

Using Formulae - Questions

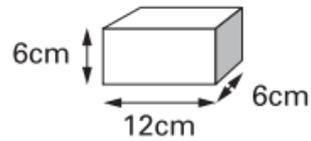
Key Stage 2: 2003 Paper A

1.

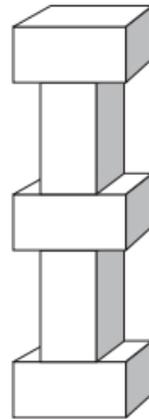
11

Martin has some bricks.

They are 12cm long, 6cm high and 6cm deep.



He builds this tower with **five** bricks.



How tall is the tower?

 cm

11a
1 mark

Each brick is 12cm long.

Martin makes a line of bricks **132cm long**.



How many bricks does he use?



11b
1 mark

1.

18

Mari is the presenter of a weekly radio show.



She always plays **five** new songs
for every **two** old songs.

Last week she played 15 **new** songs.

How many songs did she play **altogether**?

Show your **working**.
You may get a mark.

18i
18ii
2 marks

2.

22

Liam thinks of a number.

He **multiplies the number by 5** and then **subtracts 60** from the result.

His answer equals the number he started with.



What was the number Liam started with?

 Show your **working**. You may get a mark. 

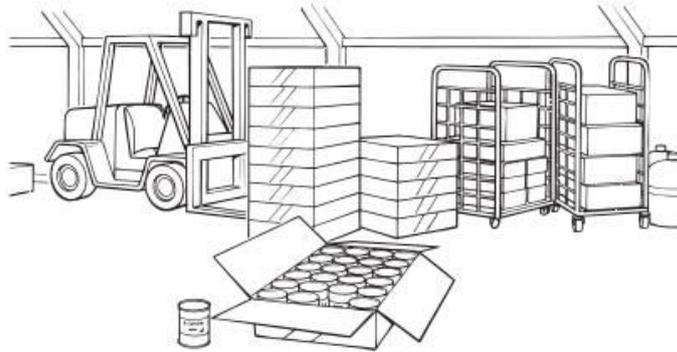
22i

22ii

2 marks

1.

11



In a supermarket storeroom there are

7 boxes of tomato soup

5 boxes of pea soup

4 boxes of chicken soup

There are **24 tins** in every **box**.

How many **tins** of soup are there **altogether**?

Show
your **method**.
You may get
a mark.

11i

11ii

2 marks

2.

20

Here are five number cards.



A and B stand for two **different** whole numbers.

The sum of all the numbers on all five cards is 30

What could be the values of A and B?

 A = B =

20
1 mark

3.

24



Every **100g** of brown bread contains **6g** of fibre.

A loaf of bread weighs **800g** and has **20** equal slices.

How much fibre is there in **one** slice?

Show your **method**.
You may get a mark.

24i

24ii

2 marks

1.

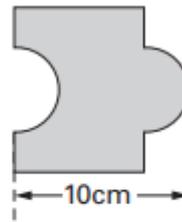
24

Josh has some tiles.

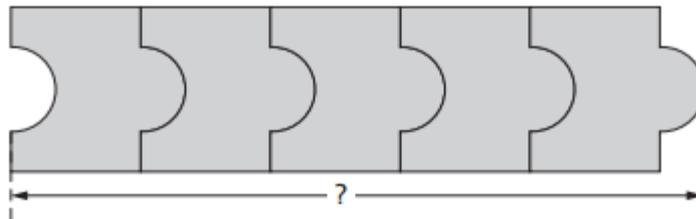
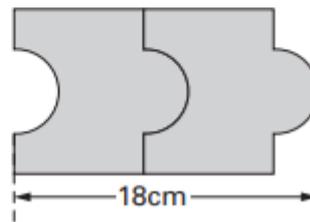


Not actual size

Each tile is 10cm long.



Two tiles fitted together are 18cm long.



Calculate the length of **five** tiles fitted together.

Show your **working**.
You may get a mark.

cm

24i
24ii
2 marks

1.

19



Sapna makes a fruit salad using bananas, oranges and apples.

For every one banana, she uses 2 oranges and 3 apples.

Sapna uses 24 fruits.

How many **oranges** does she use?

Show your **method**.
You may get a mark.

oranges

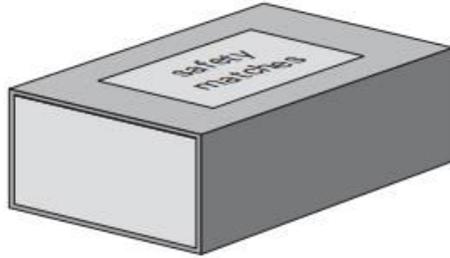
19i

19ii

2 marks

2.

25



A box contains 220 matches and weighs 45 grams.

The empty box weighs 12 grams.

Calculate the weight of **one** match.

 Show your **method**. You may get a mark. 

g

25i

25ii

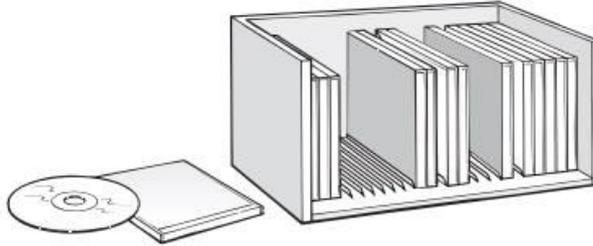
2 marks

Key Stage 2: 2006 Paper A

1.

