

Pre Paper 3H Predicted Paper June 2017

GCSE Mathematics (AQA style)

Higher Tier

Name

Class

TIME ALLOWED

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- You are permitted to use a calculator in this paper.
- You may use the π button on your calculator or you may take the value of π to be 3.142.
- Do all rough work in this book.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets at the end of each question or part question on the Question Paper.
- You are reminded of the need for clear presentation in your answers.
- The total number of marks for this paper is **80**.
- The questions included in this paper have been selected from parts of the specification not tested in Paper 1 or Paper 2. You should not assume, however, that because a topic appeared on Paper 1 or Paper 2, it will not appear on Paper 3, nor can the topics here be regarded as an exhaustive list of those to be examined on Paper 3.

Question	Mark	out of
1		1
2		1
3		1
4		1
5		3
6		4
7		5
8		5
9		6
10		3
11		3
12		6
13		7
14		4
15		3
16		3
17		3
18		1
19		3
20		6
21		5
22		6
Total		80

Answer **all** questions in the spaces provided

- 1 Sophie wants to find out about the types of holiday taken by people in the town where she lives.

She decides to compile a questionnaire and conduct a survey.

Which word describes the data she will collect?

Circle your answer.

[1 mark]

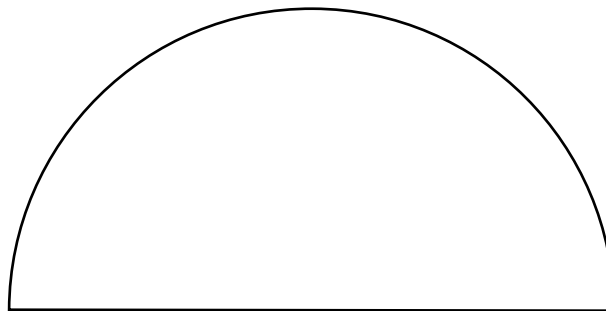
continuous

discrete

primary

secondary

2



8.4 cm

The diagram shows a semicircle.

What is its perimeter?

Circle your answer.

13.2 cm

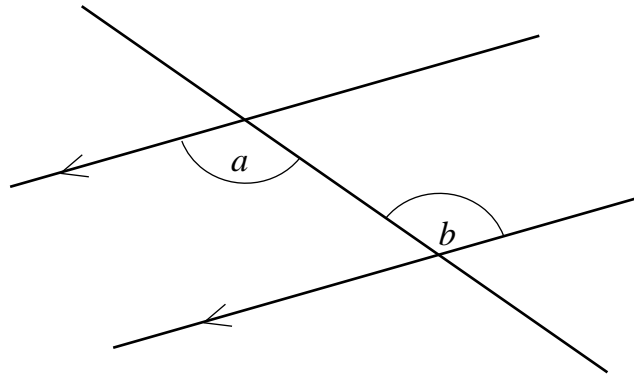
16.8 cm

21.6 cm

26.4 cm

[1 mark]

3



The diagram shows a pair of parallel lines, crossed by a third straight line.

What word describes the pair of angles a and b ?

Circle your answer.

[1 mark]

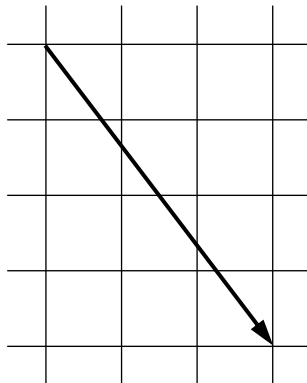
alternate

corresponding

exterior

reflex

4



The diagram shows a vector, drawn on a unit grid.

What is the vector shown by the arrow?

Circle your answer.

