



Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

GCSE MATHEMATICS (LINEAR)

H

Higher Tier Paper 1

Thursday 26 May 2016

Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- mathematical instruments.

You must **not** use a calculator.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 70.
- The quality of your written communication is specifically assessed in Questions 1, 12 and 20. These questions are indicated with an asterisk (*).
- You may ask for more answer paper, tracing paper and graph paper. These must be tagged securely to this answer book.

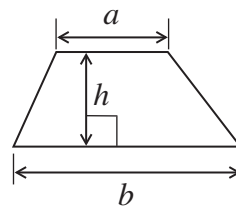
Advice

- In all calculations, show clearly how you work out your answer.

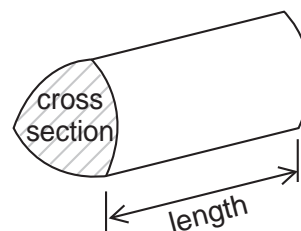


Formulae Sheet: Higher Tier

Area of trapezium = $\frac{1}{2}(a+b)h$

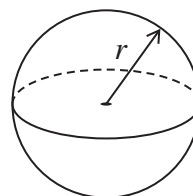


Volume of prism = area of cross section \times length



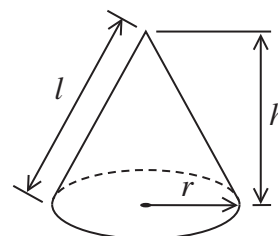
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

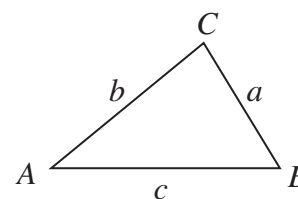


In any triangle ABC

Area of triangle = $\frac{1}{2}ab \sin C$

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$



Answer **all** questions in the spaces provided.

***1** Increase £190 by 35%

[3 marks]

Answer £ _____

Turn over for the next question

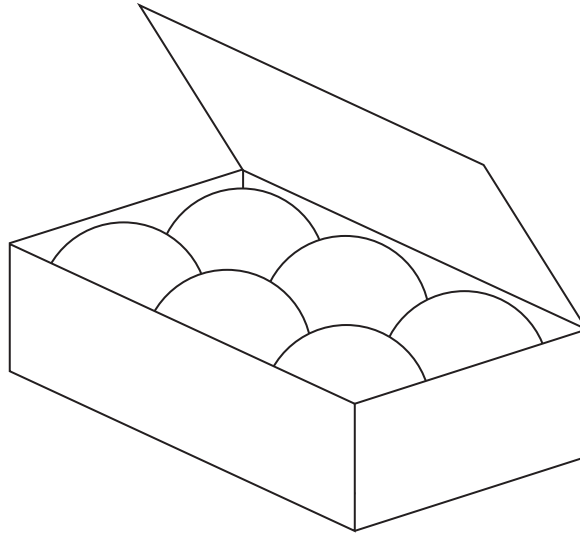
3

Turn over ►



2 Six balls just fit inside a box as shown.

The balls each have a diameter of 5 cm
The box is a cuboid.



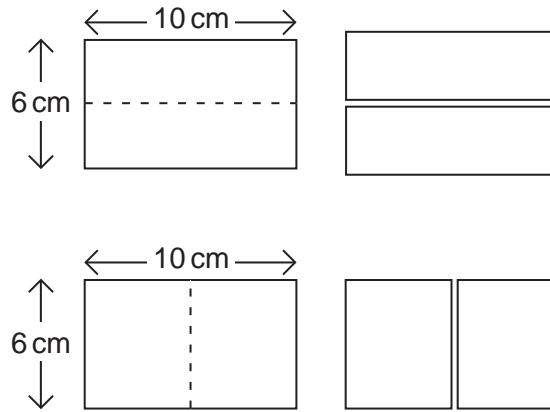
Work out the volume of the box.

[3 marks]

Answer _____ cm^3

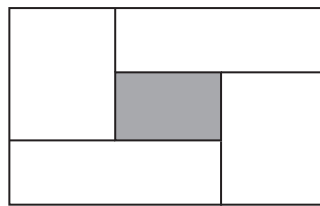


3 Two 10 cm by 6 cm rectangles are cut in half as shown.



Not drawn accurately

The four pieces are joined together, without overlap, as shown.



