2023 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

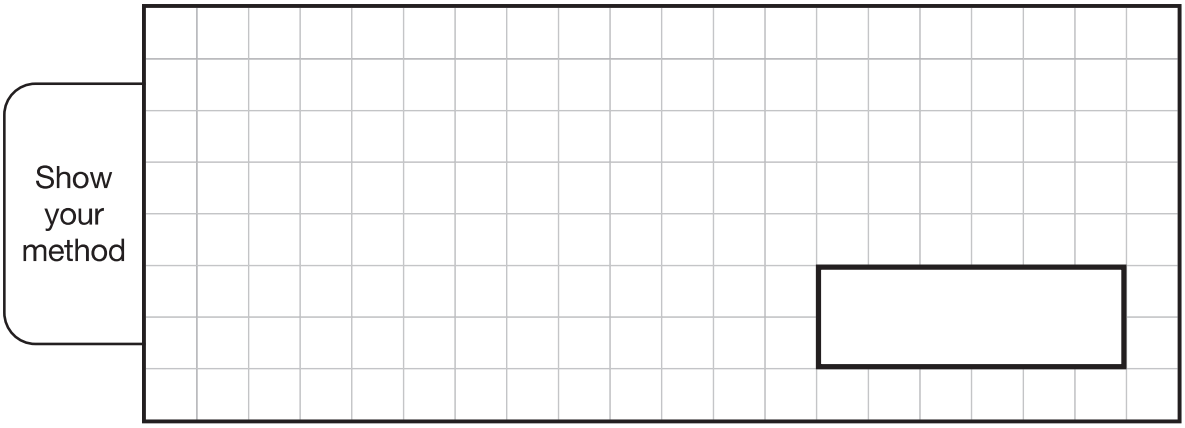
You have **40 minutes** to complete this test.

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.

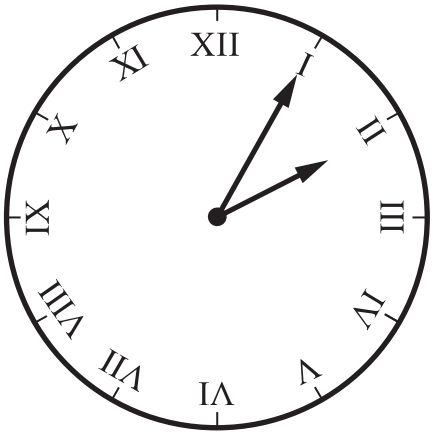
If you cannot do a question, **go on to the next one**.
You can come back to it later, if you have time.

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

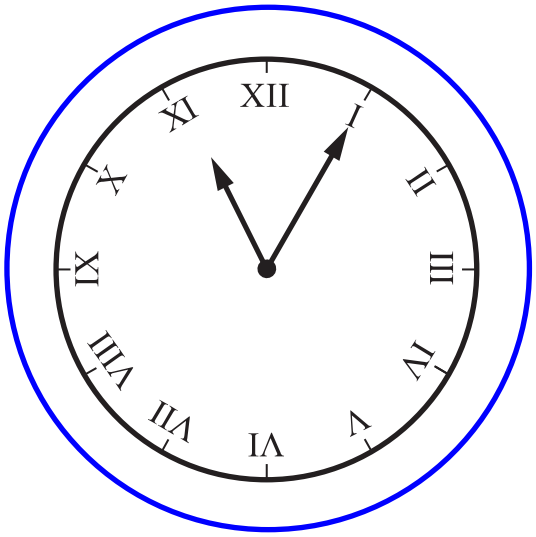
Marks

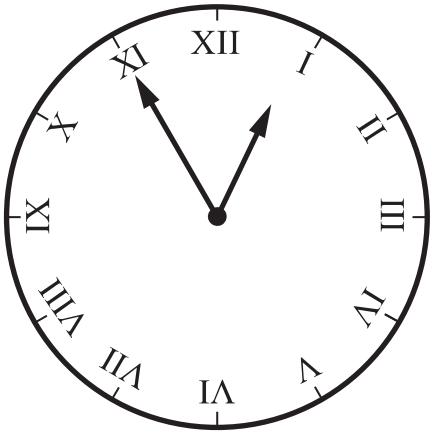
The number under each line at the side of the page tells you the number of marks available for each question.