[1 mark]

$$\begin{pmatrix} 3 \\ 4 \end{pmatrix}$$

$$\begin{pmatrix} -4 \\ 3 \end{pmatrix}$$

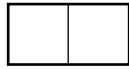
$$\begin{pmatrix} 3 \\ -4 \end{pmatrix}$$

$$\begin{pmatrix} -4 \\ -3 \end{pmatrix}$$

5 Delphi is making a pattern using rectangles.

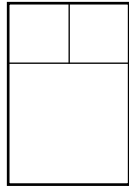
She starts with two squares, each with side length 1 cm, to make a rectangle whose longest side is 2 cm.

Rectangle 1



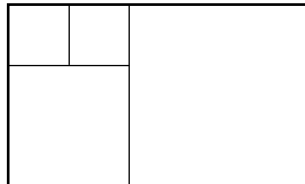
She adds a third square, with side length 2 cm, to this rectangle to make a new rectangle whose longest side is 3 cm.

Rectangle 2



Then she adds a fourth square, as shown in the diagram, to make a new rectangle.

Rectangle 3



5 (a) What is the length of the longest side of **Rectangle 4**?

Circle your answer.

[1 mark]

3 cm

5 cm

6 cm

8 cm

5 (b) What is the length of the longest side of **Rectangle 8**?

[2 marks]

Answer _____ cm

6 A television producer is selecting an audience to watch a show being recorded.
He wants the audience to be as big as possible.

The numbers of men, women and children in the audience must be in the ratio 3 : 4 : 1.

240 men, 440 women and 90 children apply to watch the show being recorded.

How many men, women and children are selected to be in the audience?

[4 marks]

Answer _____ men
_____ women
_____ children

7 You are given the following formulae;

$$v = u + at$$
$$v^2 = u^2 + 2as$$
$$s = ut + \frac{1}{2}at^2.$$

7 (a) Use an appropriate formula to find s when $a = 4$, $t = 5$ and $u = -6$.

[2 marks]