4

Here is a CD rack.



One rack holds **25** CDs.

David has **83** CDs.

How many racks does he need to hold **all** his CDs?



4a

1 mark

Lin has **6** racks **full** of CDs.

How many CDs does Lin have altogether?



4b

1 mark

2.

7

Lin needs to solve this problem.

***'How many children
are in the class?'***



Tick (✓) **all** the information that Lin needs to solve her problem.



There are 9 girls in the class.



5 girls in the class wear glasses.



There are twice as many boys as girls in the class.

7a

1 mark

David needs to solve this problem.

***'How much do two oranges and
one apple cost?'***



Tick (✓) **all** the information that David needs to solve his problem.



An orange costs 5p more than an apple.



An apple costs 20p



David has £1

7b

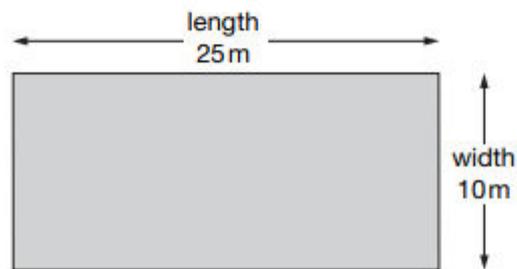
1 mark

3.

9



A rectangular swimming pool is 25 metres long and 10 metres wide.



David swims **5 lengths**.

Rosie swims **12 widths**.

How much **further** does David swim than Rosie?

Show your **working**. You may get a mark.

metres

2 marks

A large rectangular box for showing working. On the left side, there is a speech bubble containing the text "Show your working. You may get a mark." with an arrow pointing into the box. On the right side, there is a smaller box labeled "metres" and a vertical line with two tick marks, labeled "2 marks".

Key Stage 2: 2006 Paper A

4.

23

k stands for a whole number.

$k + 7$ is greater than 100

$k - 7$ is less than 90

Find **all** the numbers that k could be.



23i

23ii

2 marks

Key Stage 2: 2006 Paper B

1.

10

Here is a number sentence.

$$\boxed{?} + 27 > 85$$

Circle **all** the numbers below that make the number sentence correct.



30 40 50 60 70

10

1 mark

2.

19

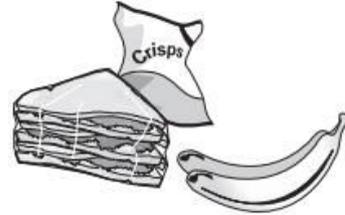
David and his friends prepare a picnic.

Each person at the picnic will get:

3 sandwiches

2 bananas

1 packet of crisps



The children pack 45 sandwiches.

How many **bananas** do they pack?

 Show your **method**. You may get a mark. 

bananas

19i

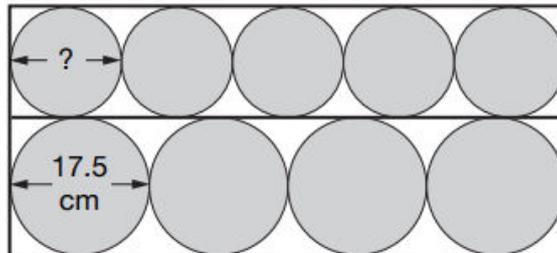
19ii

2 marks

3.

25

Four large circles and five small circles fit exactly inside this rectangle.



Not
actual size

The **diameter** of a large circle is **17.5** centimetres.

Calculate the **diameter** of a small circle.

Show your **method**.
You may get a mark.

cm

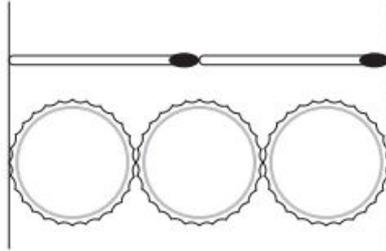
25i

25ii

2 marks

1.

21 Two matchsticks have the same length as three bottle tops.



How many bottle tops will have the same length as 50 matchsticks?

Show your **working**. You may get a mark.

_____ 21i

_____ 21ii

2 marks

Key Stage 2: 2007 Paper B

1.

9

50 children need **two** pencils each.

There are 20 pencils in a box.



How many boxes of pencils are needed?

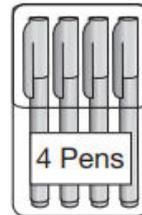


9a

1 mark

50 children need **one** pen each.

Pens are sold in packs of 4



How many packs of pens need to be bought?



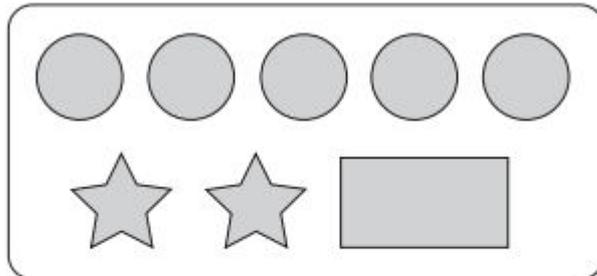
9b

1 mark

1.

8

On a sheet of stickers there are 5 circles, 2 stars and one rectangle.



How many stickers are there altogether on 4 sheets?



8a
1 mark

Nisha needs 55 circles.

How many sheets of stickers does she need?



8b
1 mark

Ben has 10 sheets of stickers.

How many **more** circles than rectangles does he have?



8c
1 mark

2.

21

Ben thinks of a number.

