AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

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.

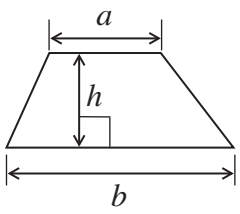
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

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.

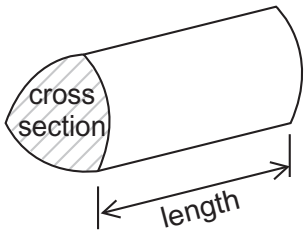
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

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

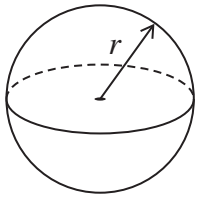


Volume of prism = area of cross section × length



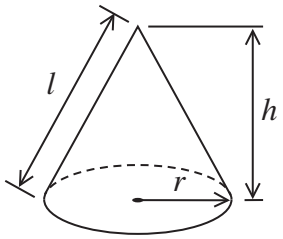
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

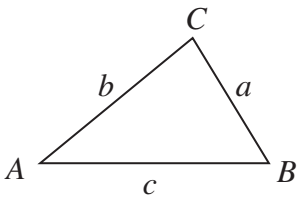
Curved surface area of cone = $\pi r l$



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]

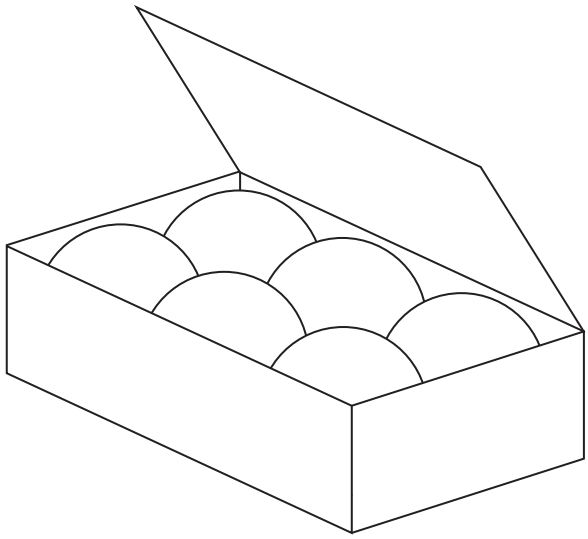
Answer £ _____

Turn over for the next question

3

2 Six balls just fit inside a box as shown.

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

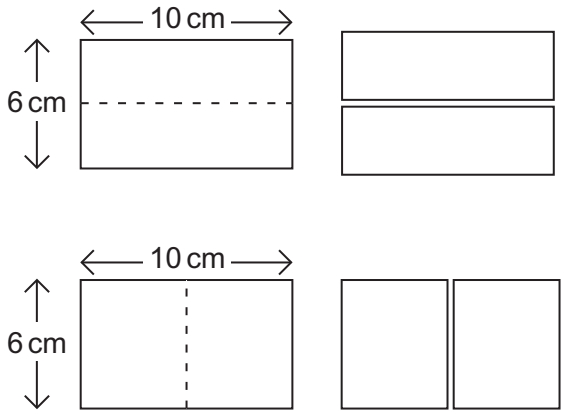


Work out the volume of the box.

[3 marks]

Answer _____ cm^3

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



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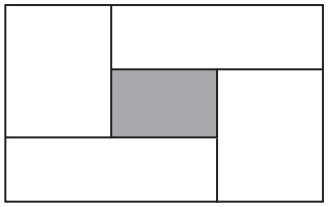
The four pieces are joined together, without overlap, as shown.



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

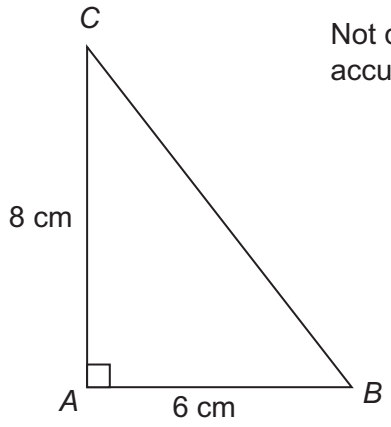
4 (c) All of the yellow counters are taken out of the bag.

