

NAME

**Non-calculator**

1. An art gallery hangs 7 small square pictures on a wall.

Each square picture has side length 11 cm.

a Write a calculation for the total area of the wall covered by pictures.

.....  
(1 mark)

b Work out the area of the wall covered by pictures.

.....  
(1 mark)

2 A flag flies at a height of 4.2 m.

The flag is lowered by 1.34 m, and then by a further 0.25 m.

Work out how high the flag flies now.

.....m  
(2 marks)

3 What is the missing number in this calculation?

$$42 \div \square = -6$$

.....  
(1 mark)

4  $3^3 + 5^2 = 2x$

Work out the value of  $x$ .

.....  
(2 marks)

5 Work out

a  $\sqrt{16 + 20}$

.....  
(1 mark)

b  $\frac{\sqrt[3]{125} + 10}{8 - 3}$

.....  
(2 marks)

6 Mark says, '81 is a square number. Therefore, 810 is a square number.'

Is Mark correct? Explain your answer.

.....  
.....  
(1 mark)

7 a Using  $68 \times 19 = 1292$ , write down a calculation that can be used to work out  $33 \times 38$

(1 mark)

b Use your calculation to work out  $33 \times 38$

.....  
(1 mark)

8 Charity raffle tickets raise £5467.50

The tickets state that the money raised will be divided equally among 12 charities.

Explain why this is not possible.

Show working to support your answer.

.....  
(2 marks)

9  $\sqrt{225} = \sqrt{a} \times \sqrt{b}$  where  $a \neq b$  and where  $a$  and  $b$  are whole numbers.

Find a possible pair of values for  $a$  and  $b$ .

.....  
(2 marks)



**Calculator**

**10** A farmer buys a tractor costing £19 975

He pays a deposit of £5890 and then 25 monthly payments.

Work out the farmer's monthly payments.

£.....

**(3 marks)**

**11** Anthony says the answer to  $(-10)^3$  is 1000

Anthony is not correct.

Explain why.

.....

.....

**(1 mark)**

**12** 8 square vegetable beds have a total area of  $11.52 \text{ m}^2$ .

Work out the side length of each vegetable bed.

.....m

**(3 marks)**

13 Work out  $20 - (\sqrt[3]{1331} + 3.5)$

.....  
(2 marks)

14  $800 = 2^5 \times 5^2$  when written as a product of its prime factors.

Write 1600 as a product of its prime factors, using index notation.

.....  
(2 marks)

15 The approximate surface area of a cone is calculated using this formula

$$A = \frac{22}{7}r \left( r + \sqrt{r^2 + h^2} \right)$$

Work out the surface area,  $A$ , of a cone, when  $r = 3$  and  $h = 4$

Give your answer to 2 decimal places.

.....cm  
(2 marks)

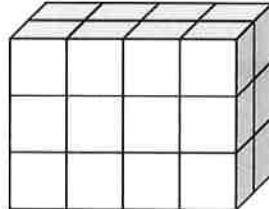
Overall mark	/30
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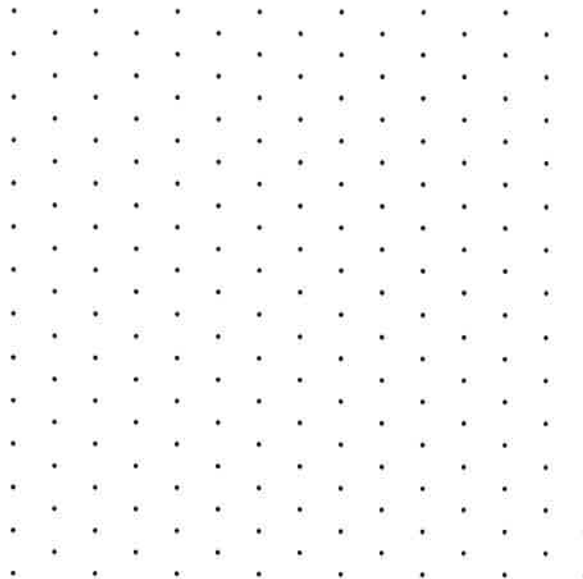
NAME

**Non-calculator**

1 A cuboid is made by joining together some centimetre cubes as shown below.



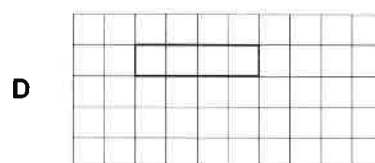
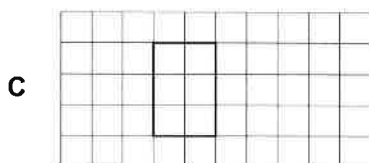
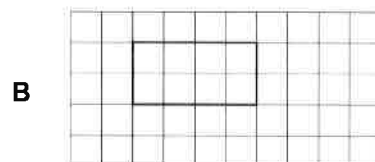
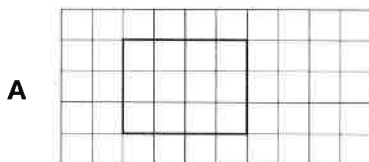
a Draw the cuboid on isometric paper.



(1 mark)

b One of the drawings below represents a **plan view** of the cuboid.

Circle the correct drawing.



(1 mark)

2 Write  $<$ ,  $>$  or  $=$  for each pair of quantities.

a 1 km 30 m  1.3 km

(1 mark)

b 3.2 m  3200 mm

(1 mark)

3 Sketch a net for a square based pyramid.



(2 marks)

4 A cube has a side of length 4 cm.

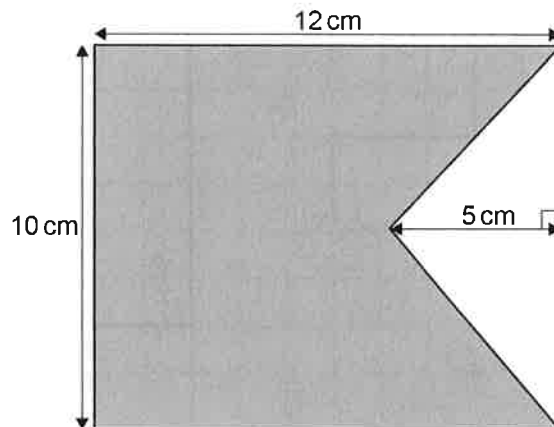
Calculate the surface area of the cube.

.....cm<sup>2</sup>

(2 marks)



- 5 The diagram shows a piece of card in the shape of a rectangle with length 12 cm and width 10 cm. A triangle of perpendicular height 5 cm is cut from the card.



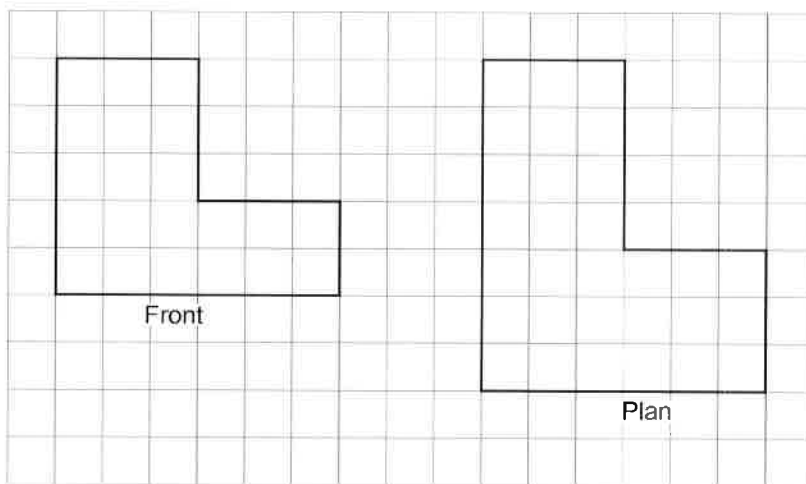
Enzo calculates the shaded area like this:

$$\begin{aligned}
 \text{shaded area} &= \text{area of rectangle} + \text{area of two triangles} \\
 &= 10 \times 7 + \frac{1}{2} \times 5 \times 5 + \frac{1}{2} \times 5 \times 5 \\
 &= 70 + 12.5 + 12.5 \\
 &= 95 \text{ cm}^2
 \end{aligned}$$

Show a different method to calculate the same shaded area.

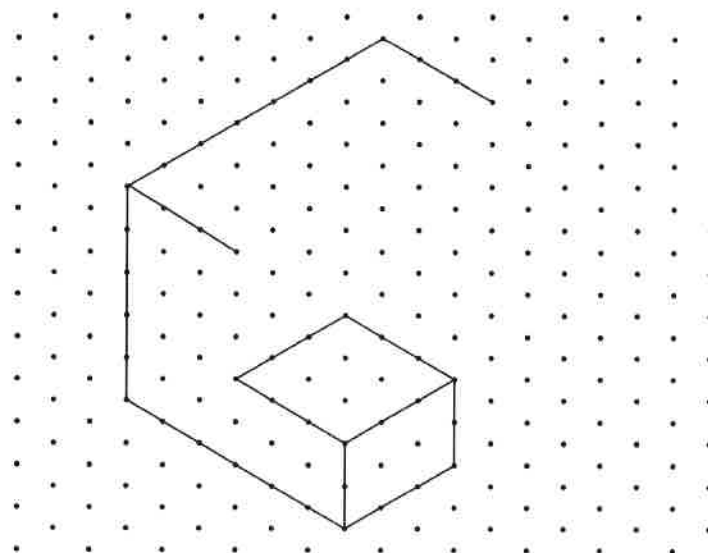
(2 marks)

6 The front elevation and plan view of a solid are drawn accurately on a centimetre grid.



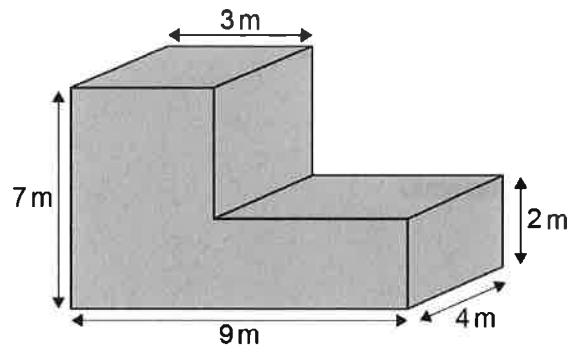
The solid has been partly drawn on isometric paper.

Complete this drawing of the solid.



(2 marks)

7 Here is a solid L-shaped prism.



a Calculate the volume of this solid.

.....cm<sup>3</sup>  
**(3 marks)**

b Calculate the total surface area of this solid.