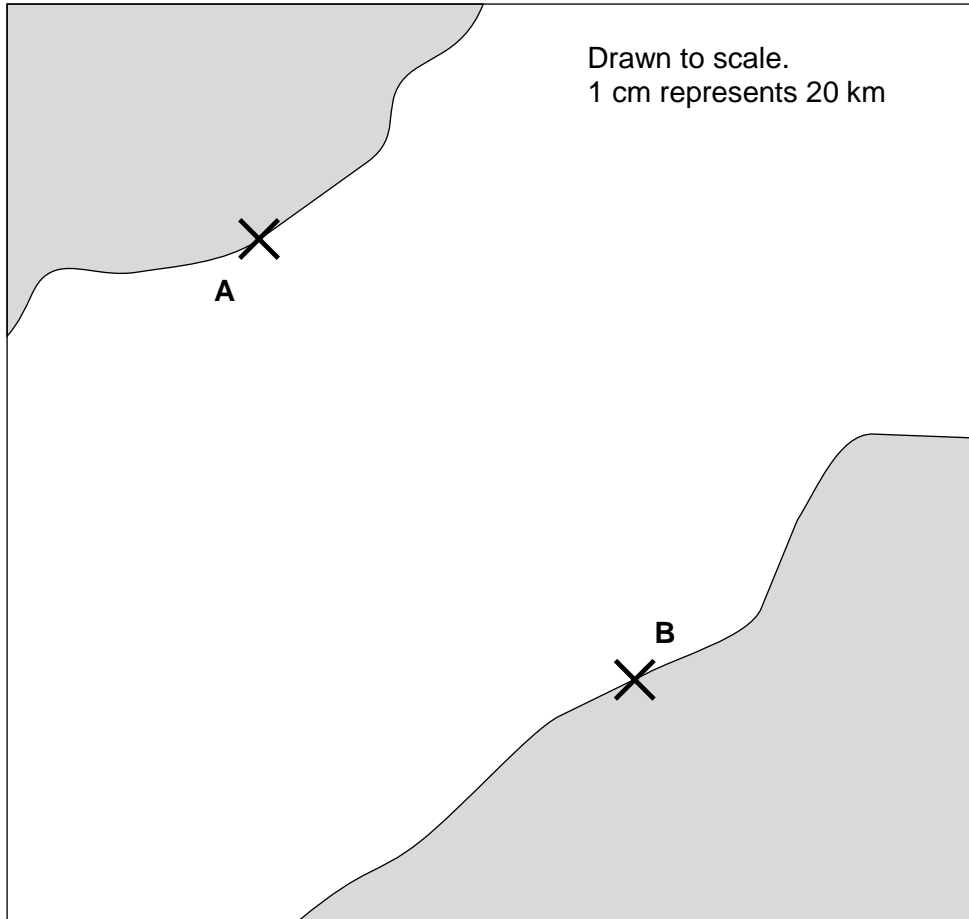
Answer _____

7 (b) Use an appropriate formula to find a possible value for u when $a = 4$, $s = 9$ and $v = 11$.

[3 marks]

Answer _____

8



The map shows the location of two ports, **A** and **B**.

It is accurately drawn. On the map, 1 cm represents 20 km.

A ship is located closer to **A** than to **B**, and is less than 130 km from **B**.

8 (a) Show accurately on the map the region in which the ship must be located.

[3 marks]

8 (b) Express the scale “1 cm represents 20 km” using a ratio in the form $1 : n$.

[2 marks]

Answer _____

9 (a) Solve $\frac{x}{2} + 1 = \frac{x - 4}{3}$.

Show your working out.

[3 marks]

Answer _____

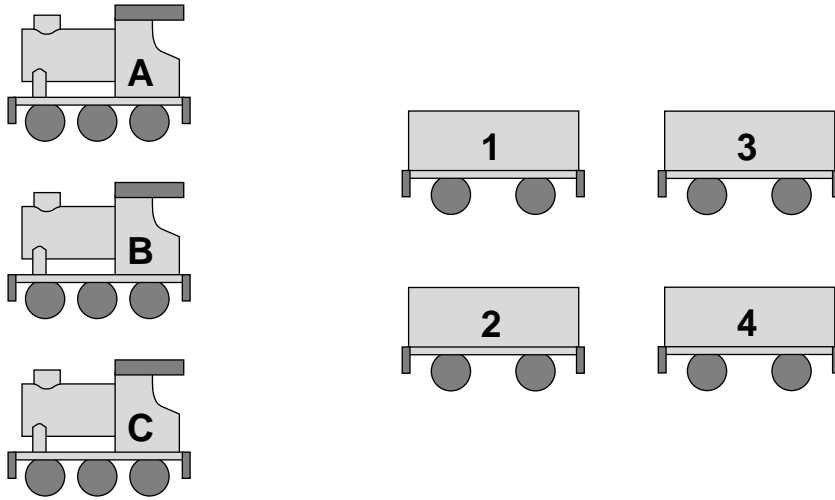
9 (b) Rearrange the expression $p = \frac{q + 3}{2q - 7}$
to make q the subject.

[3 marks]

Answer _____

10 Paul has a train set.

It contains three locomotives (A, B and C) and four wagons (1, 2, 3, and 4).



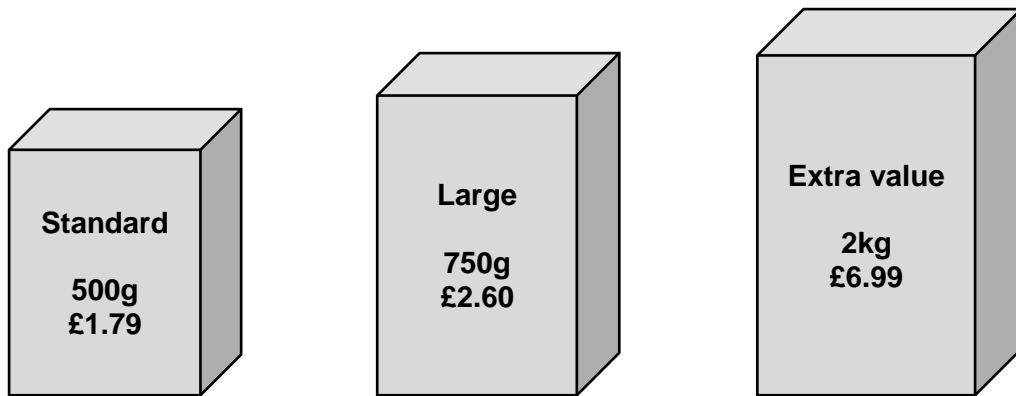
To make a train, Paul chooses one locomotive, to go at the front of the train. He then puts all four wagons, in any order, behind the locomotive.