Not drawn accurately

Work out the perimeter of the shaded rectangle.

[3 marks]

Answer _____ cm

6

Turn over ►



- 4** A bag has only red, white, blue and yellow counters.
A counter is taken from the bag at random.
Here are some of the probabilities.

Colour	Red	White	Blue	Yellow
Probability	0.1		0.3	

- 4 (a)** The probability of taking a white counter is twice the probability of taking a yellow counter.

Complete the table.

[2 marks]

- 4 (b)** There are 500 counters in the bag altogether.

Complete the table.

[2 marks]

Colour	Red	White	Blue	Yellow	Total
Number of counters in the bag	50				500

- 4 (c)** All of the yellow counters are taken out of the bag.

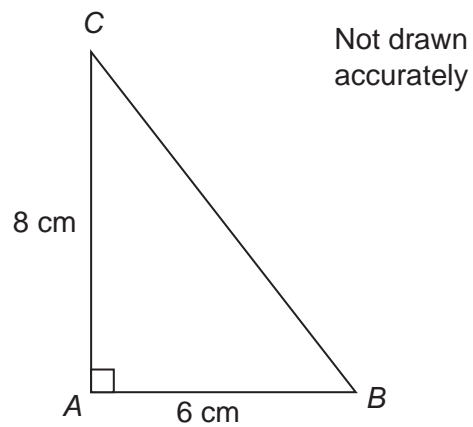
Work out the probability of taking a red counter at random from the bag now.

[2 marks]

Answer _____



5 Work out length BC .



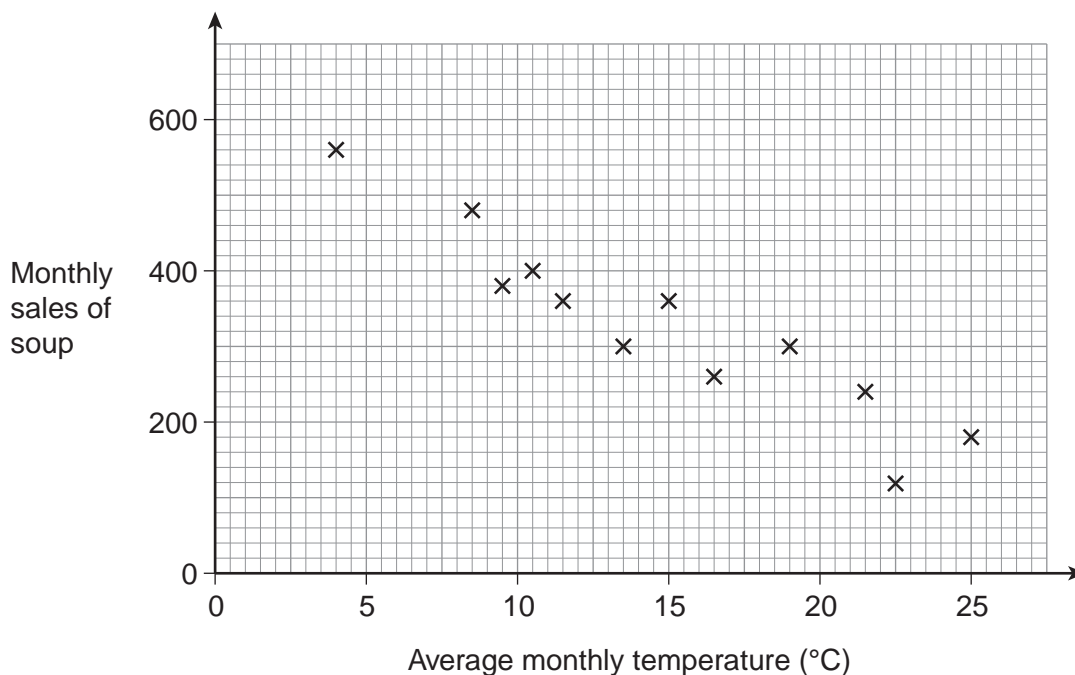
[3 marks]

Answer _____ cm

Turn over for the next question



6 A café owner records the average monthly temperature and the monthly sales of soup over a year.



6 (a) The scatter graph shows negative correlation.