1 Circle the clock that shows **5 minutes past 11**

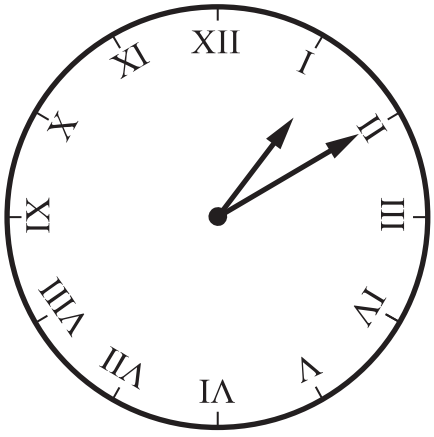


5 minutes past 2





5 minutes to 1



10 minutes past 1

1 mark

The shorter hand is the hour hand and the longer hand is the minute hand. XI is 11. The minutes go up in 5s so the I is worth 5 minutes

2 Write these temperatures in order, starting with the **lowest**.

6°C −4°C 1°C −10°C 3°C

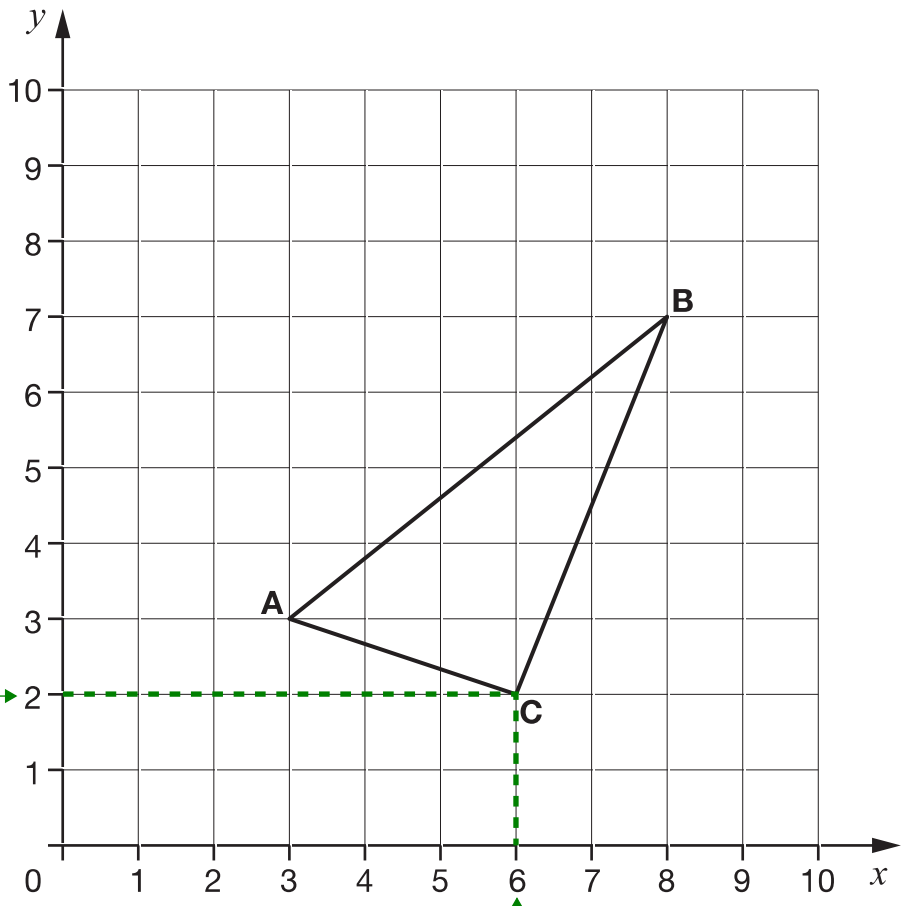
-10 °C	-4 °C	1 °C	3 °C	6 °C

lowest

1 mark

The more negative it it, the lower it is.
The less positive it is, the lower it is

3



The y-coordinate is 2

The x-coordinate is 6

ABC is a triangle.