He adds half of the number to a quarter of the number.

The result is 60



What was the number Ben first thought of?

 Show your **working**. You may get a mark. 

21i

21ii

2 marks

1.

14

Emily chooses two numbers.



She adds the two numbers together and divides the result by 2

Her answer is 44

One of Emily's numbers is 12

What is Emily's other number?

 Show your **method**. You may get a mark. 

14i

14ii

2 marks

2.

18

Small peaches
15p each



Large peaches
25p each



Emily has £5 to spend on peaches.

She decides to buy only small peaches or only large peaches.

How many **more** small peaches than large peaches
can she buy for £5?

Show
your **method**.
You may get
a mark.



18i

18ii

2 marks

3.

23

m stands for a whole number greater than 10 and less than 20

n stands for a whole number greater than 2 and less than 10

What is the **smallest** number that $m \times n$ could be?



23a

1 mark

What is the **largest** number that $m - n$ could be?



23b

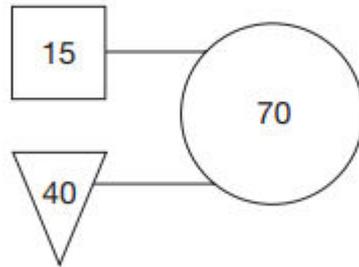
1 mark

1.

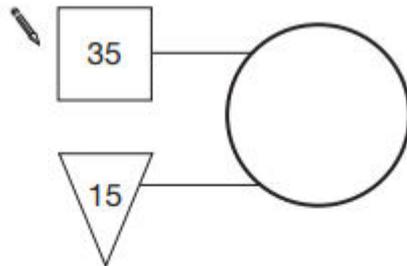
4

In this diagram the rule is

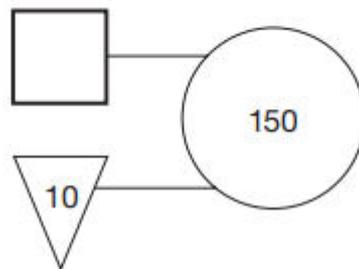
*'double the number in the square
and add the number in the triangle
to make the number in the circle'.*



Use the same rule to write in the missing numbers below.



4a
1 mark



4b
1 mark

2.

6



One battery weighs the same as **60** paperclips.

One pencil sharpener weighs the same as **20** paperclips.

How many pencil sharpeners weigh the same as one battery?

6a

1 mark

How many paperclips weigh the same as **2** batteries and **4** pencil sharpeners together?

Show your **working**.
You may get a mark.

6b

6b

2 marks

Key Stage 2: 2009 Paper B

1.

4

Plastic cups are sold in packs of 8

Amir needs 27 cups.



How many packs must he buy?



packs

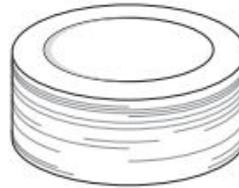
4a

1 mark

There are 30 paper plates in a pack.

Amir buys 2 packs.

He uses 37 plates.



How many plates are left?



plates

4b

1 mark

2.

14

Write what the numbers in the boxes could be.

 $10 \times \square = \square - 10$

1 mark ¹⁴

3.

22

Here is a recipe for fruit smoothies.

Recipe

10 strawberries
 $\frac{1}{2}$ litre of orange juice
250ml yogurt
1 banana

Makes two smoothies



Stefan uses the recipe to make smoothies.
He uses 1 litre of yogurt.

How many strawberries does he use?



22a
1 mark

Amir uses the same recipe.

He wants to make 5 smoothies.
He has 1 litre of orange juice.

How many **more** millilitres of orange juice does he need?



Show your **method**.
You may get a mark.

ml

22b
2 marks

1.

25

Sarah had a bag of cherries.



She ate 5 cherries, then gave half of what she had left to Liam.

Liam ate 5 of his cherries, then gave half of what he had left to Amy.

Amy got 2 cherries.

How many cherries did Sarah have in her bag at the start?

 Show your **working**. You may get a mark. 

25i
25ii
2 marks

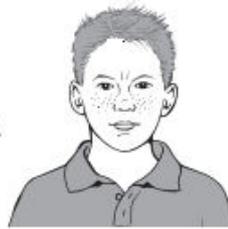
1.

13

Liam thinks of a number.

He divides it by 9 and then adds 25 to the result.

His answer is 36



What number did Liam start with?

Show your **method**.
You may get a mark.

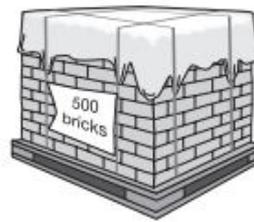
13i
13ii
2 marks

2.

15

A builder needs 7600 bricks to build a wall.

There are 500 bricks in a load.



How many loads must the builder buy?

A small pencil icon is positioned to the left of a simple rectangular box intended for the student to write their answer.

15a

1 mark

The price of one load of 500 bricks is £230

What is the cost in pence of one brick?

A small pencil icon is positioned to the left of a simple rectangular box. The letter 'p' is written in the bottom right corner of the box, indicating the unit for the answer.

15b

1 mark

3.

18

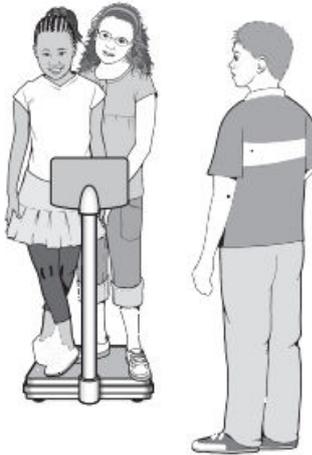
Sarah, Amy and Liam stand on some weighing scales two at a time.