In how many different ways can he make a train?

[3 marks]

Answer _____

11 Breakfast cereal is sold in three sizes.



Which of the three sizes of cereal box is the best value for money?

Tick a box.

You must show your working out.

[3 marks]

Standard.

Large.

Extra value.

12 In a scientific experiment, the volume of a substance increases by 8% every day.
At the start of 1 June, the volume was 450 ml.

12 (a) What was the volume of the substance at the start of 4 June?

[3 marks]

Answer _____ ml

12 (b) On what date did the volume of the substance reach double its initial amount?

[3 marks]

Answer _____ June

13 The table summarises the heights, h centimetres, of 60 basketball players.

Height (h cm)	Number of players		
$190 < h \leq 200$	11		
$200 < h \leq 210$	17		
$210 < h \leq 220$	28		
$220 < h \leq 230$	4		

13 (a) Work out an estimate of the mean height of one of the basketball players.

[4 marks]

Answer _____ cm

13 (b) Scott says that the median height of a basketball player is more than 7 feet.

Is Scott right?

Tick a box.

Scott is definitely right.

Scott could be right.

Scott is definitely wrong.

You **must** show your working.

You may use the fact that 1 foot is equal to 30.4 cm.

[3 marks]

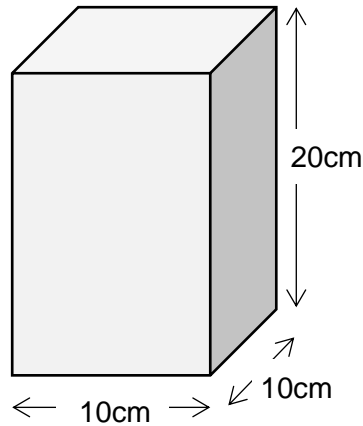
14 (a) The mass of a dog is recorded as 17.3 kg, to 1 decimal place.

Write down the error interval for the mass, m kg, of the dog.

[1 mark]

Answer _____ $\leq m <$ _____

14 (b)



A container is in the shape of a cuboid.

Its dimensions are given as 10cm, 10cm and 20cm, all to the nearest whole centimetre.

Initially the container is empty. Jim pours **exactly** 1 litre of water into the container.