..... cm<sup>2</sup>  
**(4 marks)**



**Calculator**

8 1 kg  $\approx$  2.2 lbs

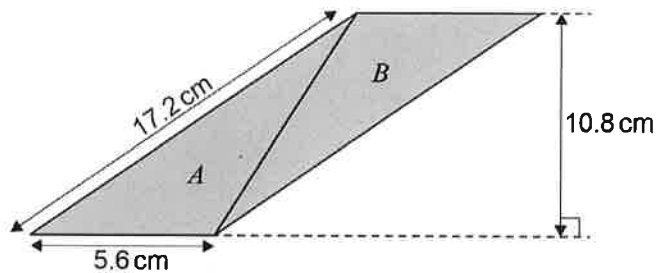
Simon weighs 165 lbs.

Estimate Simon's weight in kilograms.

.....kg

(1 mark)

9 The diagram below shows triangles *A* and *B* joined together to make a parallelogram.



a Calculate the area of triangle *A*.

.....cm<sup>2</sup>

(2 marks)

b Show that the area of *A* is equal to the area of *B*.

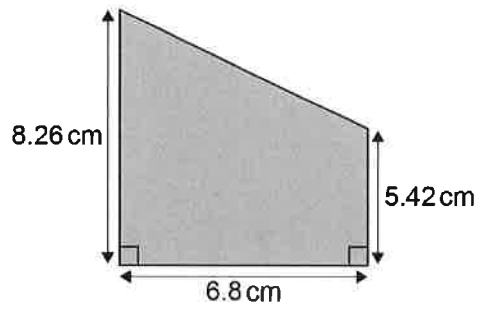
(1 mark)

10 Calculate the volume of a cube with side length 7 cm.

..... cm<sup>3</sup>

(1 mark)

11 Calculate the area of the trapezium.



.....cm<sup>2</sup>  
**(2 marks)**

12 A cube has a total surface area of 57.66 cm<sup>2</sup>.

a Find the area of one face of the cube.

.....cm<sup>2</sup>  
**(1 mark)**

b Find the length of one edge of the cube.

..... cm  
**(1 mark)**

13 Calculate the surface area of a cube of side length 0.8 m.

.....m<sup>2</sup>

**(2 marks)**

Overall mark	/30
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NAME

**Non-calculator**

1 Tariq measured the time students took to complete a times tables test.

The grouped frequency table shows the results.

Time, $t$ (seconds)	Tally	Frequency
$5 \leq t < 10$		
$10 \leq t < 15$	<del>    </del>	
$15 \leq t < 20$	<del>    </del> <del>    </del>	
$20 \leq t < 25$	<del>    </del>	
$25 \leq t < 30$	<del>    </del>	

Write down the modal class.

.....  
(1 mark)

2 The table shows the numbers of students winning gold, silver and bronze medals in different sports day events.

		Medals			Total
		Gold	Silver	Bronze	
Event type	Running			9	
	Throwing	5	7		21
Total			13		40

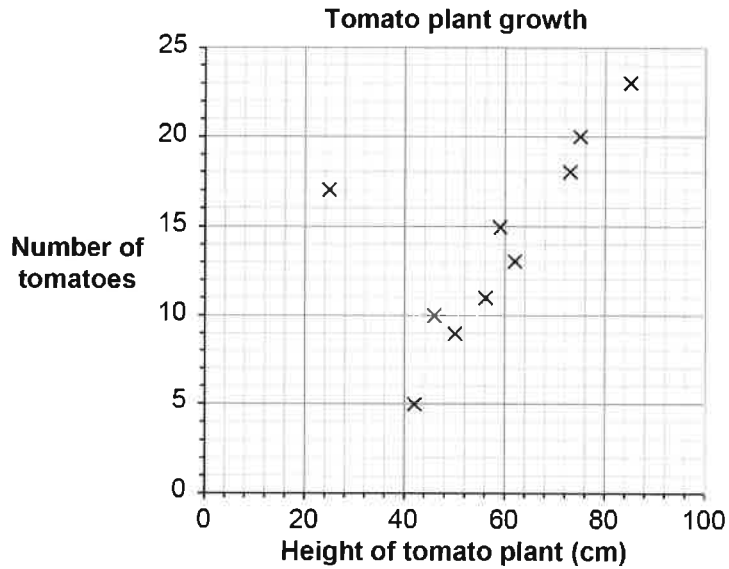
a Complete the table.

(2 marks)

b What percentage of students won a gold medal in a running event?

.....  
(2 marks)

3 This graph shows the heights of tomato plants and the numbers of tomatoes they produce.



The table shows data for two more tomato plants.

Height of tomato plant (cm)	Number of tomatoes
72	16
68	14

a Plot these on the scatter graph.

(1 mark)

b Describe the correlation shown by the scatter graph.

.....

.....

(1 mark)



4 This stem and leaf diagram shows the ages of people at a tennis club on Tuesday.



Key: 4 | 3 means 43

a What is the modal age of the people at the tennis club on Tuesday?

.....  
(1 mark)

This stem and leaf diagram shows the ages of people at the tennis club on Saturday.



Key: 1 | 6 means 16

b Which day had the higher median age? Explain how you know.

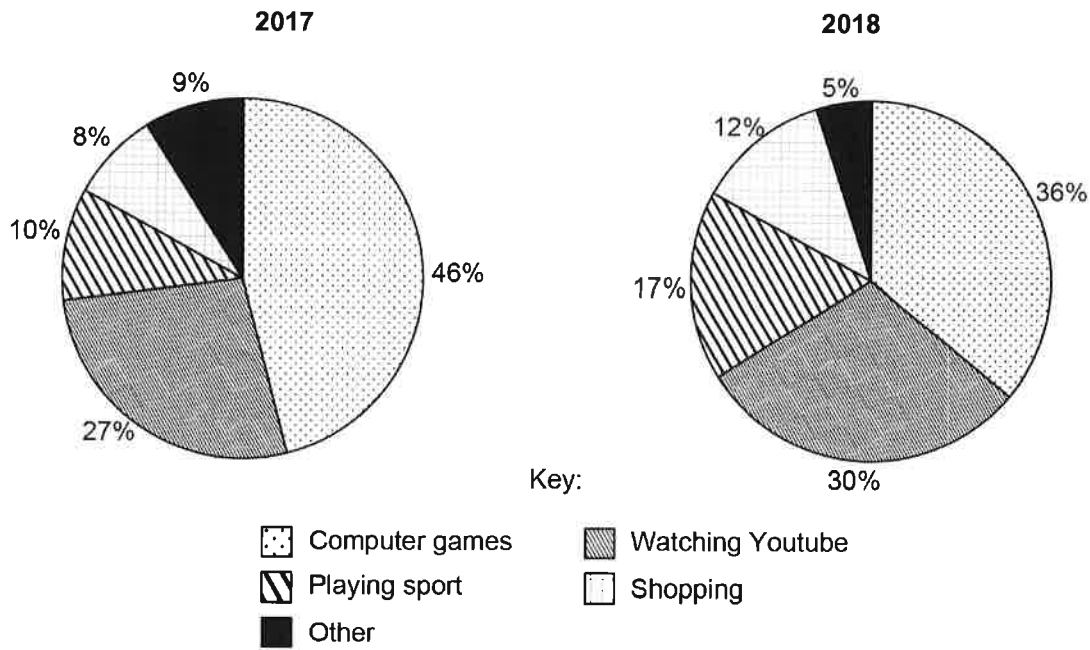
.....  
.....  
(1 mark)

c Which of the two days had the smaller range of ages?

Show your working clearly.

.....  
(2 marks)

5 The pie charts show the results of two surveys into students' favourite activities.



In 2017, 1000 students were surveyed.

In 2018, 1400 students were surveyed.

Lou says, 'More students in 2017 chose computer games.'

Is she correct? Show working to explain.

.....

.....

.....

.....

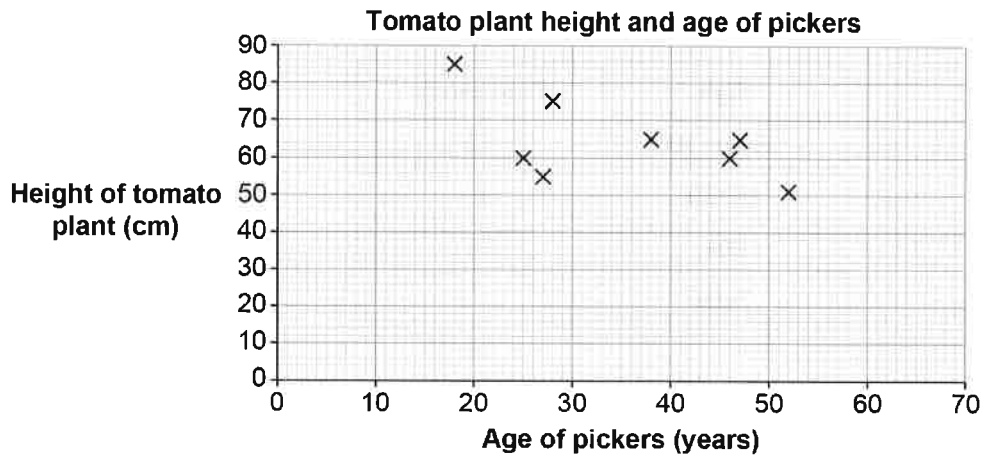
.....

.....

.....

(3 marks)

6 This scatter graph shows the heights of tomato plants and the ages of the tomato pickers.



a Describe the correlation.

.....

(1 mark)

b Is there likely to be a relationship between the height of tomato plants and the age of tomato pickers?

Explain your answer.

.....

.....

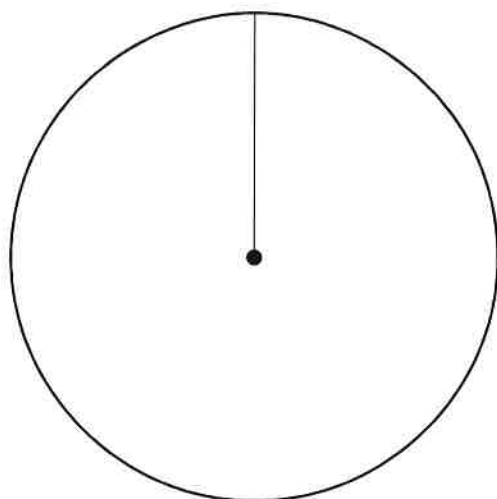
(1 mark)



**Calculator**

7 Draw a pie chart to show this data about the ages of people on a bus.

Age	Frequency
Under 16	12
16–59	8
60+	16
Total	



**(3 marks)**

8 The table shows the numbers of bicycles owned by different families in South Street.

Number of bicycles owned	Frequency
0	5
1	7
2	2
3	3
4	3

a Work out the range.

