011, 2015

Adam says,

Adam is **not** correct.

Explain how you know.

1999 is only 3 years after 1996

1 mark

10

Greater than → $>$

Equal to → $=$

Less than → $<$

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

132
11×12 $<$ 15×10 150

Add a 0 to multiply a whole number by 10

90 ÷ 30 can be simplified to 9 ÷ 3

3
$90 \div 30$ $=$ $60 \div 20$ 3

60 ÷ 20 can be simplified to 6 ÷ 2

12 ÷ 4 = 3
120 ÷ 4 = 30

30
$120 \div 4$ $>$ $160 \div 8$ 20

16 ÷ 8 = 2
160 ÷ 8 = 20

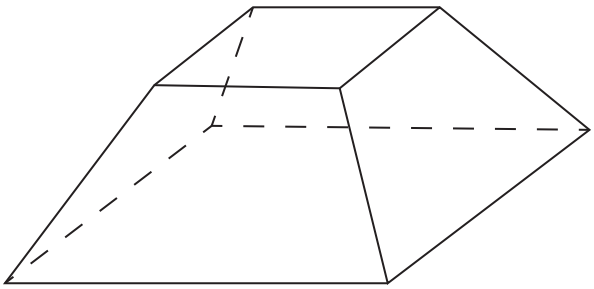
3 x 8 = 24
30 x 8 = 240

240
30×8 $<$ 100×10 1000

Add a 0 to multiply a whole number by 10

2 marks

11 Here is a drawing of a 3-D shape.



Complete the table.

Number of faces	Number of vertices	Number of edges
6	8	12

2 marks

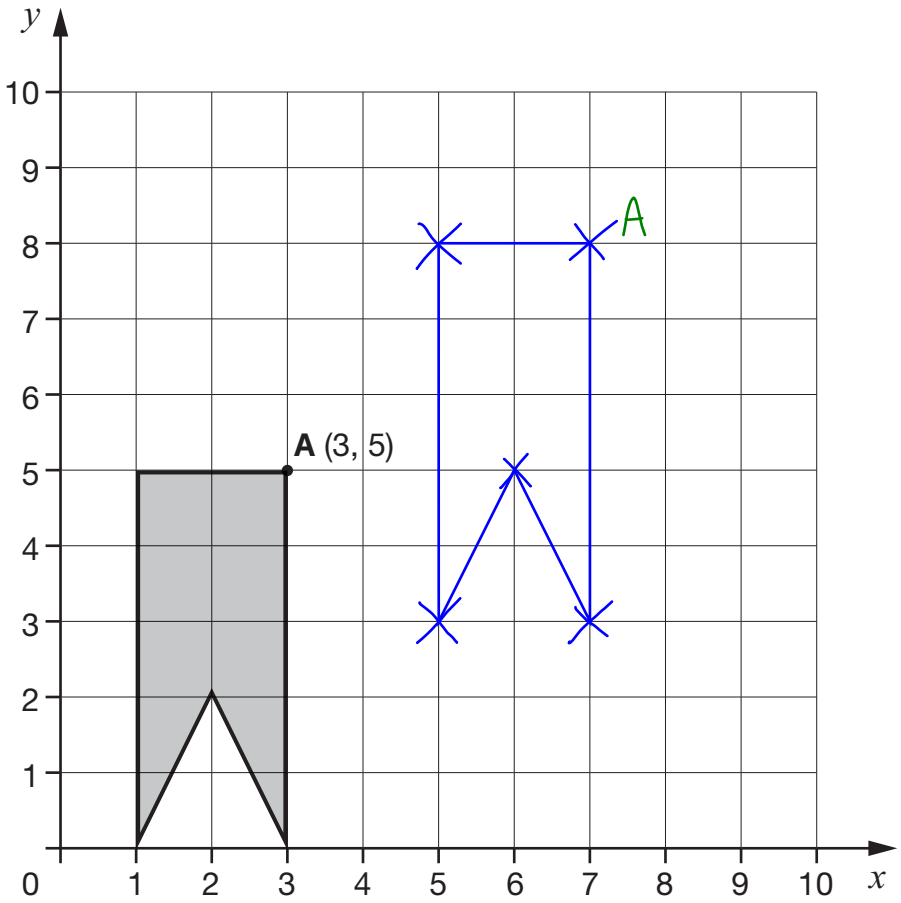
Vertices means corners

12 Here is a shape on a grid.

The shape is translated so that point **A** moves to (7, 8).

Draw the shape in its new position.

Use a ruler.