Here are the measurements:

Sarah and Amy **70kg**

Sarah and Liam **80kg**

Liam and Amy **80kg**



How much does Liam weigh?

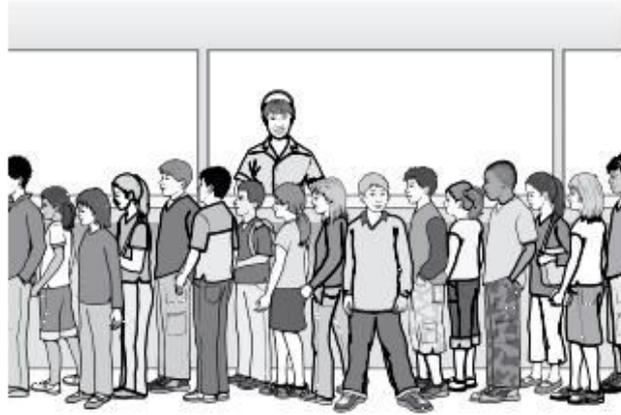
Show your **method**. You may get a mark.

kg

18i
18ii
2 marks

1.

3



There are 25 children in the lunch queue, including Nik.

Nik says,

'There are twice as many children in front of me as there are behind me'.

How many children are **in front** of Nik?

 Show your working

children

(2 marks)

2.

5

Here are three equations.

$$a + b + c = 30$$

$$a + b = 24$$

$$b + c = 14$$

What are the values of a , b and c ?



$a =$ $b =$ $c =$ (2 marks)

3.

13

A dragon lived in a cave.

The dragon **doubled** in size every day.

After **20 days** the dragon filled the cave.

After how many days did the dragon **half-fill** the cave?



After

days

(1 mark)

1.

6

Joe has a box of 72 chocolates.



He gives 18 of the chocolates to his friends.

How many chocolates are left in the box?



6a
1 mark

Holly has a box of mints.



She has 10 friends.

She gives them 5 mints each.

She has 13 mints left.

How many mints were in the box at the start?



6b
1 mark

1.

13

Dev has a bag of 50p coins and Holly has a bag of 20p coins.



Dev's bag



Holly's bag

Both bags have the same amount of money in.

There are **thirty** 50p coins in Dev's bag.

How many 20p coins are there in Holly's bag?

Show your method

20p coins

13i

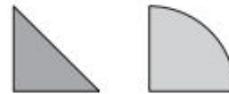
13ii

2 marks

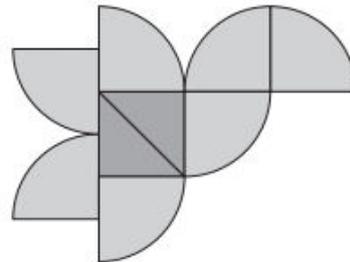
2.

19

Joe has some triangular tiles and some quarter-circle tiles.



He uses 2 triangles and 7 quarter-circles to make this 'flying bird' design.



Joe makes some more of these 'flying bird' designs.

He uses 56 quarter-circles.

How many **triangles** does he use?

Show
your
method



19i

19ii

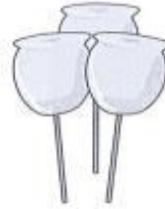
2 marks

1.

4

Kirsty, Seb and Mina made toffee apples to sell at the school fair.

They made **80** toffee apples altogether.



Kirsty sold **12** toffee apples.

Seb sold **25** toffee apples.

Mina sold **17** toffee apples.

How many toffee apples were left?

 Show your working

4a1
4a2
2 marks

Kirsty sold her 12 toffee apples for 50p each.

How much money did she collect?



4b
1 mark

1.

21



Mina has **5 more** marbles than Kirsty.

Kirsty has **2 more** marbles than Seb.

Altogether they have **30** marbles.

How many marbles does each child have?

Show
your
working

Mina

Kirsty

Seb

21i

21ii

2 marks

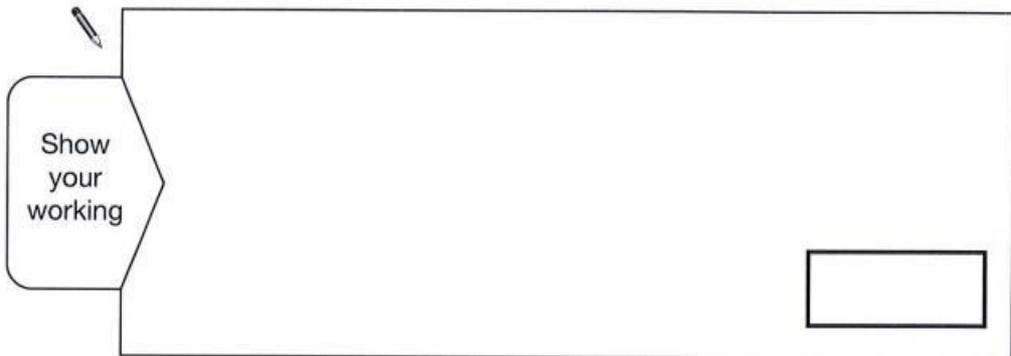
2.

24

In a class, 18 of the children are girls.

A quarter of the children in the class are boys.