.....  
(1 mark)

The mean number of bicycles owned by families in South Street is 1.6

The mean and range of the numbers of bicycles owned by families in North Street are

Mean	Range
2	3

b Using the ranges and means, compare the numbers of bicycles owned by families in South Street with those in North Street.

.....

.....

.....

.....

.....

.....

(2 marks)

9 Here is information about the length of time, in minutes, of calls to a call centre.

1	3	8	12	14	4	12	2	11
22	13	5	6	1	23	25	16	2

a Calculate the mean length of these calls.

.....minutes

(2 marks)

b Complete the grouped frequency table for the data.

The classes in the table must have equal widths.

Time, $m$ (minutes)	Frequency
$0 \leq m < 5$	

(3 marks)

c What is the modal class?

.....

(1 mark)

d Which average do you think best describes the data?

State this average along with its value and explain your answer clearly.

.....

.....

.....

.....

(2 marks)

Overall mark	/30
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NAME
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**Non-calculator**

1 Simplify

a  $6x \times 3y$

.....  
(1 mark)

b  $3x \times x$

.....  
(1 mark)

c  $-2x \times 5x$

.....  
(1 mark)

d  $(8x)^2$

.....  
(1 mark)

2 Solve  $\frac{x}{4} = 3$

.....  
(1 mark)

3 Solve

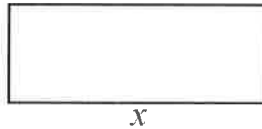
a  $8x - 5 = 35$

.....  
(1 mark)

b  $4(z + 7) = 36$

.....  
**(1 mark)**

4 The length of this rectangle is  $x$  cm.



The width of the rectangle is 5 cm shorter than its length.

a Write an expression for the width of the rectangle.

..... cm  
**(1 mark)**

b Write and simplify an expression for the perimeter of the rectangle.

..... cm  
**(2 marks)**

c Explain why the value of  $x$  must be greater than 5

.....  
 .....  
**(1 mark)**

- 5 Write an equation that has the solution  $x = -2$

.....  
(1 mark)

- 6 The length ( $L$ ) of a rectangle is twice its width ( $W$ ).

The rectangle is divided into two equal triangles.

Write an expression for the area of one of the triangles.

.....  
(1 mark)

- 7 Solve the equation  $3x - 23 = -8$

.....  
(1 mark)

- 8 Write an expression with brackets that expands to  $14x - 35$

.....  
(1 mark)

- 9 Factorise

a  $18y + 8$

.....  
(1 mark)

b  $a^2 + 11a$

.....  
(1 mark)

c  $10x^2 + 5x$

.....  
(2 marks)

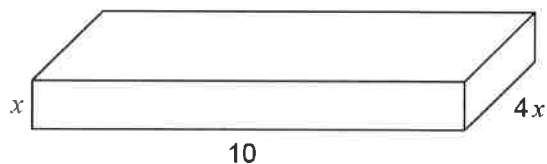


**Calculator**

10 Work out the value of  $k^3$  when  $k = 6$

.....  
(1 mark)

11 Here is a cuboid. All measurements are in cm.



Work out the volume of the cuboid when  $x = 4.5$  cm

.....cm<sup>3</sup>  
(2 marks)

12 The formula for the total surface area  $A$  of a cube of side  $c$  is  $A = 6c^2$

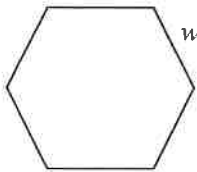
Calculate the total surface area of the cube when  $c = 8.5$  cm

..... cm<sup>2</sup>

(1 mark)

13 A regular hexagon has sides of length  $w$  cm.

Its perimeter is 102 cm.



a Write an equation in terms of  $w$  for the perimeter of the hexagon.

.....

(1 mark)

b Solve your equation to find  $w$

.....

(1 mark)

14 Solve the equation  $4(2f + 9) - 3f = 61$

You must show your working clearly.

$f =$  .....

(2 marks)

15 The smallest angle of a triangle, in degrees, is  $p$ .

The second angle is 4 times the smallest angle.

The third angle is 5 times the smallest angle.

a Write an equation for the angles in the triangle in terms of  $p$ .

.....  
(1 mark)

b Find the size of the largest angle in the triangle.

.....°  
(2 marks)

Overall mark	/30
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NAME

**Non-calculator**

1 Abdul leaves home at 10 am and walks 0.5 km to the bus stop.

He arrives at the bus stop at 10.15 am and waits 15 minutes for a bus.

The bus journey to the gym is 2.5 km.

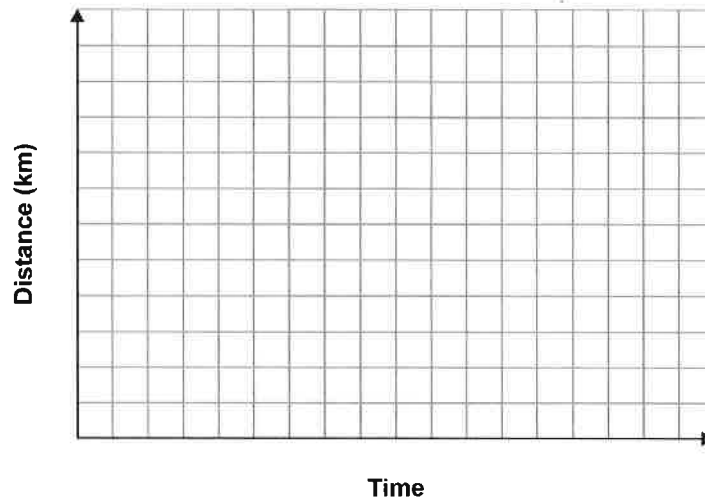
He arrives at the gym at 10.45 am.

He stays at the gym for  $1\frac{1}{2}$  hours.

Then he jogs home, which takes  $\frac{1}{2}$  hour.

a Draw a distance–time graph for Abdul's journey.

**Abdul's journey**



**(3 marks)**

b Abdul's mother had lunch ready at 1 pm.

Was Abdul home in time for lunch? Explain.

.....

.....

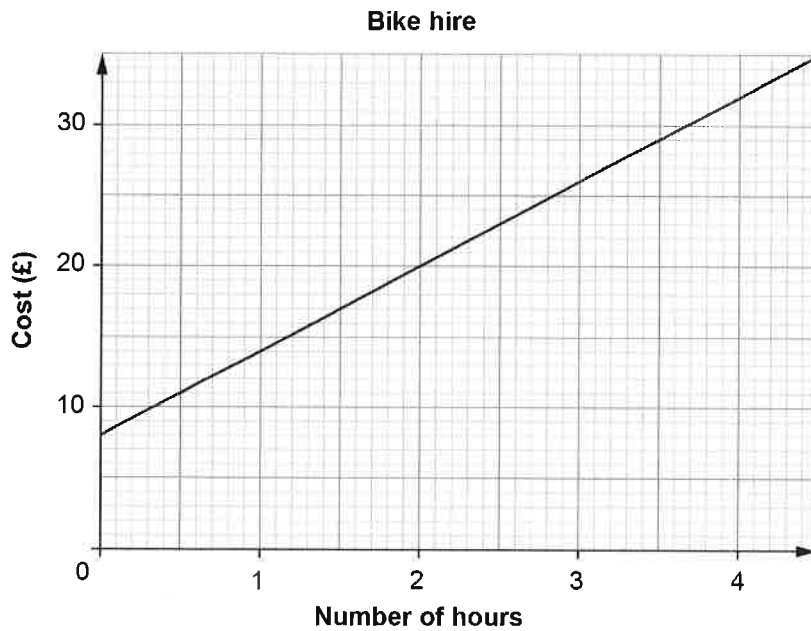
**(1 mark)**

c What was Abdul's speed on his jog home?

..... km/h

**(1 mark)**

2 The graph shows the cost of hiring a bike.



Jade pays £29.

a How many hours does she hire the bike for?

..... hours

(1 mark)

The cost includes a basic fee and a cost per hour.

b How much is the basic fee?

£.....

(1 mark)

c How much is the cost per hour?

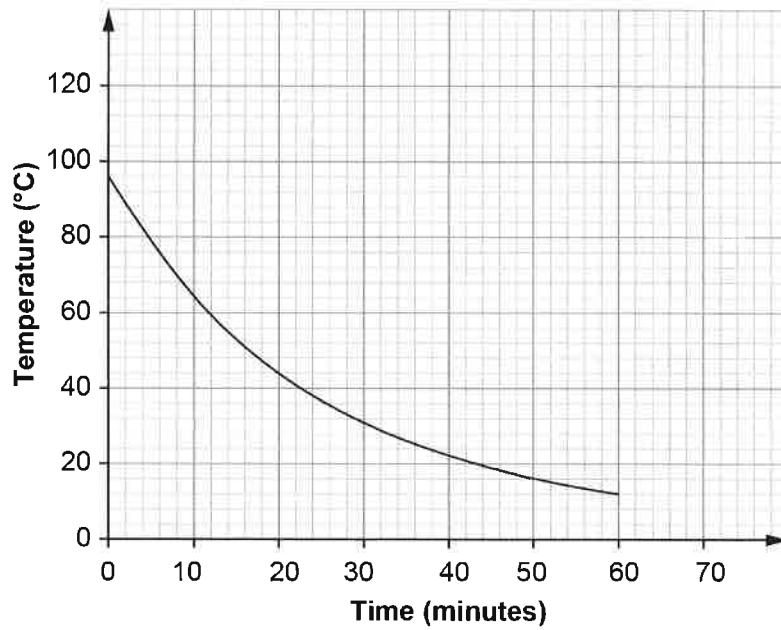
£.....

(1 mark)



3 The graph shows how the temperature of a cup of tea changes over time.

Temperature of a cup of tea



a Was the tea getting hotter or colder? Explain how you know.

.....

.....

(1 mark)

b What was the starting temperature of the cup of tea?