Write down the relationship between average monthly temperature and monthly sales of soup.

[1 mark]

6 (b) The average monthly temperature for the next month is predicted to be 7°C

Use the graph to estimate the sales of soup that month. You **must** show your working.

[2 marks]

Answer _____



7 Dwayne Pipes uses this formula to work out the cost of a plumbing job in pounds.

$$\text{Cost of job} = 35 \times \text{number of hours} + 40$$

Ivor Wrench uses this formula to work out the cost of a plumbing job in pounds.

$$\text{Cost of job} = 40 \times \text{number of hours} + 17.5$$

A job of x hours costs the same with Dwayne and Ivor.

Set up and solve an equation to work out x .

[4 marks]

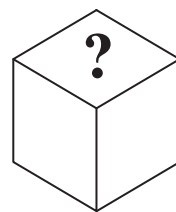
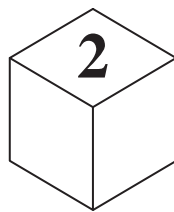
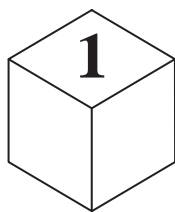
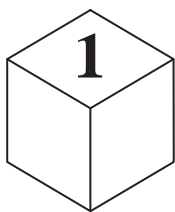
$$x = \underline{\hspace{10cm}}$$

7

Turn over ►



- 8 (a) The scores on four ordinary, six-sided dice are put in order.



The median of the **four** scores is 0.5 **less** than the mean of the four scores.

Circle the value of the fourth score.

[1 mark]

2

3

4

5

6

- 8 (b) The dice are rolled again.
The median of the scores is 0.5 **less** than the range.

Work out a possible set of scores.

[2 marks]

Answer _____, _____, _____, _____



9 (a) Simplify fully $\frac{w^3 \times w^4}{w^2}$

[1 mark]

Answer _____

9 (b) Simplify fully $2x^2y^3 \times 4xy^2$

[2 marks]

Answer _____

9 (c) Simplify fully $12a^4b^5 \div 2a^2b$

[2 marks]

Answer _____

Turn over for the next question



10 (a) Work out $3 \times 10^5 \times 6 \times 10^{-2}$

Write your answer in standard form.

[2 marks]

Answer _____

10 (b) Work out $(8 \times 10^4 + 4 \times 10^4) \div 24$

Write your answer in standard form.