Altogether, how many children are there in the class?



Show your working

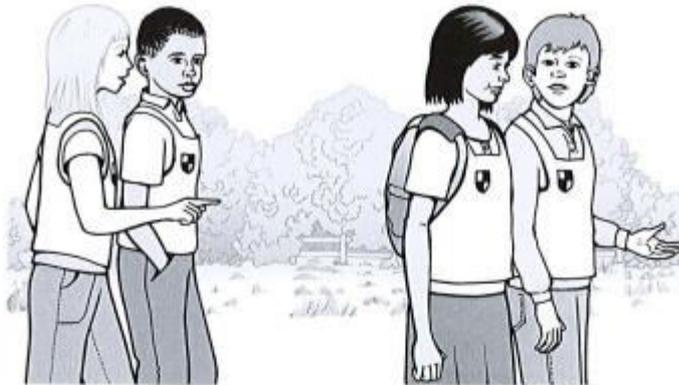
24i

24ii

2 marks

1.

10



Seb goes on a sponsored walk to collect money for charity.

His aunt promises to pay 75p for each kilometre he walks.

She pays him £6.75 at the end of the walk.

How many kilometres does Seb walk?

 km

10a
1 mark

15% of the people walk 5km or less.

40% of the people walk 8km or more.

What percentage of the people walk between 5km and 8km?

 %

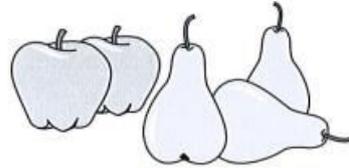
10b
1 mark

2.

15

Seb bought 2 apples and 3 pears.

He spent £1.59 altogether.



Apples cost 24p each.

How much does **one** pear cost?

Show your method

15i

15ii

2 marks

3.

17

A gardener plants tulip bulbs in a flower bed.

She plants 3 red bulbs for every 4 white bulbs.

She plants 60 red bulbs.



How many **white** bulbs does she plant?

Show your method

17i

17ii

2 marks

4.

23

j and k stand for two numbers.

Double j equals half of k .

Write numbers to complete the sentence below.

When j is then k is

23

1 mark

1.

9

A shop makes **100** sandwiches.

All the sandwiches are either cheese or tuna.

Some of the sandwiches also have salad with the cheese or tuna.

30 sandwiches have cheese with salad.

15 sandwiches have tuna without salad.

75 sandwiches have salad.

How many sandwiches have cheese without salad?

A large rectangular box for showing working, with a smaller box for the final answer. The box is divided into two sections: a larger section on the left for showing working and a smaller section on the right for the final answer. A pencil icon is located at the top left corner of the box. A label 'Show your working' is attached to the left side of the box. A small rectangular box is located in the bottom right corner of the main box.

2 marks

2.

10

This photograph shows three Russian dolls.



The real-life height of the **largest** Russian doll is **13.5cm**

What is the real-life height of the **smallest** Russian doll?

Show your working

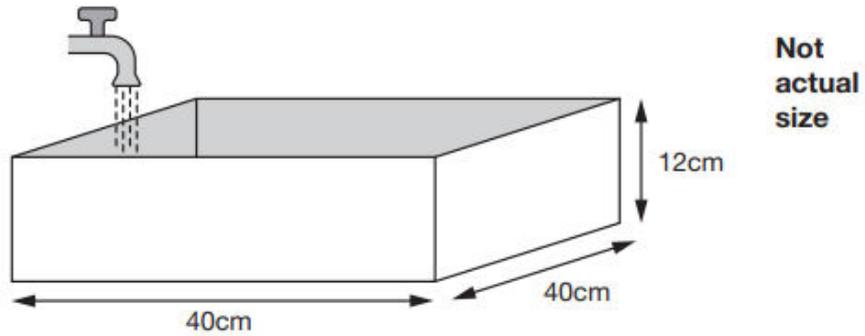
cm

2 marks

1.

8

Every second, 300cm^3 of water comes out of a tap into a cuboid tank.



The base of the tank is **40cm** by **40cm**

The height is **12cm**

How many seconds does it take to fill the tank?

Show your method

seconds

2 marks

1.

24



A cake costs 15p more than a biscuit.

Megan bought a cake and two biscuits for 90p.

How much do a cake and a biscuit each cost?

Show your working

Cost of a cake	<input type="text"/>	p	Cost of a biscuit	<input type="text"/>	p
----------------	----------------------	---	-------------------	----------------------	---

24i
24ii
2 marks

1.

18

Write the two missing digits in this multiplication.

9 × 9 = 2001

18
1 mark

2.

22

A shop sells rolls of wire.



roll A



roll B

Two rolls, A and B, each have 45 metres of wire on them.

The wire on roll A is cut into 1.25m lengths.

The wire on roll B is cut into 2.25m lengths.

How many **more** lengths of wire are cut from roll A than roll B?

 Show your method

22i

22ii

2 marks

1.

- 1** (a) There are n counters in Alfie's bag.



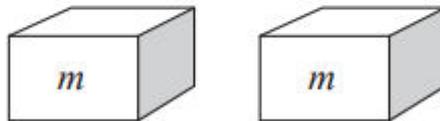
Alfie puts **3** more counters in the bag.

Write an expression for the number of counters that are in the bag now.

 1 mark

- (b) Megan has two boxes.

There are m counters in each box.



She puts all her counters together in a pile, then removes **5** of them.

Write an expression for the number of counters that are in the pile now.