.....°C

(1 mark)

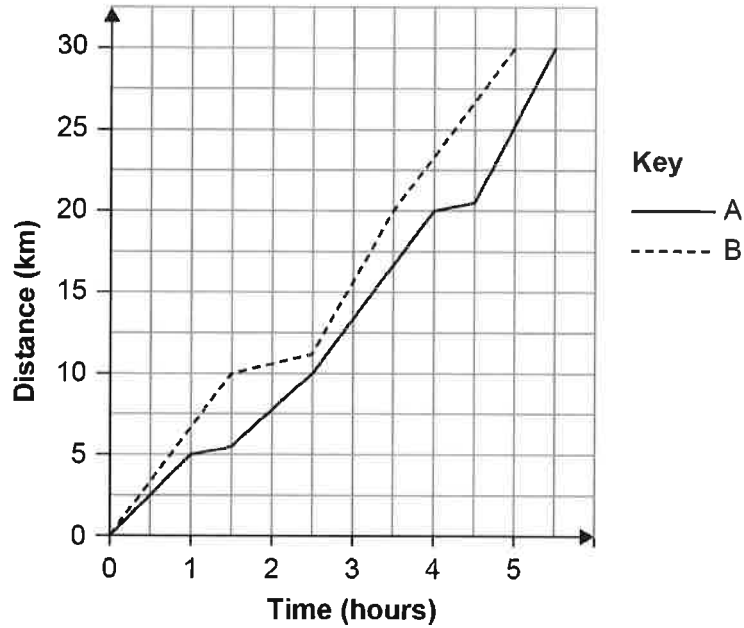
c How long did it take for the tea to cool to 40 °C?

.....minutes

(1 mark)

4 The graphs show the distances and times for two paddleboarders.

Paddleboarding race



Which paddleboarder won the race? Explain how you know.

.....

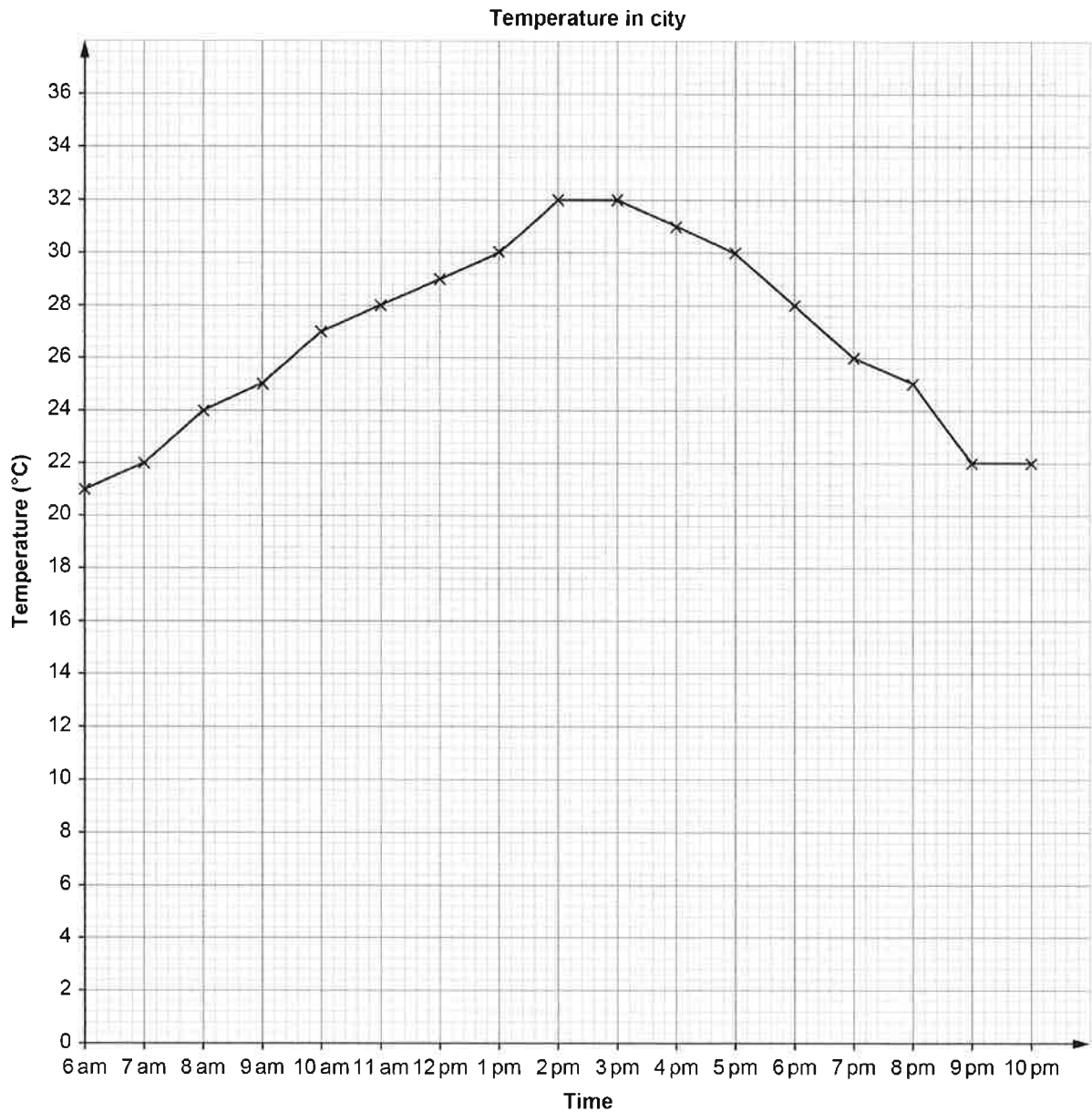
.....

.....

.....

(2 marks)

5 The graph shows the temperature in a city over a 16-hour period.



Reyan doesn't like to be outside when it is hotter than 30 °C.

Between what times should Reyan stay inside?

..... and .....

(2 marks)



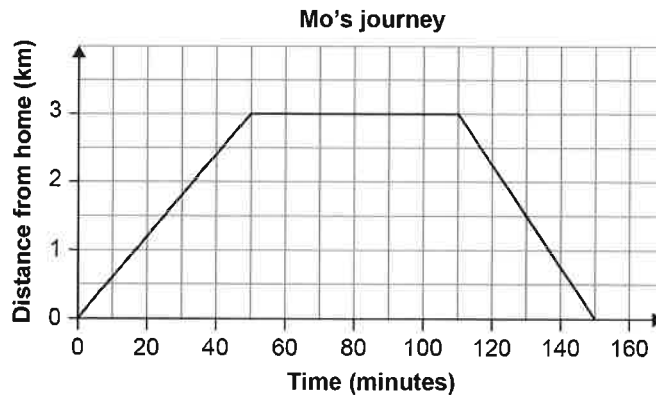
**Calculator**

6 Mo walks into town.

He spends some time at the shops.

Then he walks home.

The distance–time graph shows his journey.



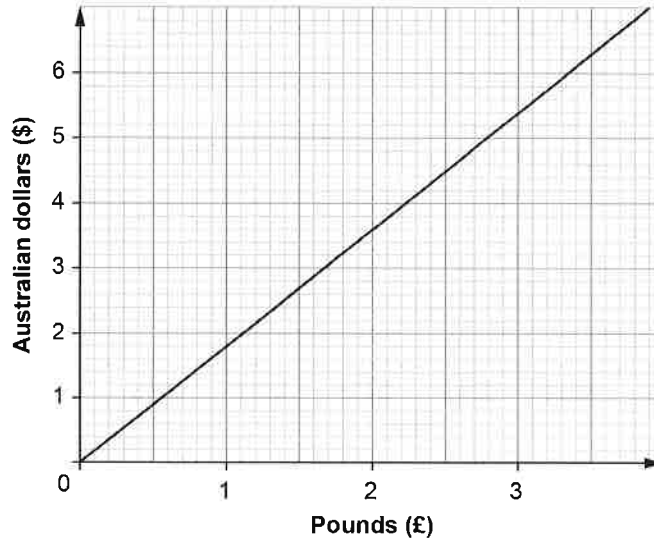
How long did Mo stay in town?

..... minutes

**(1 mark)**

7 This graph converts between Australian dollars (\$) and pounds (£).

Australian dollar/pound conversion graph



a Convert £9 to Australian dollars.

\$.....

(2 marks)

b The same toy costs £5.50 in Britain, and \$8.70 in Australia.

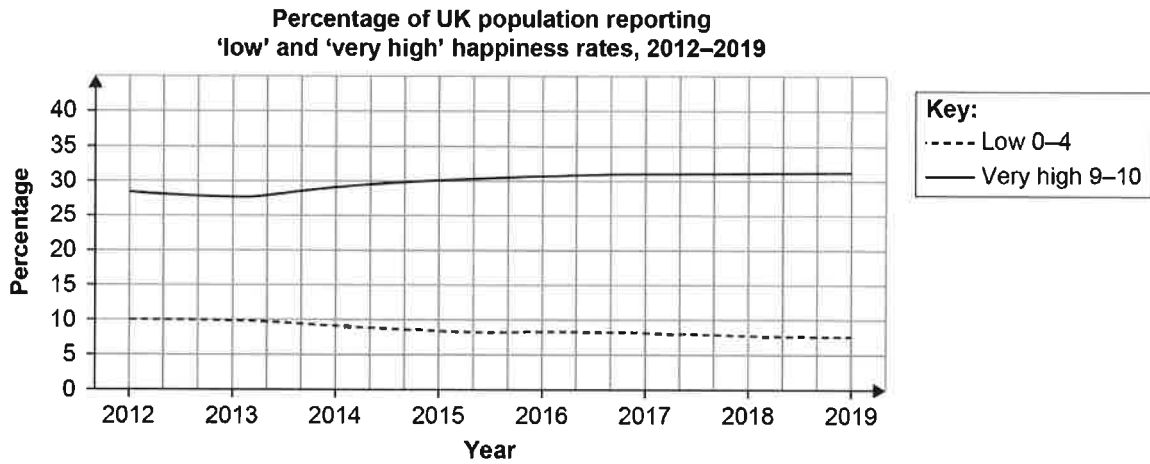
In which country is the toy cheaper?

Show working to explain.

.....

(3 marks)

8 People were asked to rate their happiness from 1 to 10. The graph shows the results.



a Estimate the percentage of people who reported low happiness rates in 2014.

..... %

**(1 mark)**

b Calculate an estimate for the difference in the percentage of people reporting high happiness rates between 2012 and 2019.

..... %

**(2 marks)**

c Claire says, 'More people reported very high happiness rates in 2019 than in 2012.'

Explain why you cannot tell if Claire is correct from the graph.

What information would you need to check if she is correct?

.....

.....