What are the coordinates of point **C**?

(6 , 2)

1 mark

(x-coordinate , y-coordinate)

4 Some children choose their favourite zoo animal.

The pictogram shows the results.

Key: ○ stands for **2** children

Animal	Number of children
penguin	○ ○ ○
elephant	○ ○ ◗
tiger	○ ○ ○ ○ ○ ○
giraffe	○ ◗

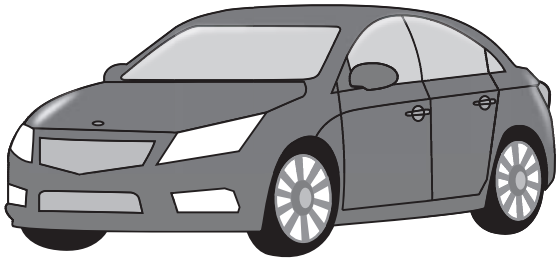
How many **more** children choose tiger than elephant?

7

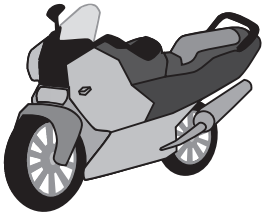
1 mark

There are $3^1/_2$ more circles for tiger than elephant.
Each circle is worth 2 children and $3^1/_2 \times 2 = 7$

5 Cars and motorbikes are parked in a street.



car
4 wheels



motorbike
2 wheels

Stefan counts 3 motorbikes and 5 cars.

He counts **28 wheels** altogether.

Explain why Stefan **cannot** be correct.

5X4=20
3X2=6
20+6=26

1 mark

Multiplying the 5 cars by the 4 wheels each has works out that 5 cars have 20 wheels in total. Multiplying the 3 motorbikes by the 2 wheels each has works out that 3 motorbikes have 6 wheels in total. Adding the 20 wheels on the cars and the 6 wheels on the motorbikes works out that there are 26 wheels altogether. This is not 28 wheels so Stefan cannot be correct

6 Kirsty buys 1 litre of apple juice for £1.39

She pays with a £5 note.

How much change does Kirsty get?

$$\begin{array}{r} 5.00 \\ -\ 1.39 \\ \hline 3.61 \end{array}$$

£ 3.61

1 mark

Taking away the £1.39 from the £5 paid works out that it is £3.61 too much and therefore this much change is needed

7 Here is a number sequence.

75 50 25 0 -25

1 mark

Write the next two numbers in the sequence.