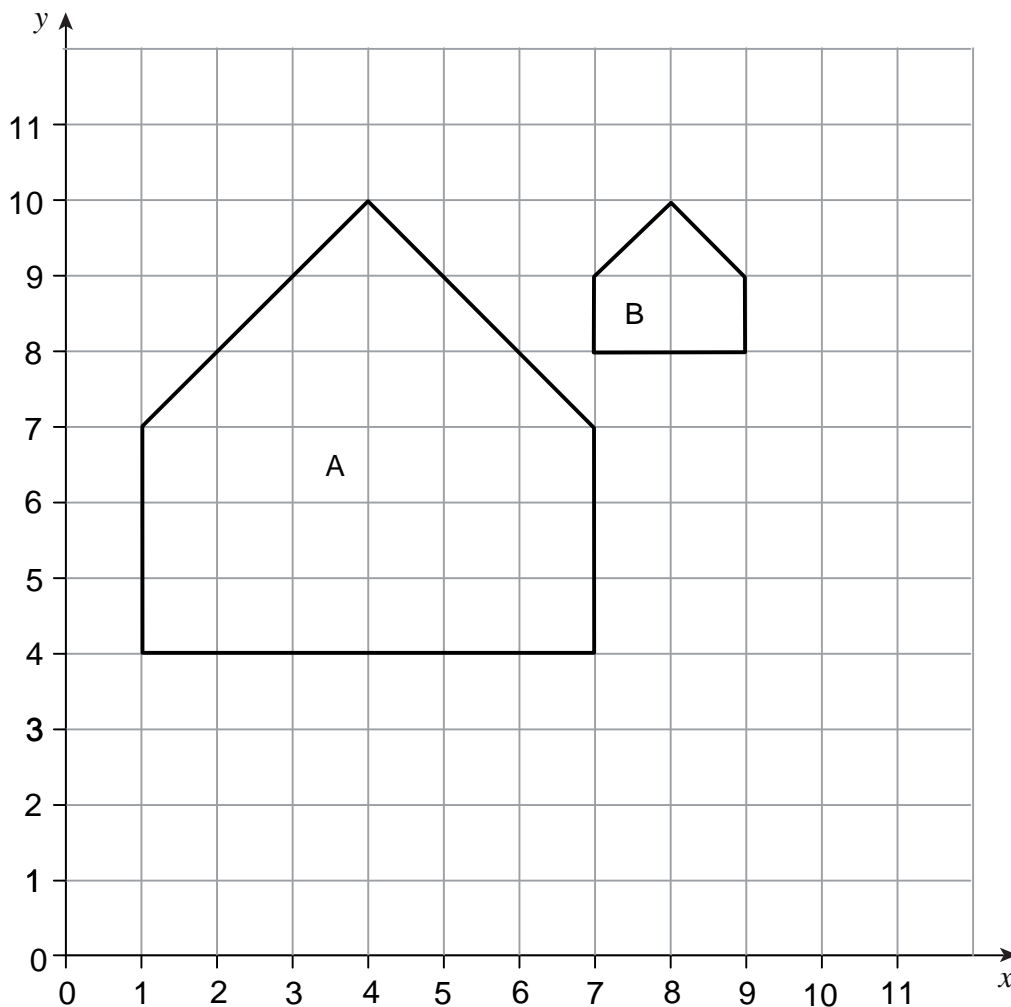
[2 marks]

Answer _____



11 Describe fully the **single** transformation that maps shape A to shape B.

[3 marks]



7

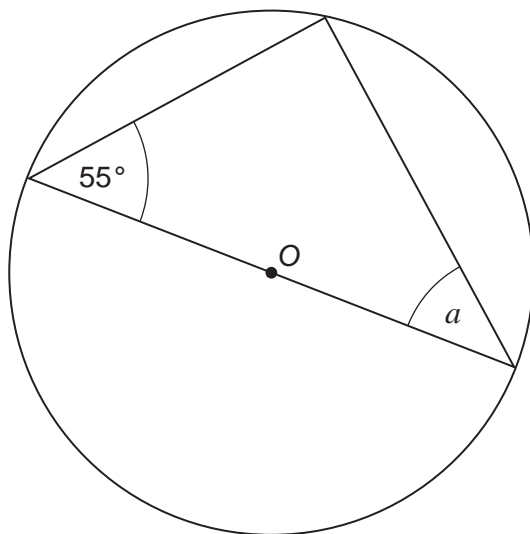
Turn over ►



12 (a) O is the centre of the circle.

Work out the size of angle a .

[1 mark]

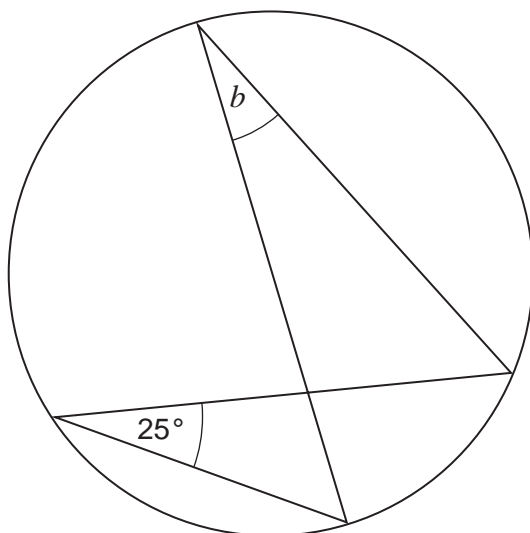


Not drawn
accurately

Answer _____ degrees

12 (b) Write down the size of angle b .