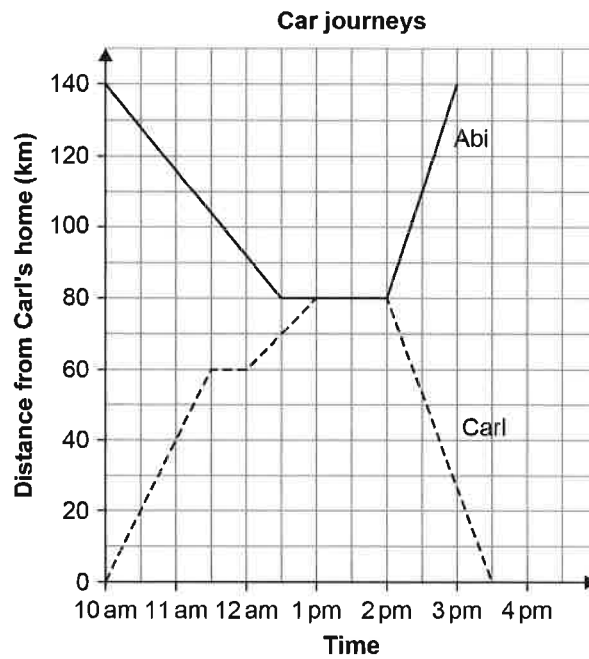
.....

.....

**(2 marks)**

9 Abi and Carl drove from their homes to meet each other.

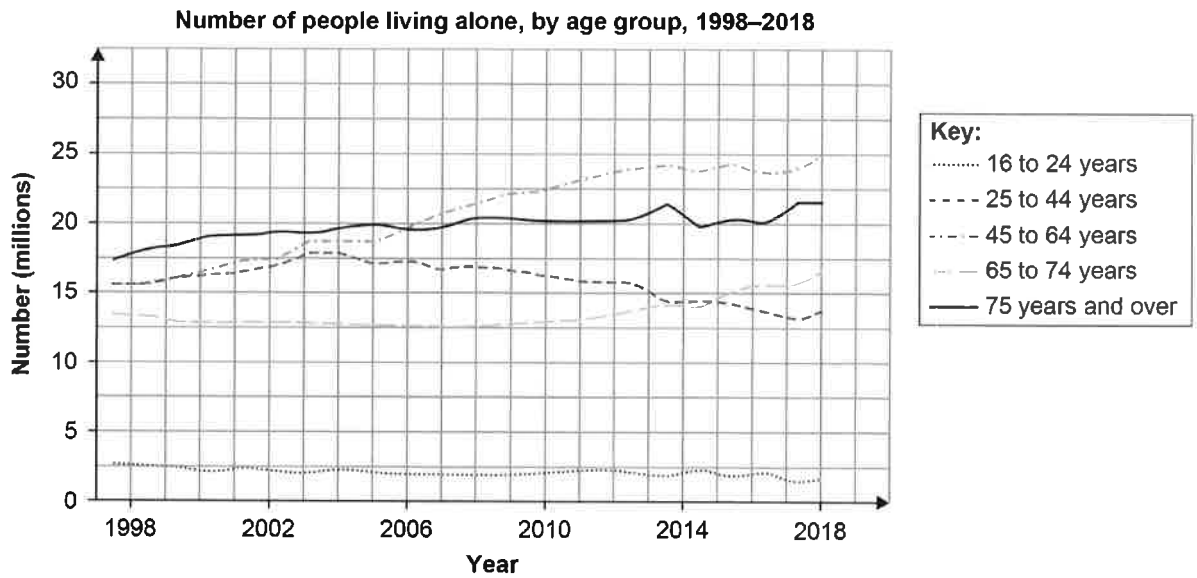
The graph shows their journeys.



Who travelled faster on their way home? Show working to explain.

.....  
(2 marks)

10 The graph shows the numbers of people living alone, for different age groups in the UK.



In 2018, approximately 80 million people in the UK were living alone.

Calculate an estimate of the percentage of people living alone in 2018 who were aged 16–24 years.

..... %  
(2 marks)

Overall mark	/30
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NAME
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**Non-calculator**

1 A farmer plants 124 rows of cabbages.

Each row has 38 cabbages.

Work out the total number of cabbages the farmer plants.

.....  
(2 marks)

2 Work out  $74.4 \div 0.6$

.....  
(2 marks)

3 Angus works out  $0.2 \times 0.4$

He says the answer is 0.8

Is Angus correct? Explain why.

.....  
.....  
(1 mark)

- 4 A piece of wood is 2.4 m long.

It is cut to make drumsticks.

Each drumstick is 0.4 m long.

How many drumsticks are made from the piece of wood?

.....  
(2 marks)

- 5 The length of an armchair is 0.95 m.

A three-seater sofa is 2.2 times longer.

Work out the length of the three-seater sofa.

.....m  
(2 marks)

- 6 The distance from Mars to the Sun is 227 940 000 km.

Write this distance as a decimal number of millions correct to 1 decimal place.

..... million km  
(2 marks)

7  $36.4 \times 0.18 = 6.552$

Larry says, 'This means that  $65.52 \div 0.18 = 364$ '

Is Larry correct? Explain why.

.....

.....

.....

.....

(2 marks)

8 A recipe for hot chocolate requires

4 cups of milk

$\frac{1}{4}$  cup of chocolate powder

$\frac{1}{3}$  cup of honey

Write the ratio of milk to chocolate powder to honey as a whole number ratio in its simplest form.

.....

(2 marks)

9 Ben's garden is 1.9 m shorter than Faisal's garden.

Amy's garden is three and a half times longer than Faisal's garden.

Amy's garden is 36.05 m long.

How long is Ben's garden?

.....m

**(4 marks)**



### Calculator

10 Write the ratio 4 : 18.8 as a ratio using only whole numbers.

Give your answer in its simplest form.

.....

**(2 marks)**

11 5 cooks, 13 waiters and 4 other staff work at a restaurant.

- a What is the ratio of cooks to waiters to other staff?

.....  
(1 mark)

The tips are shared equally between all the workers.

- b One evening the tips total £338.10

How much do the waiters get in total? Give your answer to the nearest penny.

£.....  
(2 marks)

- c Another cook starts working at the restaurant.

What proportion of the tips do the cooks get now?

.....  
(1 mark)

12 Share £28.08 in the ratio 7 : 5

£.....  
£.....  
(2 marks)

13 The angles of a triangle are in the ratio 11 : 15 : 10

What is the size of the largest angle?

.....°  
(3 marks)

Overall mark	/30
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NAME

**Non-calculator**

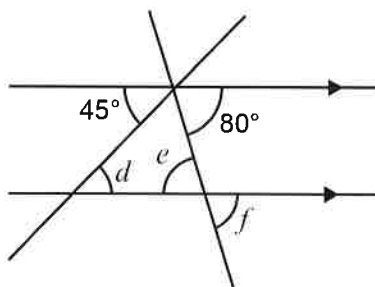
1 Name the quadrilateral that matches this description:

- two pairs of equal sides
- no parallel sides

.....  
(1 mark)

2 Write the sizes of the angles marked with letters in this diagram.

Give a reason for each answer.



$d =$  .....

Reason: .....

$e =$  .....

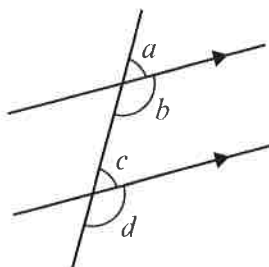
Reason: .....

$f =$  .....

Reason: .....

(3 marks)

3 For this diagram



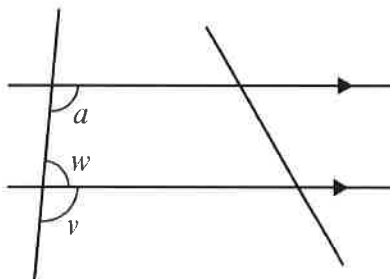
Maya says, 'a and d are corresponding angles, because they are both on the same side of the line.'

What mistake has Maya made?

.....  
 .....

(1 mark)

4 Here is a trapezium drawn between two parallel lines.



Complete these statements.

a angle  $v =$  angle  $a$  because .....

(1 mark)

b angle  $w = 180 -$  angle  $v$  because .....

(1 mark)

c angle  $w = 180 -$  angle  $a$  so:  
 angle  $a +$  angle  $w =$  angle  $a + 180 -$  angle  $a =$  ..... $^{\circ}$

(1 mark)

d the two angles between the parallel lines, on the same side of a trapezium, add up to .....

(1 mark)



5 Sam says, 'The sum of the interior angles of any polygon is  $360^\circ$ '

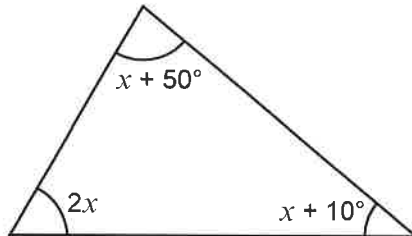
Explain why Sam is incorrect.

.....

.....

(1 mark)

6 Work out the size of the largest angle in this triangle.



.....

(3 marks)

7 A parallelogram has

- opposite sides equal in length
- opposite sides parallel
- opposite angles equal
- diagonals bisect each other.

Explain with reasons which of these shapes are special types of parallelogram.

rhombus                  square                  kite                  rectangle

.....

.....

.....

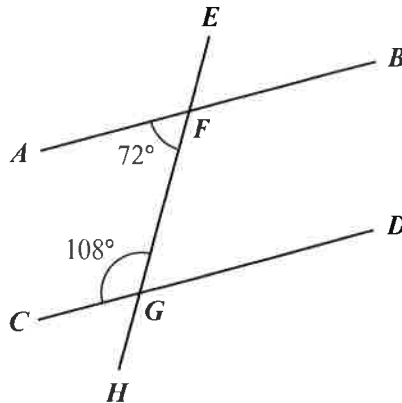
.....

.....

.....

(3 marks)

8 Use angle facts to explain how you know that the lines  $AB$  and  $CD$  are parallel.



.....

.....

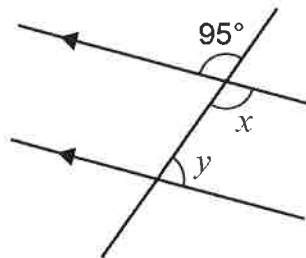
(1 mark)



**Calculator**

9 Write the sizes of the angles marked with letters in this diagram.

Give a reason for each of your answers.



$x = \text{.....}^\circ$

Reason: .....

.....

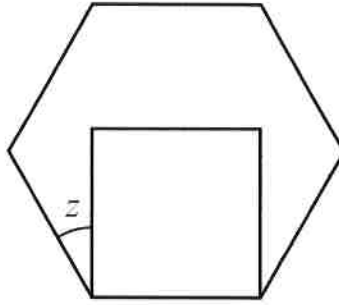
$y = \text{.....}^\circ$

Reason: .....