The sequence goes down 25 between each term

8 In 2012, there were **24,372** schools in the United Kingdom.

Round the number of schools to the **nearest hundred.**

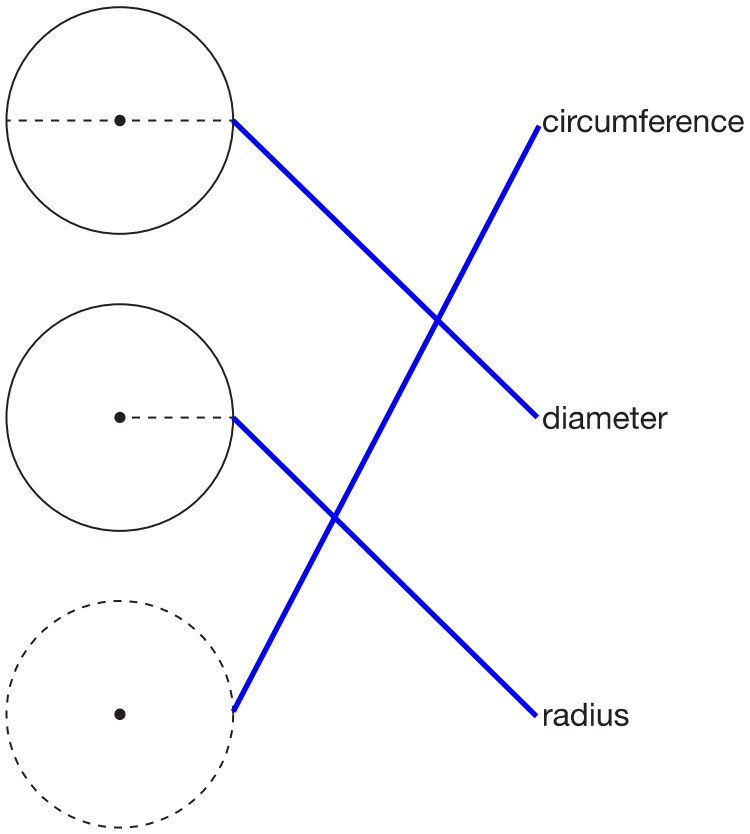
24400

1 mark

The 3 in the hundreds place is rounded up by the 7 in the tens place then everything after the hundreds place is set to 0

9 Here are some diagrams showing parts of a circle.

Match each diagram to the name of the dashed line.



1 mark

Circumference is the curve around the outside of a circle. Diameter is a straight line which goes from one side of a circle to the other and goes through the centre. Radius is a straight line going from the centre of a circle to the outside

10 Ken thinks of a number.

He divides it by 3

The answer is 72

What number was Ken thinking of?

$$\begin{array}{r} 72 \\ \times\ 3 \\ \hline 216 \end{array}$$

216

1 mark

The opposite of dividing is multiplying. So multiplying the answer of 72 by 3 works out what it was before it was divided by 3

11 Write the number that is **one thousand more** than 19,039

$$\begin{array}{r} 19039 \\ +\ 1000 \\ \hline 20039 \\ {\scriptstyle 1} \end{array}$$

20039

1 mark

Write the number that is **one hundred less** than 19,039

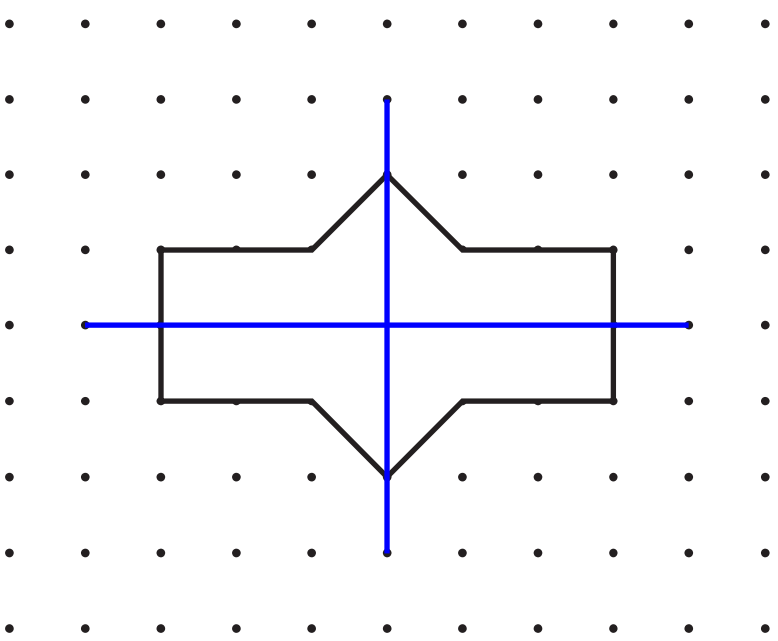
$$\begin{array}{r} 1\overset{8}{\cancel{9}}\overset{9}{0}39 \\ -\ \ 100 \\ \hline 18939 \end{array}$$

18939

1 mark

12 Draw all the lines of symmetry on this shape.

Use a ruler.



1 mark

Lines of symmetry are straight lines which cut a shape in half so that both halves are identical to each other and are a reflection of each other

13 $\frac{1}{5}$ of a number is 22

What is the number?