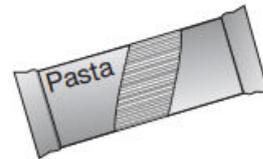
 1 mark

1.

20

Chen is cooking some pasta.

The recipe says he needs 350 grams of pasta for 4 people.



How many **kilograms** of pasta does he need for **12 people**?

Show
your
working

kg

20i

20ii

2 marks

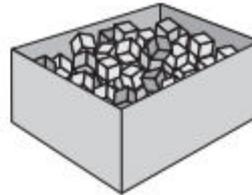
1.

5

Seb has a box of **120** cubes.

He uses some of the cubes to build a tower.

77 cubes are left over.



How many cubes has he used?



5a

1 mark

Seb has **77** cubes left over.

He builds two more towers.

One tower uses **18** cubes and the other uses **35** cubes.

How many of his **77** cubes has he got left now?



Show
your
working

5b

5b

2 marks

2.

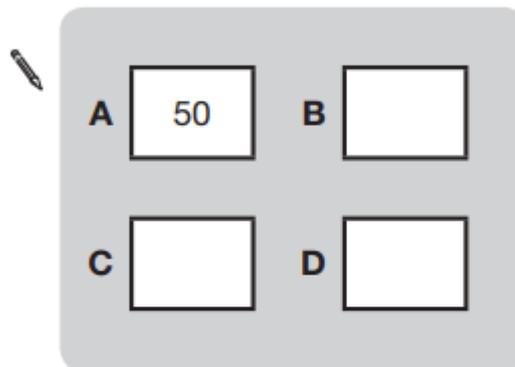
14

The number in **A** is **twice** the number in **D**.

The number in **B** is **5 less** than the number in **C**.

The number in **D** is **10 more** than the number in **B**.

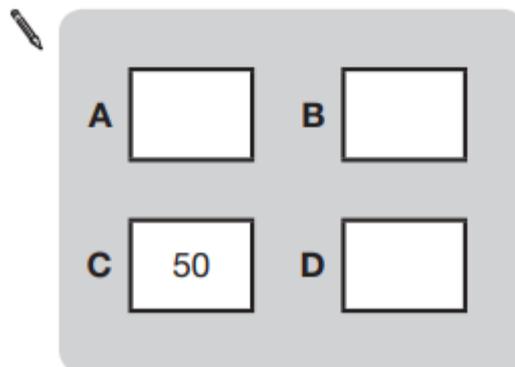
Write the missing numbers in this diagram.



14a

1 mark

Now use the same rule for this diagram.



14b

1 mark

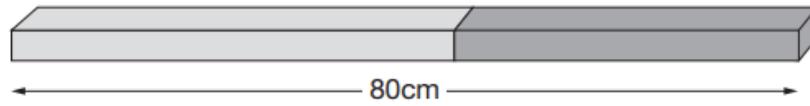
3.

19

Alfie has two sticks.

He puts them end to end.

Not
actual
size



One stick is **10cm longer** than the other stick.

How long are the two sticks?

Show your working

_____ cm and _____ cm

19i

19ii

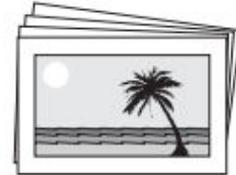
2 marks

1.

4

Alfie has some photographs printed.

The cost is £2.50 for postage and
12 pence for each print.



Alfie uses this formula for the total cost (**C**) in pence.

$$C = 250 + 12n$$

n stands for the number of photographs.

The total cost for Alfie is **£6.70**

How many photographs does he have printed?

Show
your
method

2 marks

2.

10 In a survey of children's favourite fruit juices, these were the results.

Juice	Apple	Orange	Grape	Mango
Percentage of children	25%	14%	30%	31%

(a) **20 more** children chose grape than chose apple.

How many children took part in the survey?

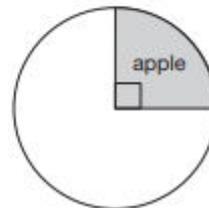
Show your method

children

2 marks

(b) Chen makes a pie chart to show the results.

What **angle** should he use for the children who chose **mango**?



1 mark

Key Stage 2: 2015 Paper B

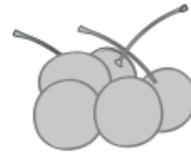
1.

12

Seb had some cherries.

Every day he ate 10 cherries and gave 5 away.

After he gave the last 5 cherries away, he had eaten 40 cherries altogether.



How many cherries did Seb have at the start?

128

128

2 marks

Show your working

A large rectangular box for showing working. On the left side, there is a callout box with a pencil icon and the text "Show your working". In the bottom right corner of the main box, there is a smaller, empty rectangular box. To the right of the main box, there are two horizontal lines, each labeled "128", and the text "2 marks" below them.

Key Stage 2: 2016 Paper 2 Reasoning - Sample

1.

2

A pack of paper has 150 sheets.

4 children each take 7 sheets.

How many sheets of paper are left in the packet?

2 marks

Show your method

A large grid for showing method. On the left side, there is a callout box with the text "Show your method". In the bottom right corner of the grid, there is a smaller, empty rectangular box. To the right of the grid, there are two horizontal lines, each labeled "2 marks".

Key Stage 2: 2016 Paper 3 Reasoning - Sample

2.

16

Lara chooses a number less than 100

She divides it by 3 and then subtracts 11

She then divides this result by 2

Her answer is 10.5

What was the number she started with?