.....

(4 marks)

10 The diagram shows a square inside a regular hexagon.



Work out the size of angle  $z$ .

.....°

**(3 marks)**

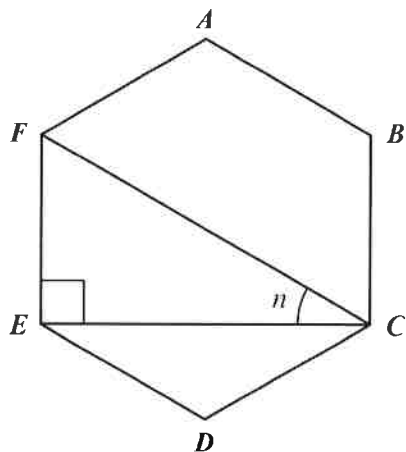
11 The exterior angle of a regular polygon is  $18^\circ$

What is the sum of its interior angles?

.....°

**(2 marks)**

12  $ABCDEF$  is a regular hexagon.



Work out the size of the angle labelled  $n$ .

.....°  
(4 marks)

Overall mark	/30
--------------	-----

NAME
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**Non-calculator**

1 Work out

$$8 \times \frac{6}{7}$$

Give your answer as a mixed number in its simplest form.

.....  
**(2 marks)**

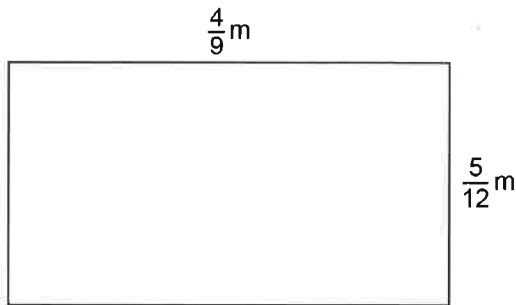
2 Work out

$$\frac{7}{12} + \frac{3}{4}$$

Give your answer as a mixed number in its simplest form.

.....  
**(2 marks)**

3 Work out the area of this rectangle.



Give your answer as a fraction in its simplest form.

.....m<sup>2</sup>  
(2 marks)

4 Anna works out  $\frac{1}{9} + \frac{5}{18}$

She writes the answer  $\frac{6}{27}$

Explain what Anna has done wrong.

.....

.....

(1 mark)

5 Crista makes 10 pizzas for a party.

She assumes each of her friends will eat  $\frac{2}{5}$  of a pizza.

If Crista's assumption is correct, how many people will her 10 pizzas feed?

.....  
(2 marks)

- 6 Antony says that  $3\frac{5}{6} - 2\frac{1}{2}$  gives the same answer as  $7 \div 5\frac{1}{4}$

Show that Antony is correct.

(5 marks)

- 7  $\frac{5}{12}$  of a number is 20

What is the number?

.....  
(2 marks)

8 Work out

$$\frac{2}{7} \text{ of } \left( 3 \times \frac{4}{15} \right)$$

Give your answer as a fraction in its simplest form.

.....  
(3 marks)



### Calculator

9 Write these fractions in ascending order of size.

$$\frac{3}{5} \quad \frac{5}{12} \quad \frac{1}{2} \quad \frac{2}{3}$$

.....  
(2 marks)

10 The reciprocal of a fraction is  $1\frac{1}{2}$

What is the fraction?

.....  
(1 mark)



11 Sunil is thinking of a fraction. He says:

'My fraction has a denominator of 16.

It is larger than  $\frac{1}{2}$  and it is smaller than  $\frac{3}{4}$

The fraction cannot be simplified.'

Write down all the possible fractions Sunil could be thinking of.

.....  
(2 marks)

12  $\frac{7}{12}$      $\frac{5}{8}$      $\frac{11}{24}$

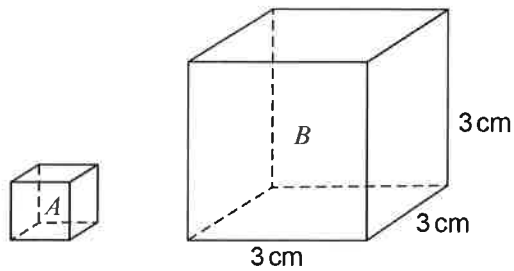
a Work out the median of these fractions.

.....  
(2 marks)

b Work out the range of these fractions.

.....  
(1 mark)

13 The sides of cube *A* are one tenth of the length of the sides of cube *B*.



Work out the volume of cube *A*.

Give your answer as a fraction.

.....cm<sup>3</sup>  
(3 marks)

Overall mark	/30
--------------	-----

NAME

**Non-calculator**

1 The stem and leaf diagram shows the ages of people visiting a library one day.



Key: 2 | 1 means 21

a Work out the range.

.....  
(1 mark)

b Find the median.

.....  
(2 marks)

c How many of the visitors were older than the modal age?

.....  
(2 marks)

2 Simplify

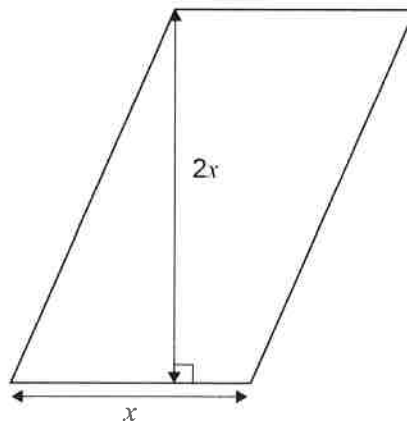
a  $3x \times 4x$

.....  
(1 mark)

b  $c \times 6c$

.....  
(1 mark)

3 a Write an expression for the area of this parallelogram.



.....  
(1 mark)

b Use your expression to find the area of the parallelogram when  $x = 4$  cm.

.....  
(1 mark)

- 4 Find the missing terms so that the following is correct:

$$7(x + \square) = \square + 21$$

..... and .....

**(2 marks)**

- 5 A cuboid has width 10 cm and height 4 cm. It is filled with water.

The water from the cuboid is then poured into an empty cube of side length 8 cm.

The cube is three quarters full with water.

Calculate the length of the cuboid.

.....cm

**(3 marks)**

6 Here are some babies' weights, in kilograms.

- 3.8 2.5 3.6 2.8 2.7 4.1 3.2 4.4 2.6 4.6
- 3.1 2.8 3.3 2.6 2.5 4.3 4.5 3.9 2.7 4.7

Complete the grouped frequency table for the data.

The classes in your table must have equal widths.

Weight, $w$ (kilograms)	Tally	Frequency
$2.5 \leq w < 3.0$		8

(3 marks)

7 A number is written as a product of its prime factors as  $2^3 \times A^2$

The number is in the 12 times table.

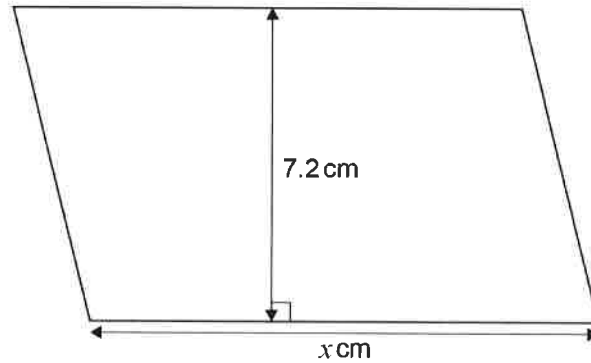
What must  $A$  be?

.....  
(1 mark)



**Calculator**

8 The diagram shows a parallelogram with an area of  $50 \text{ cm}^2$ .



Work out the value of  $x$ .

Give your answer correct to 1 decimal place.

..... cm  
(2 marks)

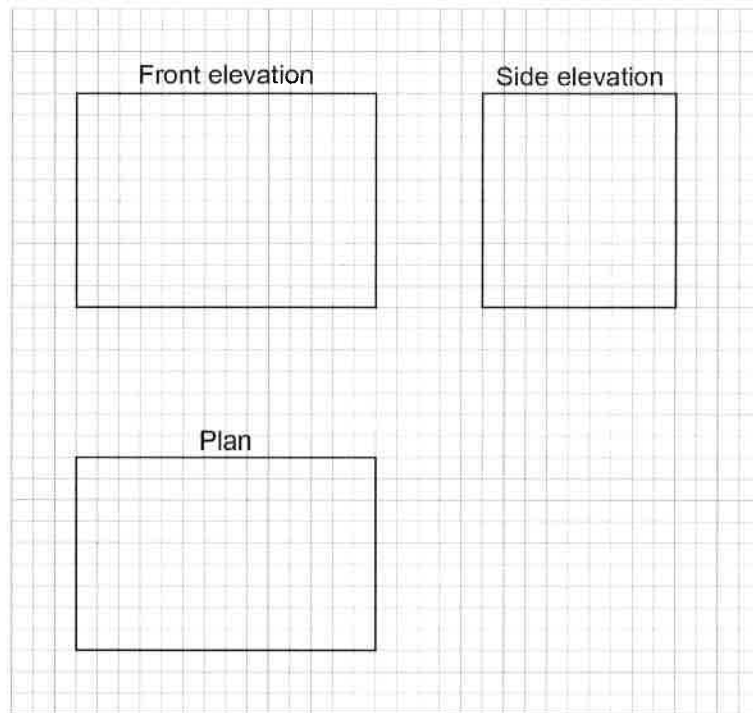
9 Work out the volume of a cube with side length 3.8 mm.

Give your answer to 1 decimal place.

..... mm<sup>2</sup>  
(2 marks)

10 The diagram shows the plan and elevations of a fish tank.

The diagrams are drawn on a 1 cm squared grid.



a Work out the volume of the fish tank.

.....  
(2 marks)

All five faces of the fish tank are made from glass.

b Calculate the area of glass used to make the fish tank.

.....  
(3 marks)



11 a Write 45 as a product of its prime factors.

.....  
(2 marks)

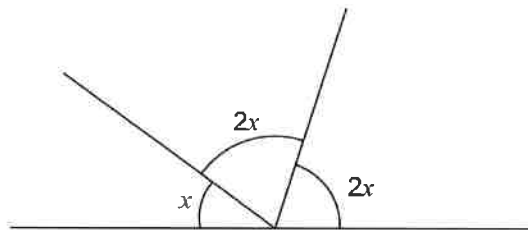
b Write 120 as a product of its prime factors, using index notation.

.....  
(2 marks)

c Use your answers to parts a and b to find the LCM (lowest common multiple) of 45 and 120.