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

[2 marks]

Answer _____

5 Work out length *BC*.



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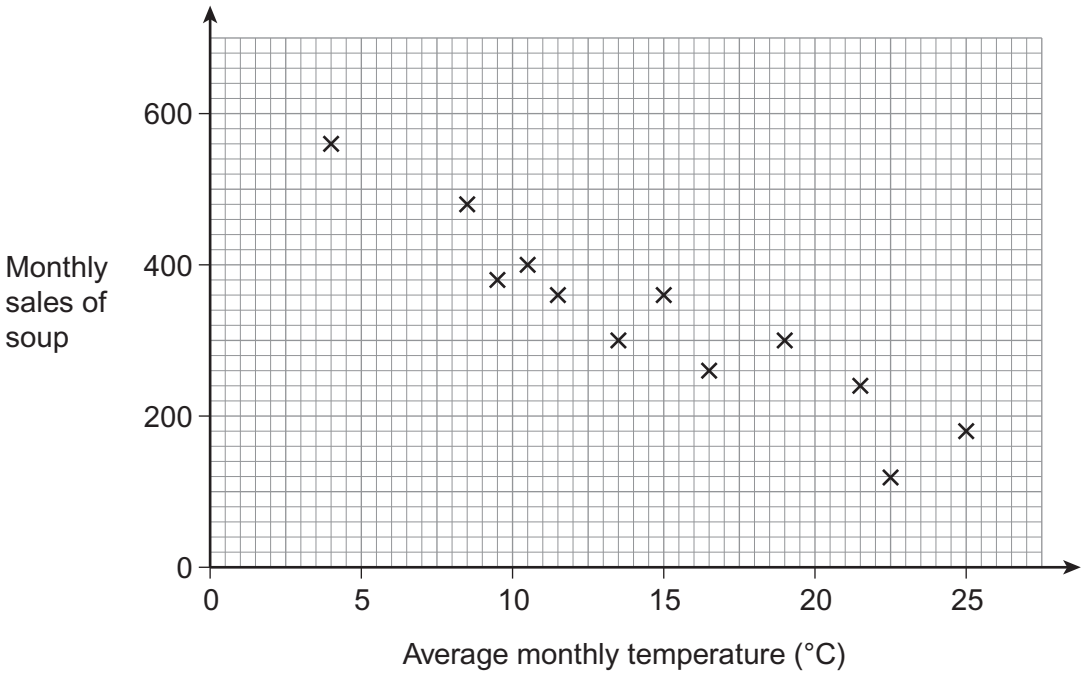
[3 marks]

Answer _____ cm

Turn over for the next question

9

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.

Cost of job = 35 × number of hours + 40

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

Cost of job = 40 × number of hours + 17.5

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

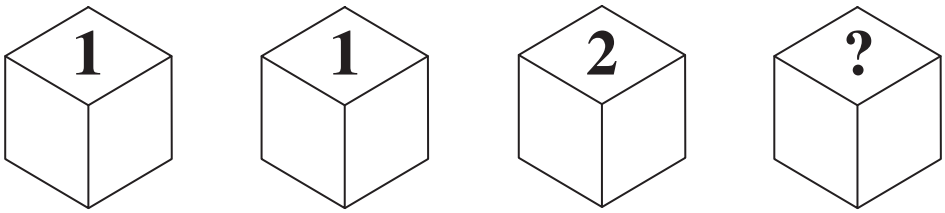
Set up and solve an equation to work out x.

[4 marks]

$x =$ _____

7

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 $\dfrac{w^3 \times w^4}{w^2}$