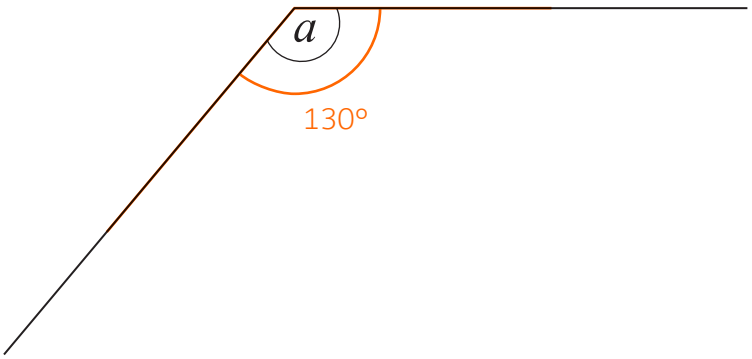
22
× 5
110

110

1 mark

To find 1/5 of a number it can be divided by 5. The opposite of dividing by 5 is multiplying by 5 so multiplying the 22 by 5 works out the number

14



Measure angle a.

a is 130 °

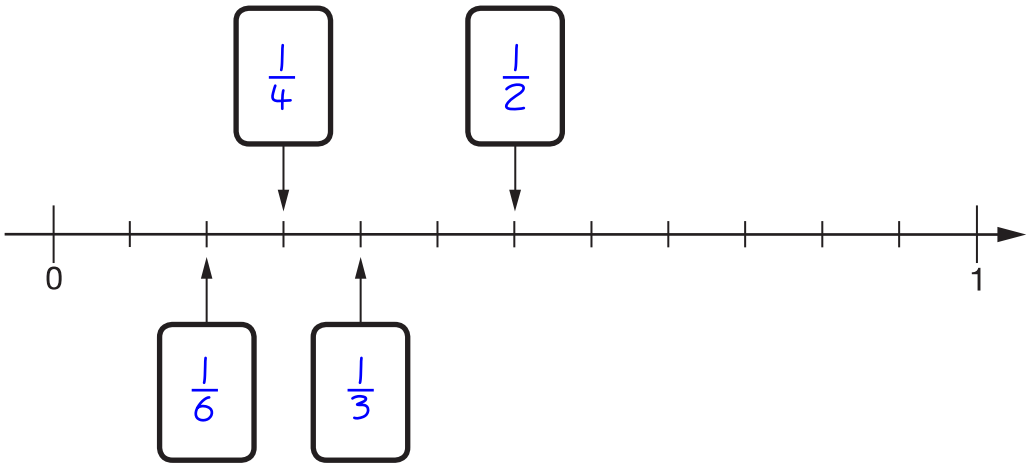
1 mark

The angle can be measured using a protractor

15 Here are four fractions.

$\frac{1}{3}$ $\frac{1}{6}$ $\frac{1}{4}$ $\frac{1}{2}$

Write the fractions in the correct place on the number line.



1 mark

The larger the denominator the smaller it is as they all have the same numerator of 1. The smaller it is the further it is to the left

16 One day last year, the rate of rainfall from 6:30 am until 9:00 am was 2 millimetres per hour.

What was the **total** rainfall from 6:30 am until 9:00 am?

$\overset{8}{\cancel{9}}\overset{6}{:}\cancel{00}$
$-6:30$
$2:30$

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

5 mm

1 mark

Subtracting the 6:30 am from 9:00 am works out that there is 2 hours and 30 minutes between the two times. This is $2^{1}/_{2}$ hours as 30 minutes is half an hour. Every hour there was 2 millimetres so multiplying the $2^{1}/_{2}$ by 2 works out that there was 5mm of rainfall in total. 2 x 2 = 4 and 1/2 x 2 = 1 then 4 + 1 = 5

17 The manager of a flower shop orders 4 boxes of red roses.

There are 50 roses in each box.

The manager makes bunches with 6 roses in each bunch.

What is the **greatest** number of bunches that can be made?

Show your method

$50 \times 4 = 200$

$6 \overline{)200}$ = 33 r 2

33

2 marks

Multiplying the 50 roses in each box by the 4 boxes works out that there are 200 roses in total. Dividing this by the 6 in each bunch works out how many lots of 6 the 200 is and therefore how many bunches can be made. There is a remainder of 2 roses and this is not enough to make another bunch

18 A cinema sells tickets at three different prices.

- $\frac{1}{20}$ of the tickets are price A.
- $\frac{3}{5}$ of the tickets are price B.
- The rest of the tickets are price C.

What fraction of the tickets are price C?