[1 mark]



Not drawn
accurately

Answer _____ degrees



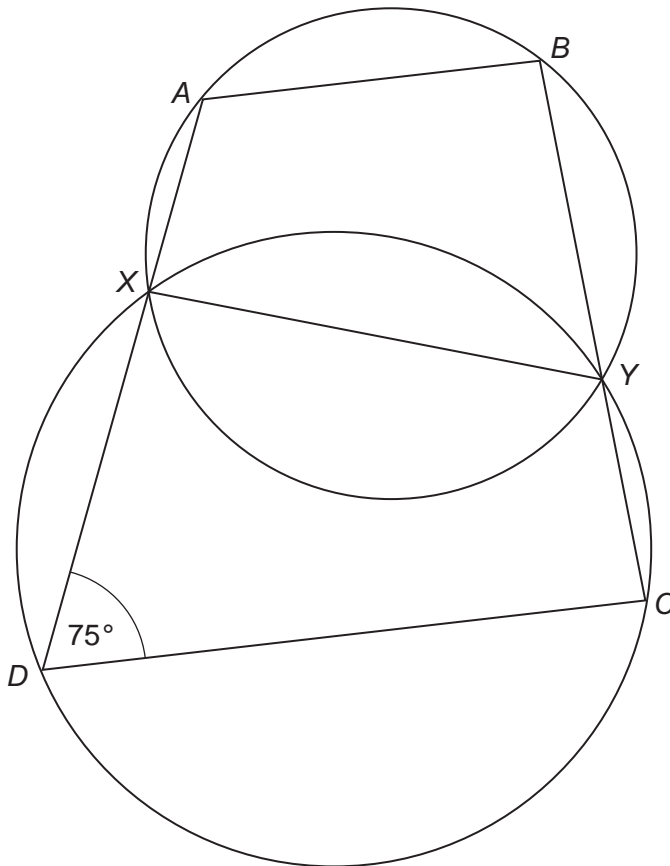
***12 (c)** Two circles, with different radii, intersect at X and Y .

A and B are points on the smaller circle.

C and D are points on the larger circle.

AXD and BYC are straight lines.

Angle $XDC = 75^\circ$



Not drawn
accurately

Show that AB is parallel to DC .

[3 marks]

5

Turn over ►



13 (a) Expand and simplify $(6x - 1)(2x + 3)$

[2 marks]

Answer _____

13 (b) Solve $4x^2 + x - 3 = 0$

[3 marks]

Answer _____

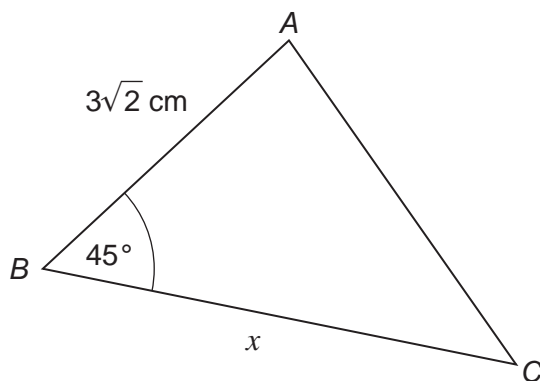


14

 ABC is a triangle.

$AB = 3\sqrt{2} \text{ cm}$

Angle $ABC = 45^\circ$

Not drawn
accuratelyThe area of ABC is 12 cm^2

You are given that $\sin 45^\circ = \frac{1}{\sqrt{2}}$

Work out the length x .**[2 marks]**

Answer _____ cm

7

Turn over ►



15 Rearrange $y = \frac{3x + 5}{x}$ to make x the subject.

You **must** show your working.