[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

8

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

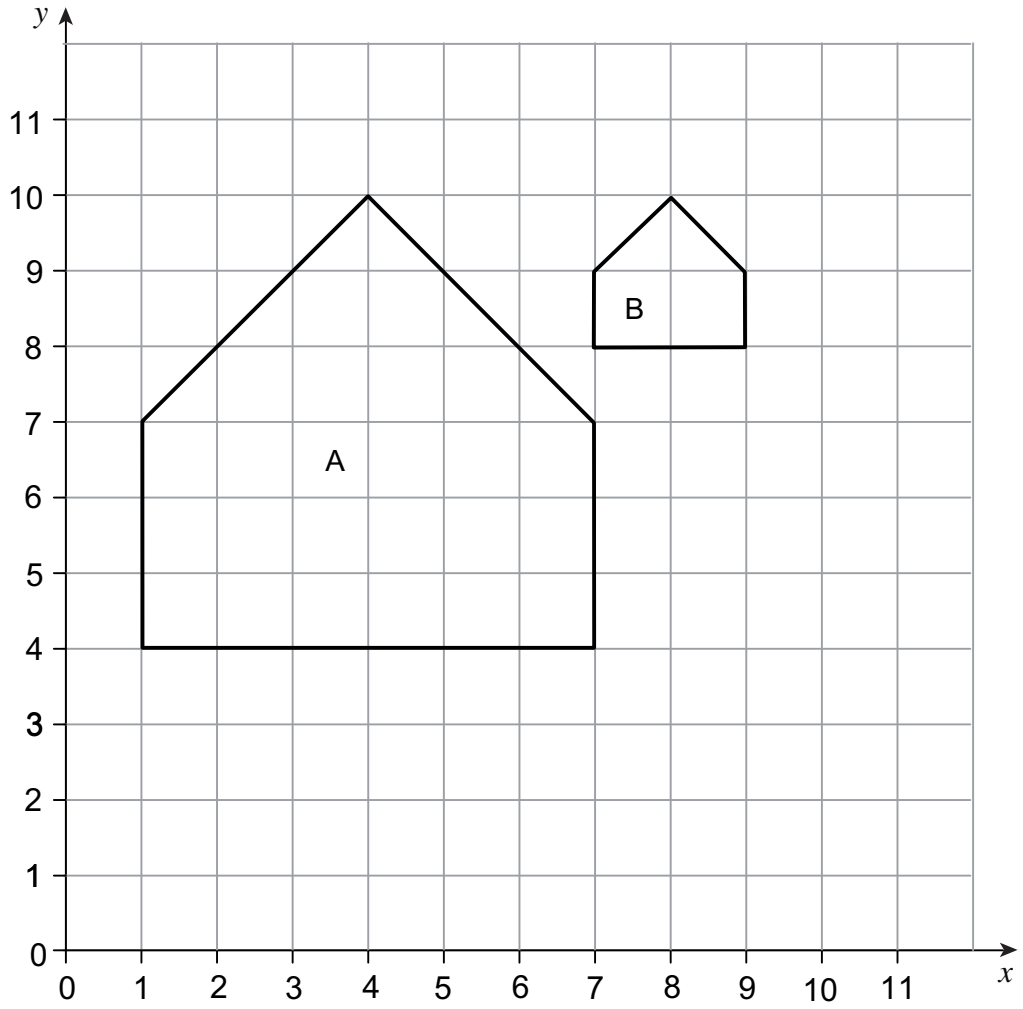
Write your answer in standard form.

[2 marks]

Answer _____

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

[3 marks]

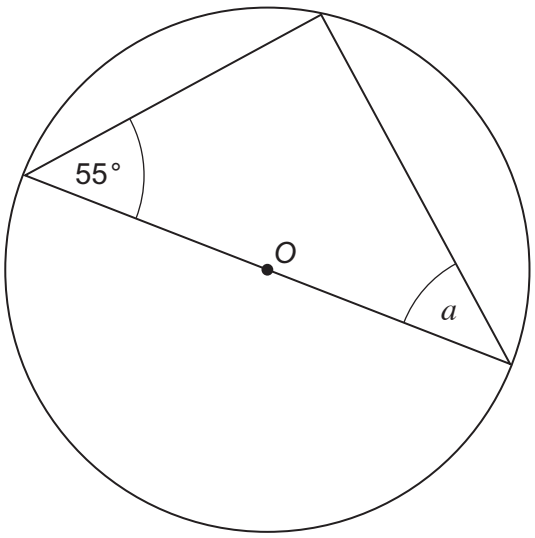


7

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

Work out the size of angle a.