.....  
(1 mark)

12 Write and solve an equation to work out the value of  $x$



.....  
(2 marks)

13 A company is replacing an old machine.

The new machine costs £67 082

Four staff will be trained to use the new machine.

The training course costs £249 per person.

The company will sell the old machine for £17 500

Work out if replacing the old machine will cost the company more than £50 000

Show your working clearly.

.....  
(3 marks)

14  $a = 2$ ,  $b = -4$  and  $c = -5$

Calculate  $x$  when  $x = \sqrt{b^2 - 4ac}$

Give your answer to 1 decimal place.

.....  
(1 mark)

15 A number is entered into a calculator.

Then, these two keys are pressed, in this order:

$$\sqrt{x}$$

$$x^3$$

The calculator shows the answer 1331

What number was entered into the calculator?

.....  
(2 marks)

Overall mark	/40
--------------	-----



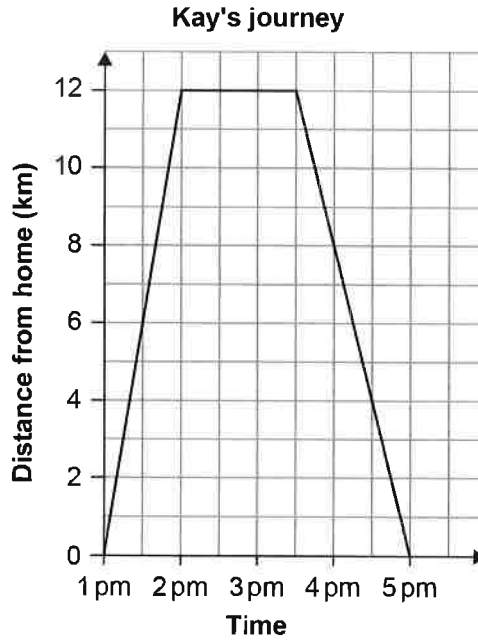
NAME

**Non-calculator**

1 Kay cycles to the swimming pool.

She stays there for a while and then cycles home.

The distance–time graph shows her journey.



a How long did Kay stay at the swimming pool?

.....  
**(1 mark)**

b When did Kay cycle faster: on her way to the pool or on the way home?

Explain how you know.

.....  
 .....  
**(1 mark)**

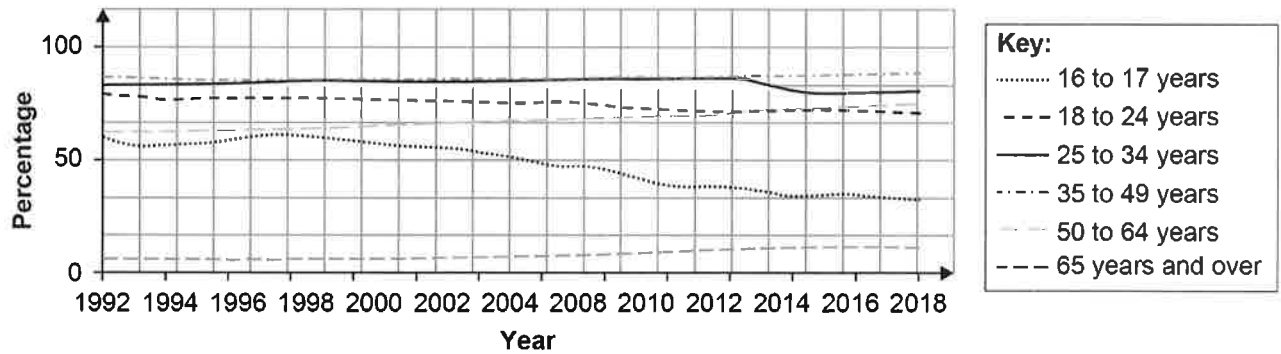
2 Write this list of decimal numbers in descending order.

-3.5, -3.15, -4, -3.145

.....  
(2 marks)

3 The graph shows the percentage of the population working or looking for work, for different age groups in the UK.

**Percentage of UK population working or looking for work, by age group, 1992 to 2018**



a Which age group shows the greatest decrease in the percentage of people working or looking for work from 1992 to 2018?

.....  
(1 mark)

b Which two age groups show a slight increase in the percentage of people working or looking for work from 1992 to 2018?

..... and .....  
(2 marks)

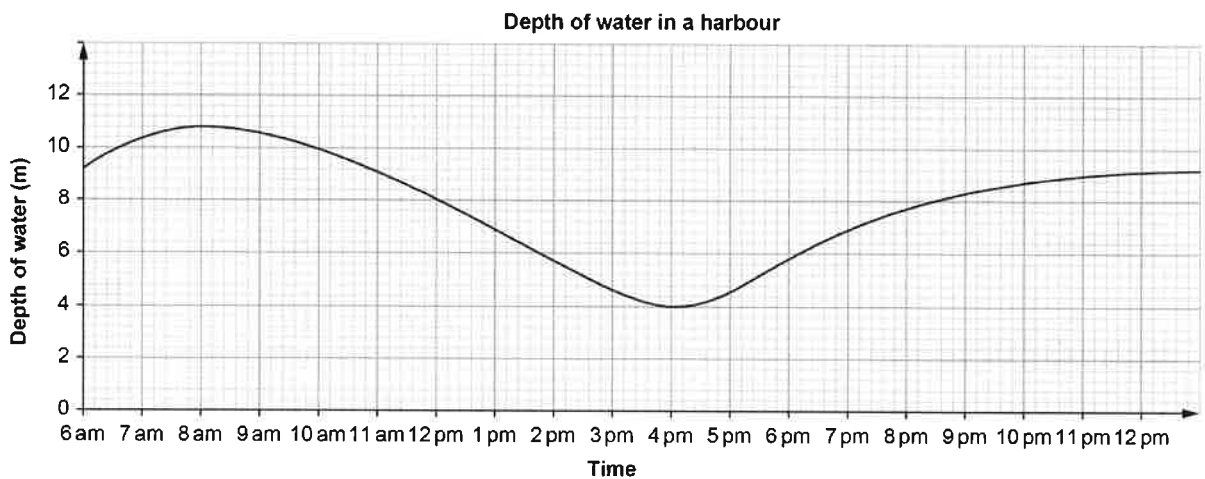
4 The west stand of a stadium has 108 rows.

Each row has 216 seats.

How many seats are in the west stand?

.....  
(2 marks)

5 The graph shows the depth of water in a harbour over an 18-hour period.



a What was the minimum depth of water in the harbour?

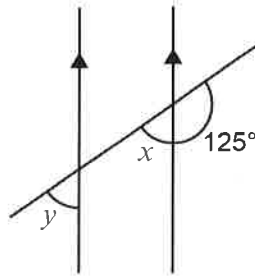
.....  
(1 mark)

b At what time did this minimum depth occur?

.....  
(1 mark)

6 Work out the size of each angle labelled with a letter.

Give reasons.



$x = \dots\dots\dots$

Reason:  $\dots\dots\dots$

$y = \dots\dots\dots$

Reason:  $\dots\dots\dots$

**(2 marks)**

7 Angus works out  $0.2 \times 0.4$

He says the answer is 0.8

Is Angus correct? Explain your answer.

$\dots\dots\dots$   
 $\dots\dots\dots$

**(1 mark)**

8 A tree trunk is 3.2 m long.

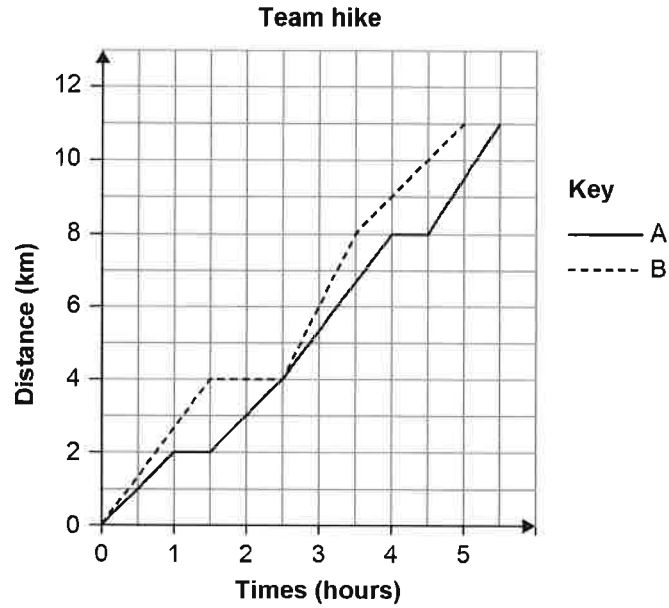
It is split into logs. Each log is 0.4 m long.

How many logs are made from the tree trunk?

$\dots\dots\dots$   
**(2 marks)**



9 The graphs show the distances and times for two teams in a hiking race.



a Manish says that team A spent more time resting than team B.

Is Manish correct? Explain your answer.

.....

.....

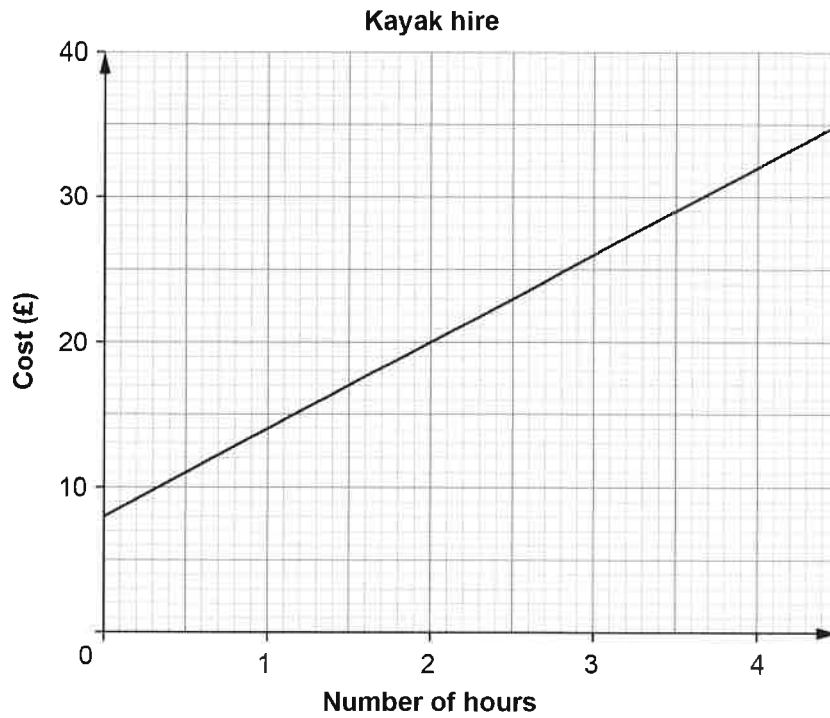
(1 mark)

b After team A and team B met, how much further did they hike?