1 mark

First move point A to (7 , 8). This means 7 in the x direction (to the right) and 8 in the y direction (upwards). The shape looks identical so each of the corners form the same shape as the original. Once the corners have been drawn, join up the shape with a ruler

13 Circle the improper fraction that is equivalent to $6\frac{7}{8}$

$\frac{67}{8}$ $\frac{48}{8}$ $\frac{62}{8}$ $\frac{55}{8}$ $\frac{76}{8}$

1 mark

Multiply the whole number by the denominator then add the result to the numerator.
6 x 8 = 48
7 + 48 = 55

14

$\frac{6}{5}\frac{\times 4}{\times 4} = \frac{24}{20}$ $\frac{3}{5}\frac{\times 4}{\times 4} = \frac{12}{20}$ $\frac{3}{4}\frac{\times 5}{\times 5} = \frac{15}{20}$

Write these fractions in order, starting with the **smallest**.

$\boxed{\frac{3}{5}}$ $\boxed{\frac{3}{4}}$ $\boxed{\frac{6}{5}}$

smallest

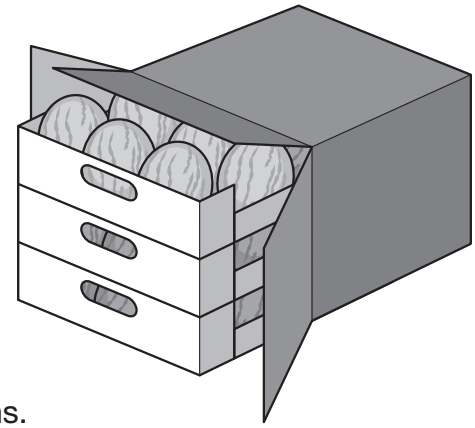
1 mark

Convert the denominators to the same number so that they can be compared

15 A box contains trays of melons.

There are 15 melons in a tray.

There are 3 trays in a box.



A supermarket sells **40** boxes of melons.

How many melons does the supermarket sell?

Show your method

$$\begin{array}{r} 15 \\ \times\ 3 \\ \hline 45 \end{array} \qquad \begin{array}{r} 45 \\ \times\ 40 \\ \hline 00 \\ 1800 \\ \hline 1800 \end{array}$$

40 boxes of 45 melons

3 trays of 15 melons. This works out how many melons are in a box

1800 melons

2 marks

16 Adam wants to use a mental method to calculate 182 – 97

He starts from 182

Here are some methods that Adam could use.

Tick the methods that are **correct**.

add 3 then subtract 90	☐	This only subtracts 93
subtract 100 then add 3	☑	
subtract 7 then subtract 90	☑	
subtract 3 then subtract 100	☐	This subtracts 103

2 marks

17 There are 28 pupils in a class.

The teacher has 8 litres of orange juice.

She pours 225 millilitres of orange juice for every pupil.

How much orange juice is left over?

Show your method

```
   225
 x  28
 1800
 4500
 6300
```

The total amount of juice given to all 28 pupils in millilitres

```
 8000
-6300
 1700
```

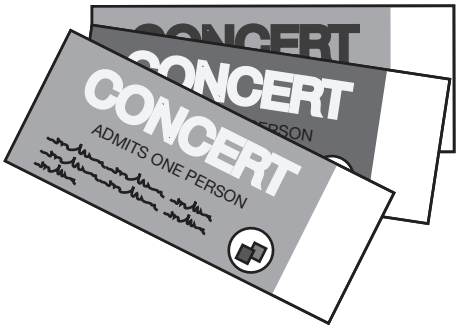
This works out the amount of juice left over in millilitres. 8 litres is 8000 millilitres as there are 1000 millilitres in a litre

1700ml

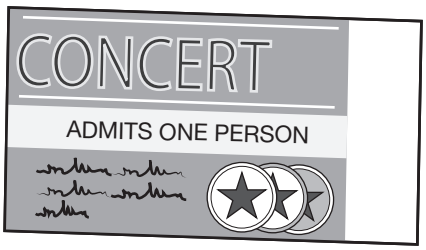
3 marks

18 Last year, Jacob went to four concerts.

Three of his tickets cost £5 each.



The other ticket cost £7



What was the **mean** cost of the tickets?

Show your method

3 x 5 = 15

15 + 7 = 22

5.5

4 | 2 2.0

Mean is total divided by number. The total is £22. The number is 4 tickets. 0.5 of a pound is 50p so £5.5 is £5.50

£ 5.50

2 marks

19 Layla wants to estimate the answer to this calculation.

This is nearly 4

$$3\frac{9}{10} - 2\frac{1}{8} + 1\frac{4}{5}$$

These are both nearly 2

Tick the calculation below that is the best estimate.

Tick **one**.