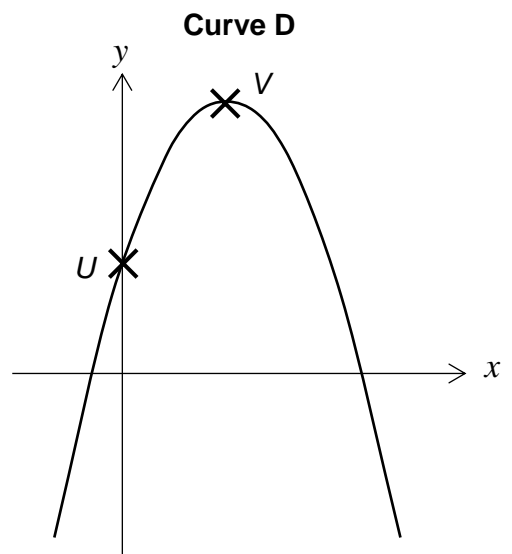
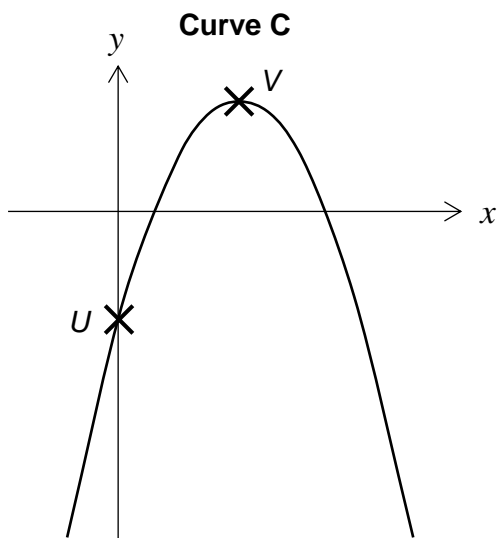
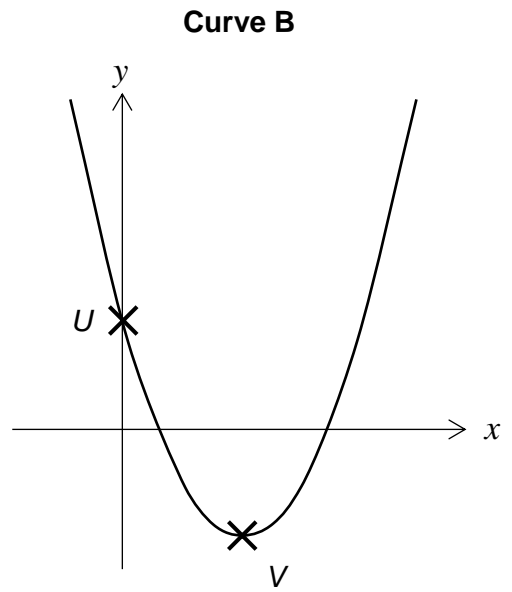
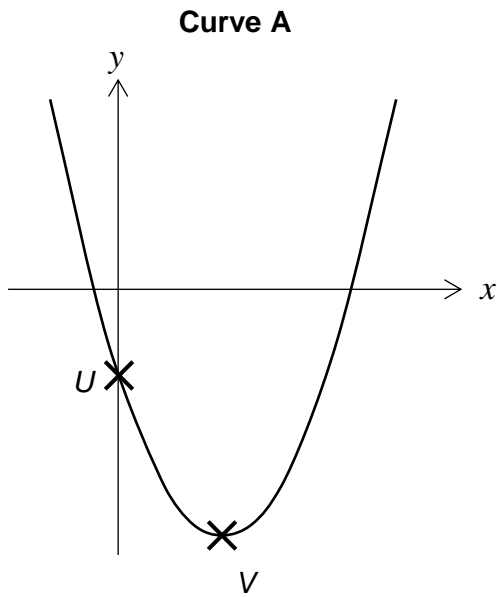
What is the maximum height to which the water rises in the container?

Give your answer to 1 decimal place.

[3 marks]

Answer _____ cm

15 Here are four curves, which are not drawn to scale.



15 (a) One of the curves, **A**, **B**, **C** or **D**, is the graph of $y = x^2 - 6x - 4$.

Which curve is it?

Circle your answer.