Show
your
method

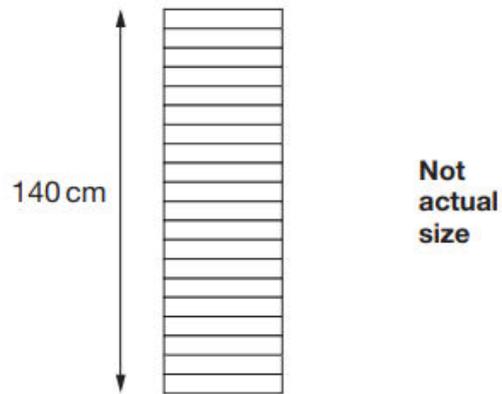
The grid is 20 units wide and 10 units high. A smaller empty box is located on the right side of the grid, approximately 15 units from the left edge and 4 units from the bottom edge, with a width of 5 units and a height of 2 units.

2 marks

1.

13

A stack of 20 identical boxes is 140 cm tall.



Stefan takes **three** boxes off the top.

How tall is the stack now?

Show your method

The grid is 10 units wide and 10 units high. A small rectangular box is drawn in the bottom right corner of the grid, containing the text "cm".

2 marks

Key Stage 2: 2016 Paper 3 Reasoning

1.

6

Jacob cuts **4** metres of ribbon into **three** pieces.

The length of the first piece is **1.28** metres.

The length of the second piece is **1.65** metres.

Work out the length of the third piece.

Show your method

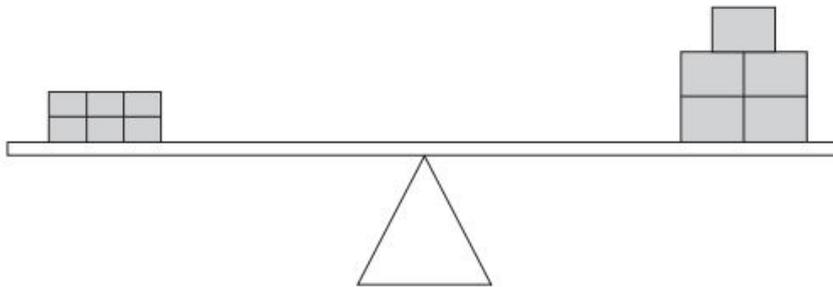
metres

2 marks

3.

16

6 small bricks have the same mass as 5 large bricks.



The mass of one small brick is 2.5 kg.

What is the mass of one large brick?

Show
your
method

A large rectangular grid for showing the method. The grid is 20 units wide and 10 units high. A rounded rectangle on the left side contains the text 'Show your method'. A smaller rectangle on the right side of the grid contains the text 'kg'.

2 marks

Key Stage 2: 2017 Paper 2 Reasoning

1.

8

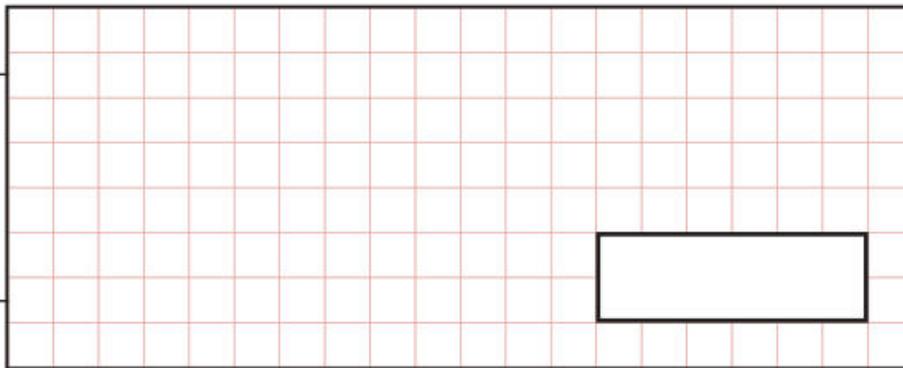
At the start of June, there were 1,793 toy cars in the shop.

During June,

- 8,728 more toy cars were delivered
- 9,473 toy cars were sold.

How many toy cars were left in the shop at the end of June?

Show
your
method



2 marks

Key Stage 2: 2017 Paper 2 Reasoning

2.

14

Amina planted some seeds.

For every 3 seeds Amina planted, only 2 seeds grew.

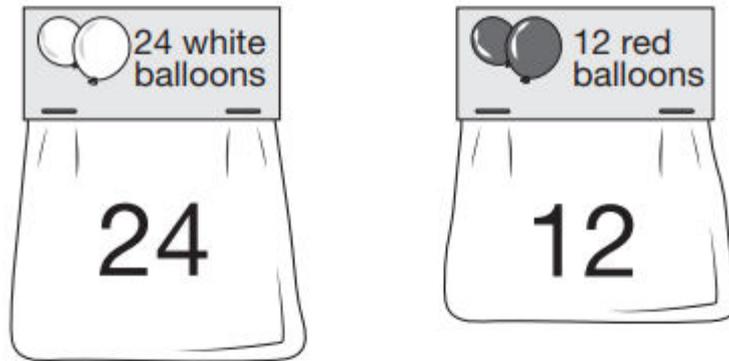
Altogether, 12 seeds grew.

How many seeds did Amina **plant**?

1 mark

1.

12



Adam buys 6 bags of white balloons.

Chen buys 3 bags of red balloons.

Adam says,

'I have four times as many balloons as Chen.'