Show your method

$\frac{1}{20} + \frac{12}{20}$

$\frac{20}{20} - \frac{13}{20}$

$\frac{7}{20}$

2 marks

Adding the 1/20 which are price A and the 3/5 which are price B works out the fraction which are price A or price B The denominators need to be the same so multiplying both the numerator and denominator of 3/5 by 4 converts it into the equivalent fraction of 12/20. The numerators can then be added and the denominator stays the same.

There is 1 lot of tickets. Subtracting the 13/20 which are price A or price B leaves the fraction which are price C. 1 as a fraction is 1/1, which can have both the numerator and denominator multiplied by 20 to give 20/20 so that the denominators are the same. Then the numerators can be subtracted and the denominator stays the same

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

$$15{,}000 \div \boxed{200} = 75$$

1 mark

00200
75 | 1'5'1'5'000
150

Dividing the 15000 by the 75 works out how many times smaller the 75 is and therefore what the 15000 must be divided by to get it. Listing out the 75 times table helps with the division

20 Write the two missing digits to make this **long multiplication** correct.

			3	2	3	5
×					5	3
			9	7	0	5
1	6	1	7	5	0	
1	7	1	4	5	5	

2 marks

First working out the top missing number by following the first line of working out. The only possibility is 3 as 3 x 3 = 9 for the last multiplication on the first line and nothing is carried over onto it.

To work out the other missing number a bit of trial and error is best while following the second line of working out. It could be 1 as 1 x 5 = 5 but then this doesn't work for the 1 x 3 as it needs to end in a 7. Next trying 3 as 3 x 5 = 15, which ends in a 5. Carrying the 1 over and then doing 3 x 3 and adding the 1 doesn't end in a 7 though. Next trying 5 as 5 x 5 = 25, which ends in 5. This works with all the numbers on the second line of working

21 The height of the tallest person in history is 8 feet 11 inches.

Conversion table	
One foot	30 centimetres
One inch	2.5 centimetres

Use this conversion table to calculate the height of the tallest person, in **centimetres**.

Show your method

$$\begin{array}{r} 30 \\ \times\ 8 \\ \hline 240 \end{array} \qquad \begin{array}{r} 2.5 \\ \times\ 11 \\ \hline 25 \\ 250 \\ \hline 27.5 \end{array} \qquad \begin{array}{r} 240.0 \\ +\ 27.5 \\ \hline 267.5 \end{array}$$

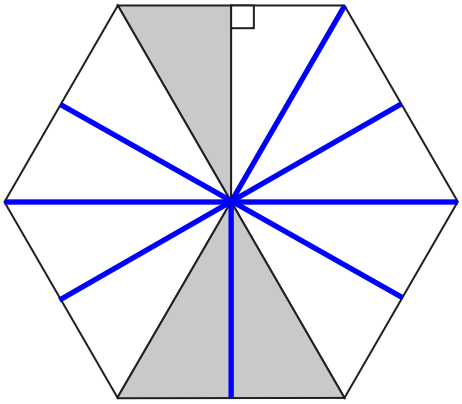
267.5 cm

2 marks

Multiplying the 30cm each foot is by the 8 feet converts the 8 feet into 240cm. Multiplying the 2.5cm each inch is by the 11 inches works converts the 11 inches into 27.5cm. The decimal point is ignored then is put back in at the end. Then adding the 240cm and the 27.5cm gives the height in centimetres

22 Here is a regular hexagon.

The area of the large shaded triangle is double the area of the small shaded triangle.



What **fraction** of the whole hexagon is the shaded area?

$\frac{3}{12}$

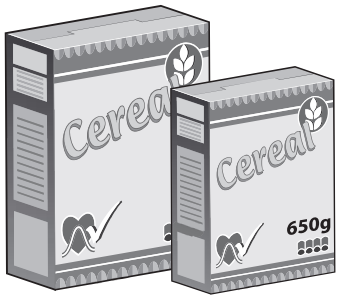
1 mark

Drawing on more lines divides the shape into equal triangles. 3 out of the 12 equal triangles are shaded

23 A small box contains **650** grams of cereal.

A large box contains **20% more** cereal.

One portion of cereal is **40** grams.



How many **full** portions are in a **large** box?