[3 marks]

Answer _____



16 Solve $\frac{1}{2}(3x - 1) < \frac{3}{8}(x + 1)$

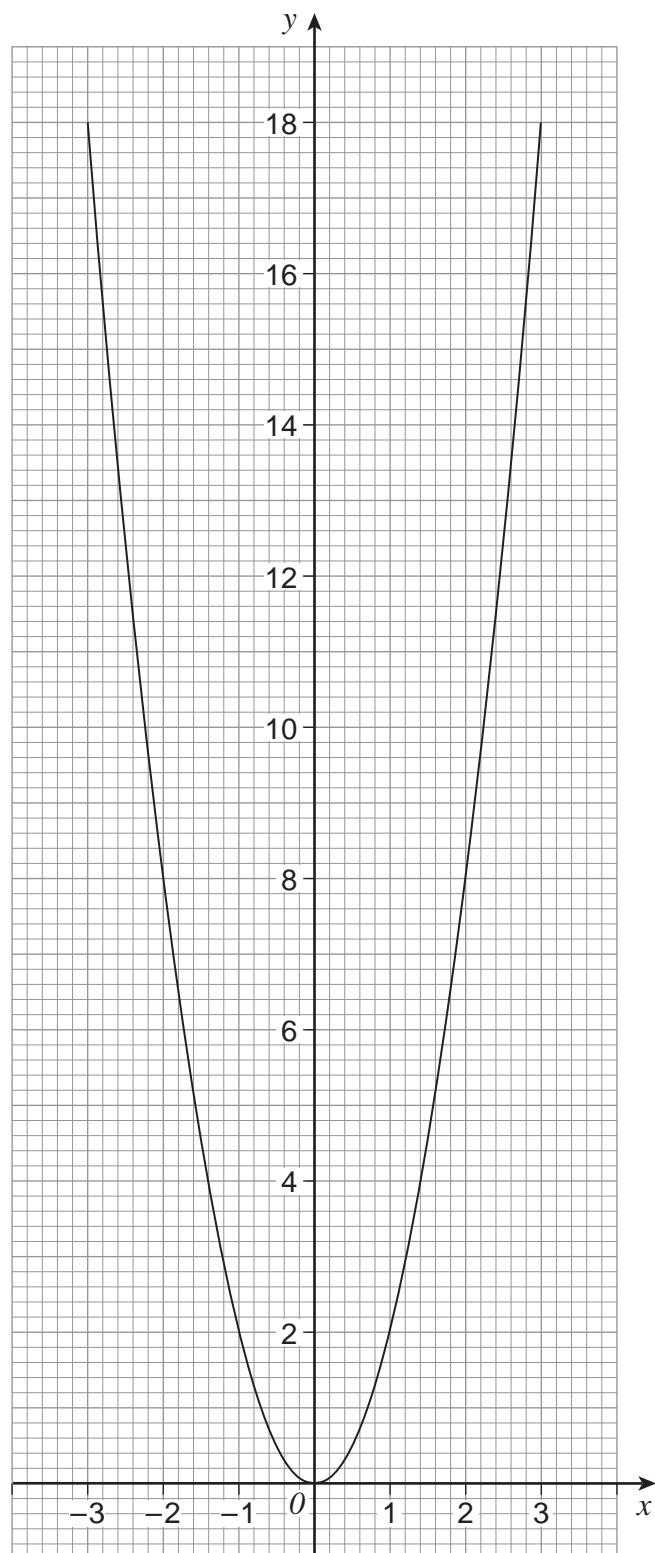
[3 marks]

Answer _____

Turn over for the next question



17 Here is the graph of $y = 2x^2$ for values of x from -3 to 3



- 17 (a)** Use the graph to estimate the solutions to $2x^2 = 15$
Show clearly how you obtained your answer.

[2 marks]

Answer _____ and _____

- 17 (b)** Use the graph to estimate the value of $\sqrt{5}$
Show clearly how you obtained your answer.

[2 marks]

Answer _____

- 18** Simplify fully $\frac{(5 - \sqrt{3})(3 - \sqrt{3})}{2}$

Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.