[1 mark]

Curve A

Curve B

Curve C

Curve D

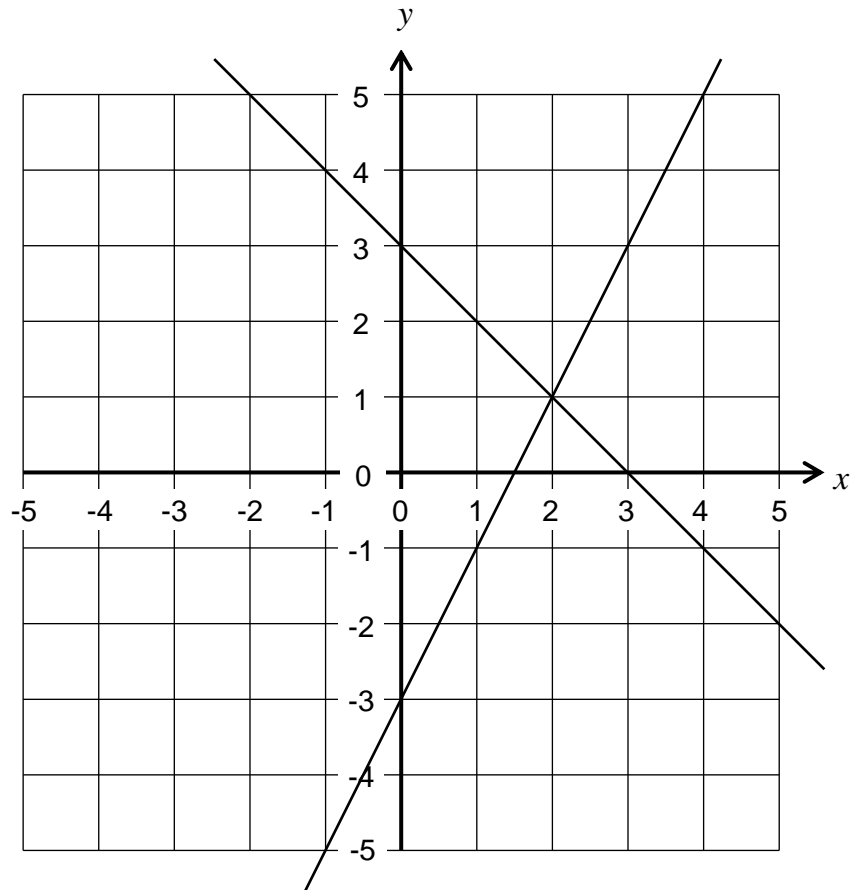
15 (b) Write the expression $x^2 - 6x - 4$ in the form $(x - p)^2 - q$.

[2 marks]

Answer _____

16 Use algebra to prove that the sum of the squares of three consecutive even numbers is **never** a multiple of 3.

[3 marks]



The diagram shows the lines $x + y = 3$ and $y = 2x - 3$.

Find the number of integer solutions that exist for the following set of inequalities

$$\begin{aligned} x + y &< 3 \\ y &\geq 2x - 3 \\ x &\geq 0. \end{aligned}$$

Circle your answer

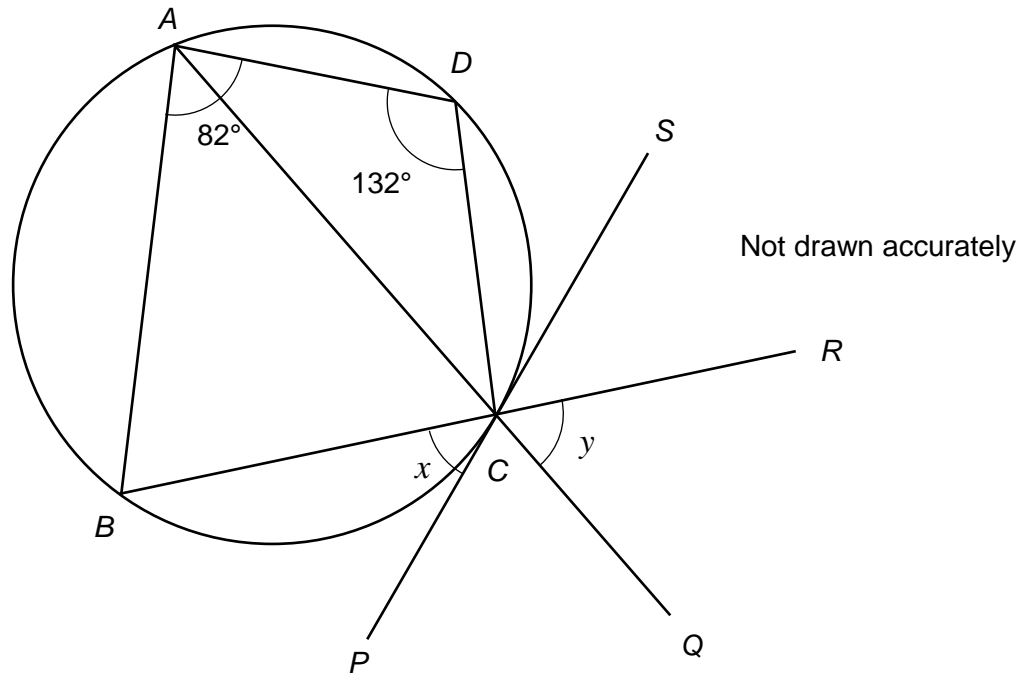
[1 mark]