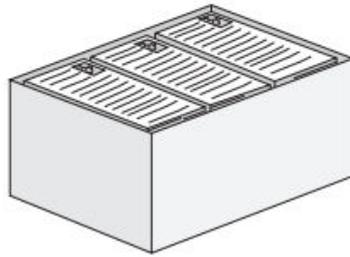
Explain why Adam is correct.

A large, empty, cloud-shaped box with a scalloped border, intended for the student to write their explanation.

1 mark

2.

16



There are 2,400 leaflets in a box.

William and Ally take 450 leaflets each.

Adam and Chen share the rest of the leaflets equally.

How many leaflets does Adam get?

Show
your
method

2 marks

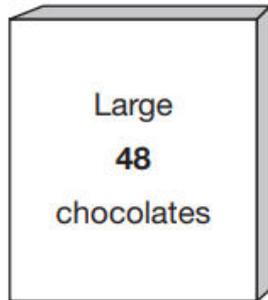
Key Stage 2: 2018 Paper 2 Reasoning

1.

8

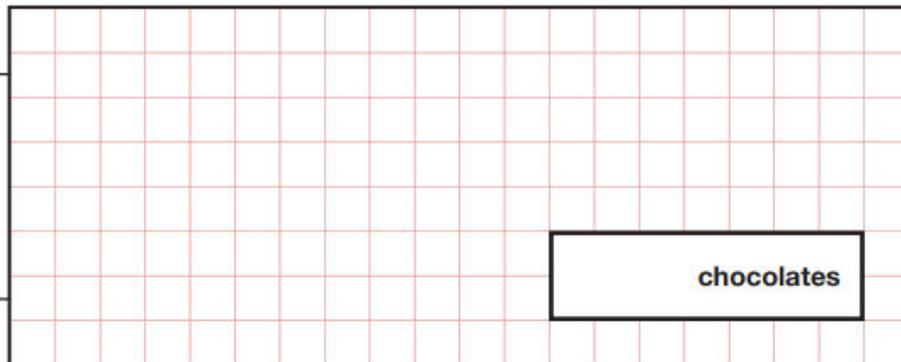
Ken buys 3 large boxes and 2 small boxes of chocolates.

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



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

Show
your
method



chocolates

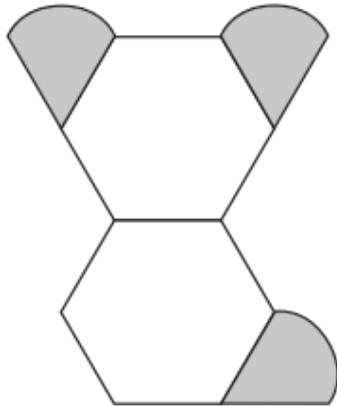
2 marks

3.

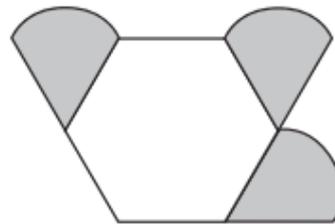
21

Amina is making designs with two different shapes.

She gives each shape a value.

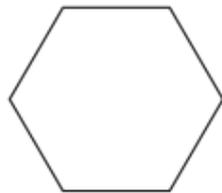


Total value is 147



Total value is 111

Calculate the value of each shape.



=

1 mark



=

1 mark

Key Stage 2: 2018 Paper 3 Reasoning

1.

7

A farmer is packing eggs.

Each box holds **six** eggs.



The farmer has 980 eggs to pack.

How many boxes can the farmer **fill** using 980 eggs?

full boxes

1 mark

How many eggs will be left over?

left over

1 mark

Key Stage 2: 2018 Paper 3 Reasoning

3.

20

In March, Ken collects 2, 3 or 4 eggs each day from his hens.

In the first 20 days, Ken collects 57 eggs altogether.

There are 31 days in March.

What is the **greatest** number of eggs Ken can collect in March?

Show your method

eggs

2 marks

Key Stage 2: 2019 Paper 2 Reasoning

1.

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 \times 3 + 24

number of tickets \times 24 + 3

number of tickets + 3 \times 24

number of tickets + 24 \times 3

1 mark

1.

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

A large grid of 20 columns and 20 rows of small squares, intended for the student to show their working out. A small rectangular box is placed in the bottom right corner of the grid, containing the word "beads".

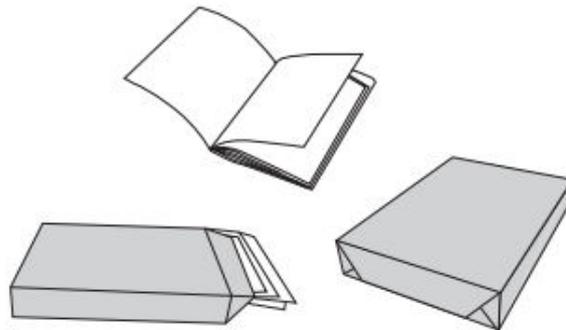
beads

3 marks

2.

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?

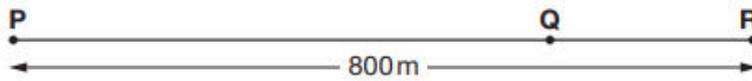
Show
your
method

booklets

2 marks

3.

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,

It is 600 metres from point **P** to point **Q**.

Explain why Olivia is **not** correct.

A large, empty, cloud-shaped box with a scalloped border, intended for the student to write their explanation.

1 mark