Show your method

$$\begin{array}{r} 65 \\ \times\ 2 \\ \hline 130 \end{array} \qquad \begin{array}{r} 650 \\ +\ 130 \\ \hline 780 \end{array} \qquad 40\overline{)780} = 19 \text{ r } 20$$

19 **portions**

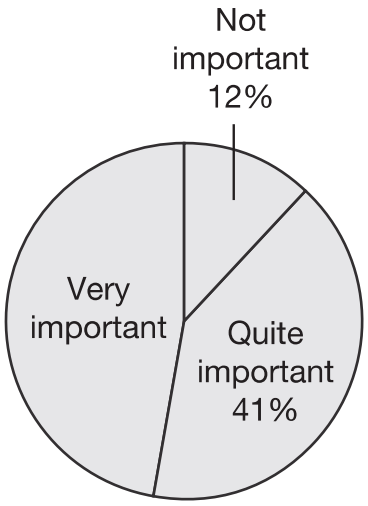
2 marks

10% as a fraction is 1/10 so dividing the 650 grams by 10 finds that 10% of the cereal in the small box is 65 grams. Multiplying this by 2 works out that 20% of the cereal in the small box is 130 grams. Adding this to the 650 grams in the small box works out that there is 780 grams in the large box. Dividing this by the 40 grams of each portion works out that there is 19 portions with a remainder of 20 grams, which is not enough for another portion

24 1,200 pupils were asked this question:

How important is it to have a break when using a screen?

This chart shows the results.



How many pupils answered 'Very important'?

100
- 12
- 41
47

12
×47
84
480
564

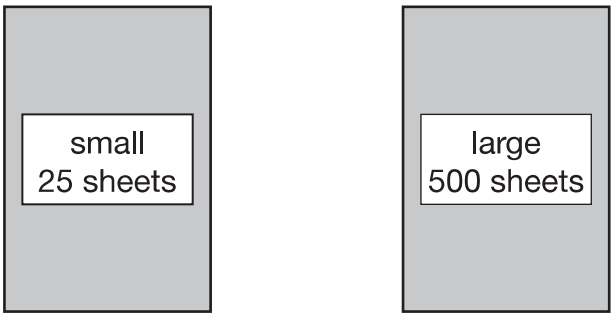
564 **pupils**

1 mark

Percentage is out of 100 so subtracting the 12% and 41% from 100% finds that 47% answered 'Very important'. 1% as a fraction is 1/100, so dividing the 1200 pupils by 100 finds that 1% of the pupils is 12. Multiplying this by the 47 finds that 47% of the pupils is 564

25 There are 25 sheets of paper in a small pack.

There are 500 sheets in a large pack.



How many small packs make one large pack?

0 2 0
25 | 5 5 0 0

20

1 mark

Dividing the 500 sheets in the large pack by the 25 sheets in the small pack works out that the 500 is 20 lots of 25

The mass of the paper in the large pack is 2.4 kilograms.

What is the mass of **one sheet** of paper, in **grams**?

Show your method

0 0 0 4.8
500 | 2 ²4 ²⁴0 ²⁴0 ⁴⁰0.⁴⁰0

4.8 g

2 marks

There are 1000 grams in 1 kilogram so multiplying the 2.4kg by 1000 converts it into 2400g. Dividing this by the 500 sheets in the large pack works out the mass of one sheet of paper in grams

26 This formula is used to estimate the mass (in kilograms) of young children.

mass = 2 × (age in years + 5)

Stefan's sister is 4 years of age.

Use the formula to estimate her mass.

The order of operations needs to be followed so the brackets are done first. 4 + 5 = 9. Then multiplying the 9 by 2 gives 18

18 **kg**

1 mark

The mass of Megan's brother is 16 kilograms.

Use the formula to estimate his **age**.

3 **years**

1 mark

3 + 5 = 8. Then 2 x 8 = 16. Putting 3 in the formula gives 16 so this must be an estimate of his age

Standards & Testing Agency

2023 key stage 2 mathematics
Paper 2: reasoning
Print version product code: STA/23/8718/p ISBN: 978-1-78957-631-3
Electronic PDF version product code: STA/23/8718/e ISBN: 978-1-78957-652-8

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