3

9

12

infinity



The diagram shows a quadrilateral $ABCD$ whose vertices lie on a circle.

The line PS is a tangent to the circle at C .
 ACQ and BCR are straight lines.
 ACD is an isosceles triangle.

Angle DAB is 82° .
 Angle CDA is 132°

Find the size of angle PCB , marked x on the diagram.

Give reasons for your answer.

[3 marks]

Answer _____^o

20



The maker of a type of chocolate bar decides to reduce the weight of each bar of chocolate, from 60 grams to 50 grams.

The new, smaller, bar will be mathematically similar to the previous one.

20 (a) The old bar was 12 cm long.

Find the length of the new, smaller, bar.

[3 marks]

Answer _____ cm

20 (b) The chocolate bar is wrapped in foil.

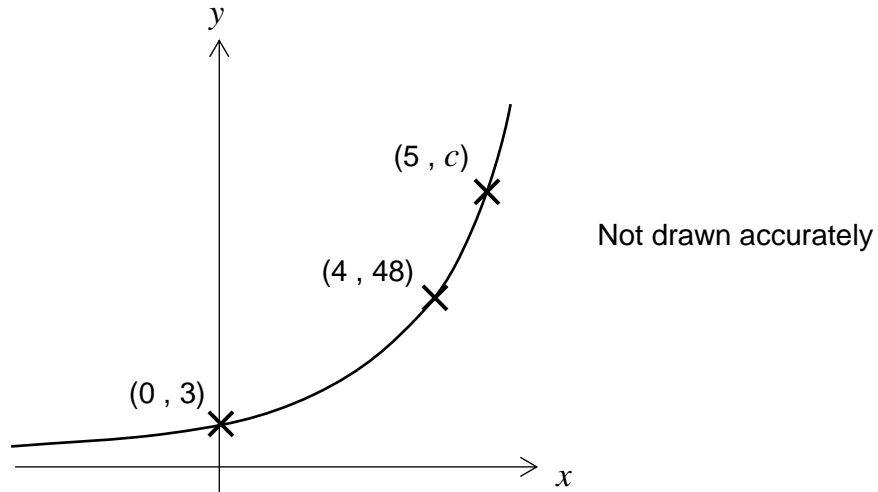
The sheet of foil used to wrap the old bar had area 120 cm^2 .

Obtain an estimate of the area of the sheet of foil used to wrap the new, smaller, bar.

[3 marks]

Answer _____ cm^2

21



The diagram shows part of the graph of $y = ab^x$.
The co-ordinates of two of the points on the graph are given.

21 (a) What is the value of a ?

Circle your answer.

[1 mark]

0 $\frac{1}{3}$ 1 3

21 (b) Find the value of b .

[2 marks]

Answer _____

21 (c) A third point on the graph has co-ordinates $(5, c)$.

Find the value of c .

[2 marks]

Answer _____

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