..... km

(2 marks)

10 The graph shows the cost of hiring a kayak from Kate's Kayaks.



a How much does it cost to hire a kayak from Kate's Kayaks for 5 hours?

£.....

(1 mark)

b Dav's Kayaks charge £10 per hour and no basic fee.

Draw a line on the graph to show this.

(2 marks)

c When is it cheaper to hire a kayak from Dav's Kayaks than from Kate's Kayaks?

.....

(1 mark)

11 Write this ratio in the form  $1 : n$

40 : 840

.....  
(1 mark)

12 The UK population is estimated to be 66 435 600

Write this number as a decimal number of millions to 2 decimal places.

.....  
(1 mark)

13  $490.42 \div 7.91 = 62$

Tim says that this means

$$79.1 \times 0.62 = 4.9042$$

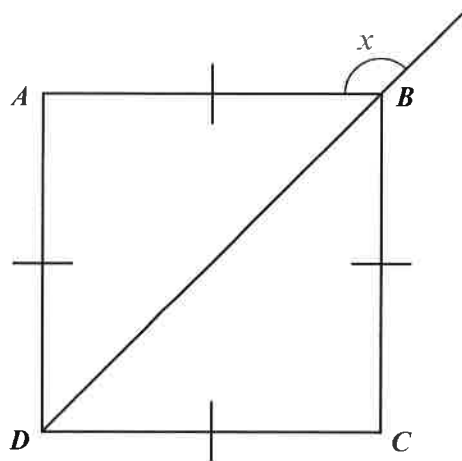
Is Tim correct? Explain your answer.

.....  
.....  
(1 mark)



**Calculator**

14  $ABCD$  is a square.



Work out the size of angle  $x$ .

$x = \dots\dots\dots^\circ$   
(2 marks)

15 Write this ratio as a whole number ratio in its simplest form.

12 : 16.8

$\dots\dots\dots$   
(2 marks)

16 Belle says, 'The sum of the interior angles of a hexagon is  $6 \times 180^\circ = 1080^\circ$ .'

a What mistake has she made?

.....  
.....

(1 mark)

b What is the correct sum of the interior angles of a hexagon?

.....°

(1 mark)

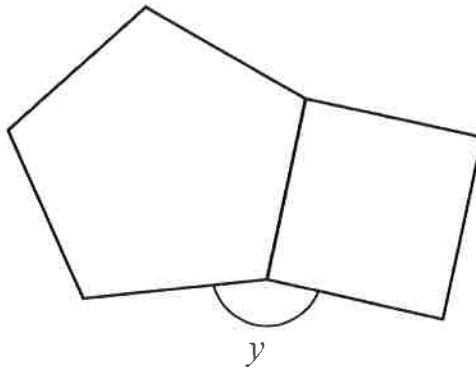
17 Share £17.28 in the ratio 5 : 4

.....

(2 marks)

18 The diagram shows a regular pentagon and a square that are joined together with a side in common.

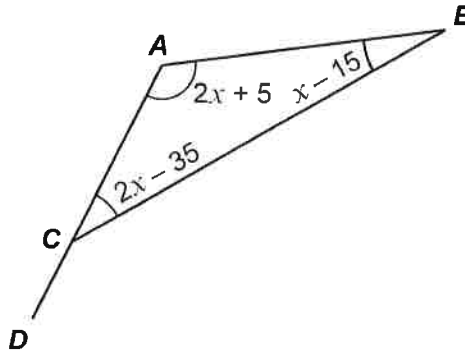
Work out the size of angle  $y$ .



$y = \dots\dots\dots^\circ$   
(3 marks)

19 The diagram shows triangle  $ABC$ .

Work out the size of angle  $BCD$ .



.....<sup>o</sup>  
 (3 marks)

Overall mark	/40
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NAME

**Non-calculator**

1 Write these fractions in descending order of size.

$$\frac{1}{2} \quad \frac{4}{7} \quad \frac{5}{9}$$

.....  
(1 mark)

2 a Write  $\frac{1}{8}$  as a decimal.

.....  
(1 mark)

b Is your answer to part a a recurring decimal or a terminating decimal? Explain.

.....  
.....  
(1 mark)

3 A survey asked 40 households:

'Do you grow any fruit or vegetables in your garden?'

13 households answered 'Yes'.

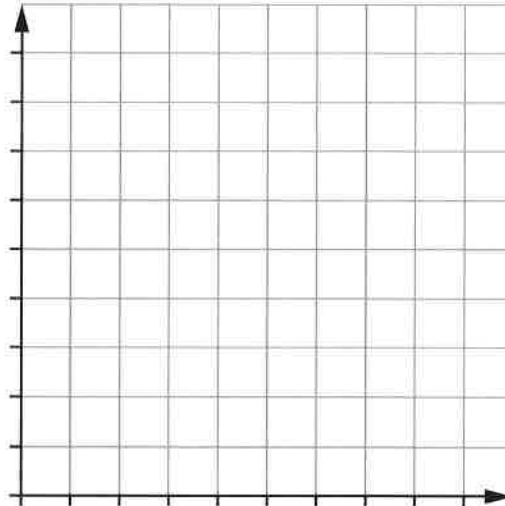
Work out the percentage of these households that answered 'Yes'.

..... %  
(2 marks)

4 The table shows the masses of different volumes of the chemical element radium.

Mass, $M$ (grams)	10	15	40
Volume, $V$ (cm <sup>3</sup> )	2	3	8

a Draw a graph of mass ( $M$ ) against volume ( $V$ ) for radium.



(2 marks)

b Write an equation linking mass ( $M$ ) and volume ( $V$ ).

.....  
(2 marks)

c Are mass ( $M$ ) and volume ( $V$ ) in direct proportion? Explain.

.....  
 .....  
 .....  
 .....

(2 marks)

5 Abe works out

$$\frac{3}{7} + \frac{3}{14}$$

He writes the answer  $\frac{6}{21}$

Explain what Abe has done wrong.

.....

.....

**(1 mark)**

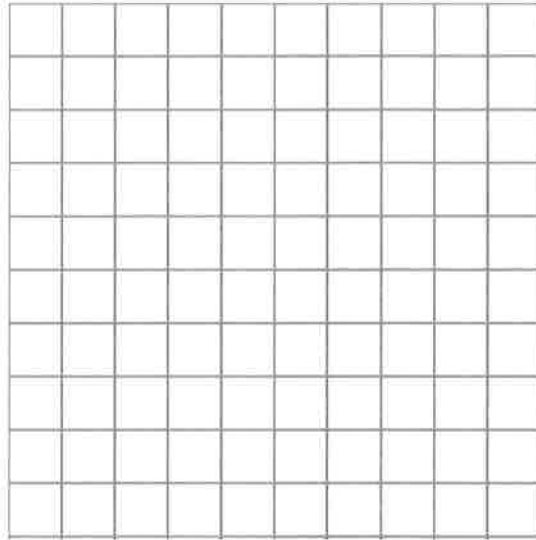
6 A jar holds  $\frac{2}{3}$  of a cup of liquid.

How many jars can be filled from 18 cups of liquid?

.....

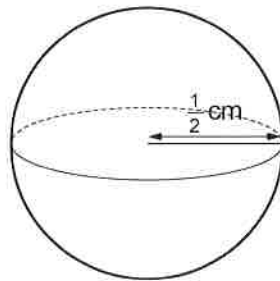
**(2 marks)**

7 Draw a line segment with gradient  $\frac{3}{4}$



(1 mark)

8 Here is a marble with radius  $\frac{1}{2}$  cm.



Work out the approximate volume of this marble using this calculation:

$$\frac{4}{3} \times \frac{22}{7} \times \left(\frac{1}{2}\right)^3$$

Give your answer as a fraction in its simplest form.

.....cm<sup>3</sup>

(3 marks)

9 Anna multiplies  $4\frac{2}{5}$  by another mixed number.

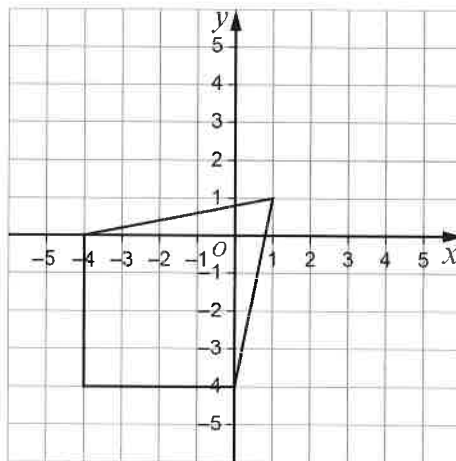
Her answer is  $6\frac{3}{5}$

What is this other mixed number?

Give your answer in its simplest form.

.....  
(3 marks)

10 Write the equations of the lines that are the diagonals of this kite.



..... and .....

(3 marks)

**Calculator**

11 Write  $\frac{5}{12}$  as a recurring decimal using dot notation.

.....  
(1 mark)

12 Salim buys pet insurance for his cat.

Last year it cost £137.75

This year the cost increases by 12%.

What is the cost of pet insurance this year?

£.....  
(2 marks)

13 On a 3.5 km road, there are 700 m of roadworks.

What percentage of the road has roadworks?

..... %  
(2 marks)

14 These are the labels from two different bars of chocolate.

Chocolate bars 250g bar		Chocolate bars 200g bar	
Carbohydrate	60g	Carbohydrate	40g
Fat	172.5g	Fat	152g
Protein	17.5g	Protein	8g

Which bar of chocolate contains the greater proportion of fat?

Show working to support your answer.

.....  
(4 marks)

15 A shop sells gold at £38 per gram.

Anthony bought 0.25 kg of gold from the shop.

He received a discount of 15%.

Anthony made a profit of 20% when he sold this gold.

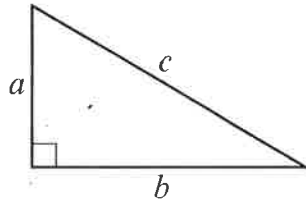
Work out how much profit Anthony made.

£.....  
(4 marks)

16 Side  $a$  of this right-angled triangle is 25% shorter than side  $b$ .

Side  $b$  is 20% shorter than side  $c$ .

The length of side  $c$  is 2 m.



How long is side  $a$ ? Give your answer in cm.

..... cm

(3 marks)

Overall mark	/40
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