3 – 2 + 2 ☐

4 – 2 + 1 ☐

4 – 2 + 2 ☑

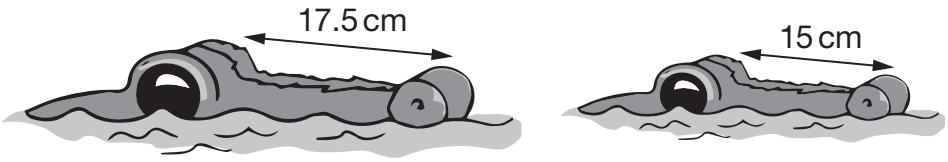
3 – 2 + 1 ☐

1 mark

20 The length of an alligator can be estimated by:

- measuring the distance from its eyes to its nose
- then multiplying that distance by 12

What is the **difference** in the estimated lengths of these two alligators?



Not to scale

Show your method

17.5 × 12 = 35.0 + 175.0 = 210.0

15 × 12 = 30 + 150 = 180

210 − 180 = 30

Difference is largest subtract smallest

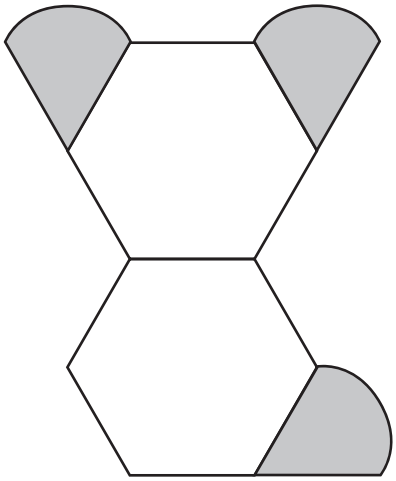
Multiplying the distance between the eyes and nose by 12 for both alligators to work out the estimated length

30 **cm**

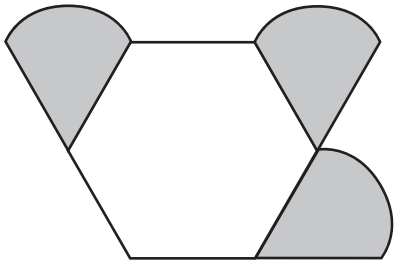
2 marks

21 Amina is making designs with two different shapes.

She gives each shape a value.



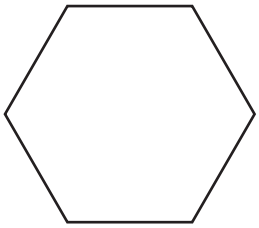
Total value is 147



Total value is 111

Calculate the value of each shape.

$$\begin{array}{r} 147 \\ -111 \\ \hline 36 \end{array}$$

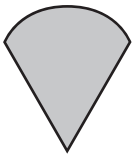


= 36

1 mark

$$\begin{array}{r} {}^{0}\cancel{1}{}^{1}\cancel{0}{}^{1}\cancel{1} \\ -\ 36 \\ \hline 75 \end{array}$$

$$3\overline{)75} = 25$$

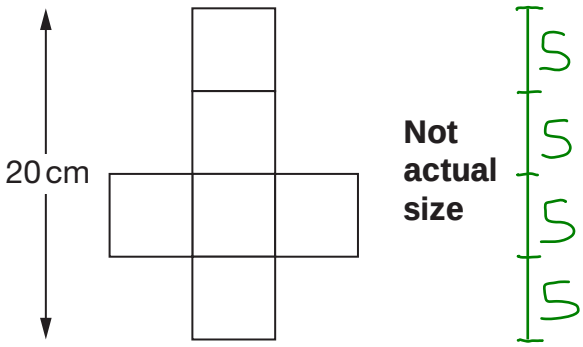


= 25

1 mark

The difference between the two designs is that the first one has an extra hexagon. Therefore the value of the hexagon must be the difference between 147 and 111. Once the value of the hexagon has been worked out, subtracting 36 from 111 leaves the value of three of the other shape. Dividing by 3 works out the value of one of the other shapes

22 This is the net of a cube.



The length of one of the squares is 5cm

What is the **volume** of the cube?

$20 \div 4 = 5$

$5^3 = 125$

$$\begin{array}{r} 25 \\ \times \quad 5 \\ \hline 125 \\ {\scriptstyle 2} \end{array}$$

Length cubed works out the volume of a cube. $5^3 = 5 \times 5 \times 5$
$5 \times 5 = 25$

125 cm^3

1 mark

23 The length of a day on Earth is 24 hours.

The length of a day on Mercury is $58\frac{2}{3}$ times the length of a day on Earth.

What is the length of a day on Mercury, in **hours**?

Show your method

$$\begin{array}{r} 24 \\ \times\ 58 \\ \hline 192 \\ 1200 \\ \hline 1392 \end{array}$$

$24 \div 3 = 8$

$8 \times 2 = 16$

16 is 2/3 of 24

$$\begin{array}{r} 1392 \\ +\ 16 \\ \hline 1408 \end{array}$$

1408 hours

2 marks