[3 marks]

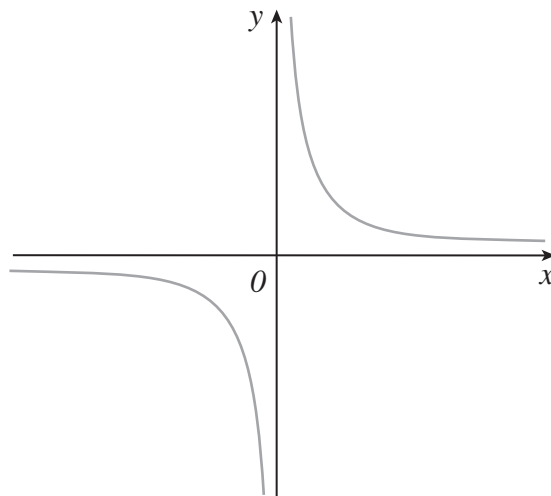
Answer _____

7

Turn over ►

19 (a) Circle a possible equation for the graph shown below.

[1 mark]



$y = x^3$

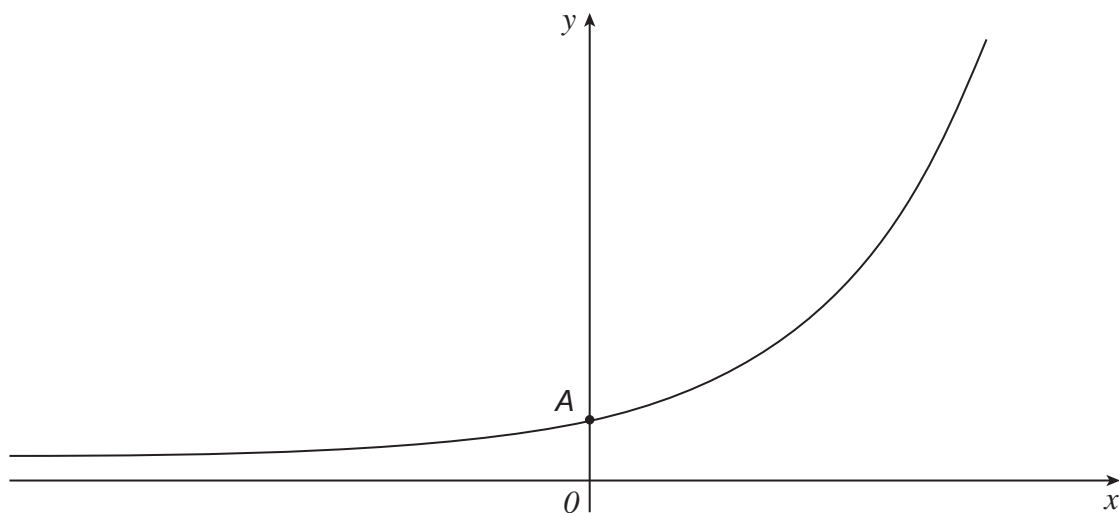
$y = \frac{1}{x}$

$y = \cos x$

$y = \sin x$

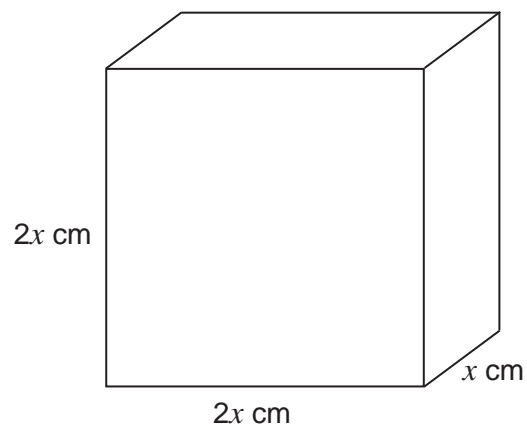
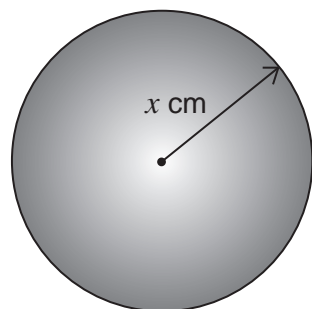
19 (b) This is the graph of $y = 2^x$
Write down the co-ordinates of A.

[1 mark]



Answer (_____ , _____)



***20**A sphere has a radius of x cmA cuboid has edges of length x cm, width $2x$ cm and height $2x$ cm

Show clearly that the sphere has the larger volume.

[3 marks]

END OF QUESTIONS

There are no questions printed on this page

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