[1 mark]



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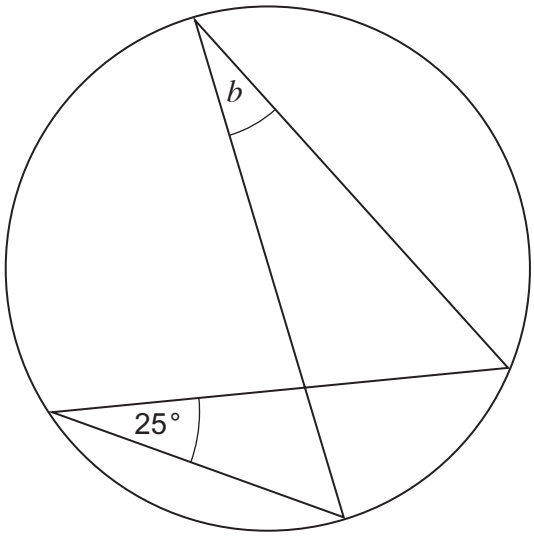
Answer _____ degrees

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

[1 mark]



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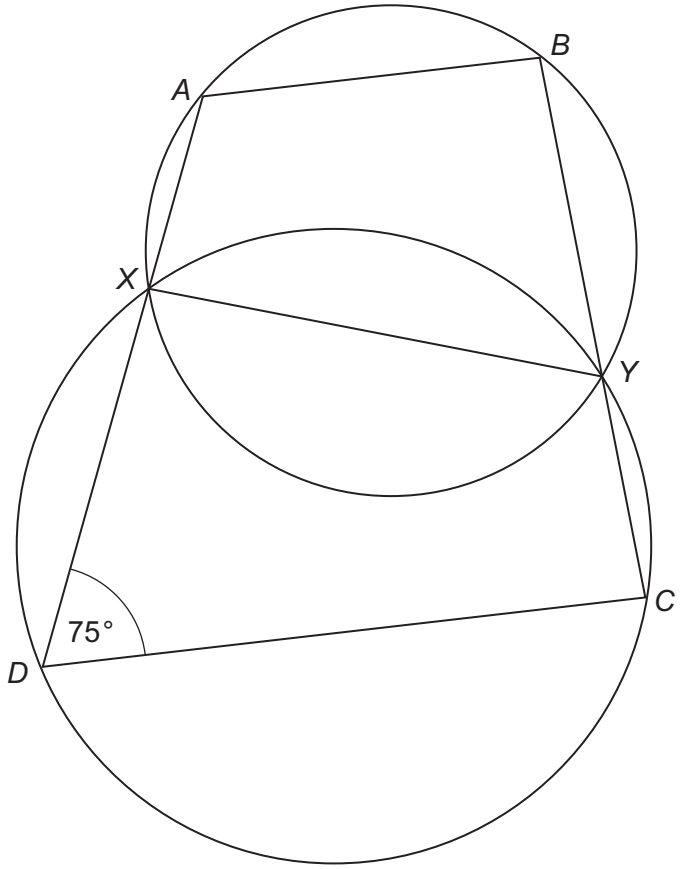
Answer _____ degrees

***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* = 75º



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Show that *AB* is parallel to *DC*.

[3 marks]

5

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

[2 marks]

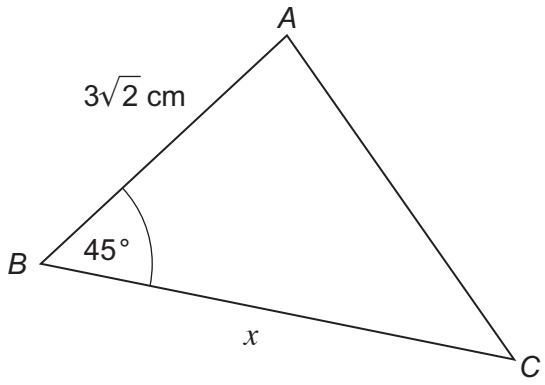
Answer _____

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

[3 marks]

Answer _____

14 *ABC* is a triangle.
$AB = 3\sqrt{2}$ cm
Angle $ABC = 45°$



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The area of *ABC* is 12 cm^2

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

Work out the length x.

[2 marks]

Answer _____ cm

7

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

You **must** show your working.

[3 marks]

Answer _____

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

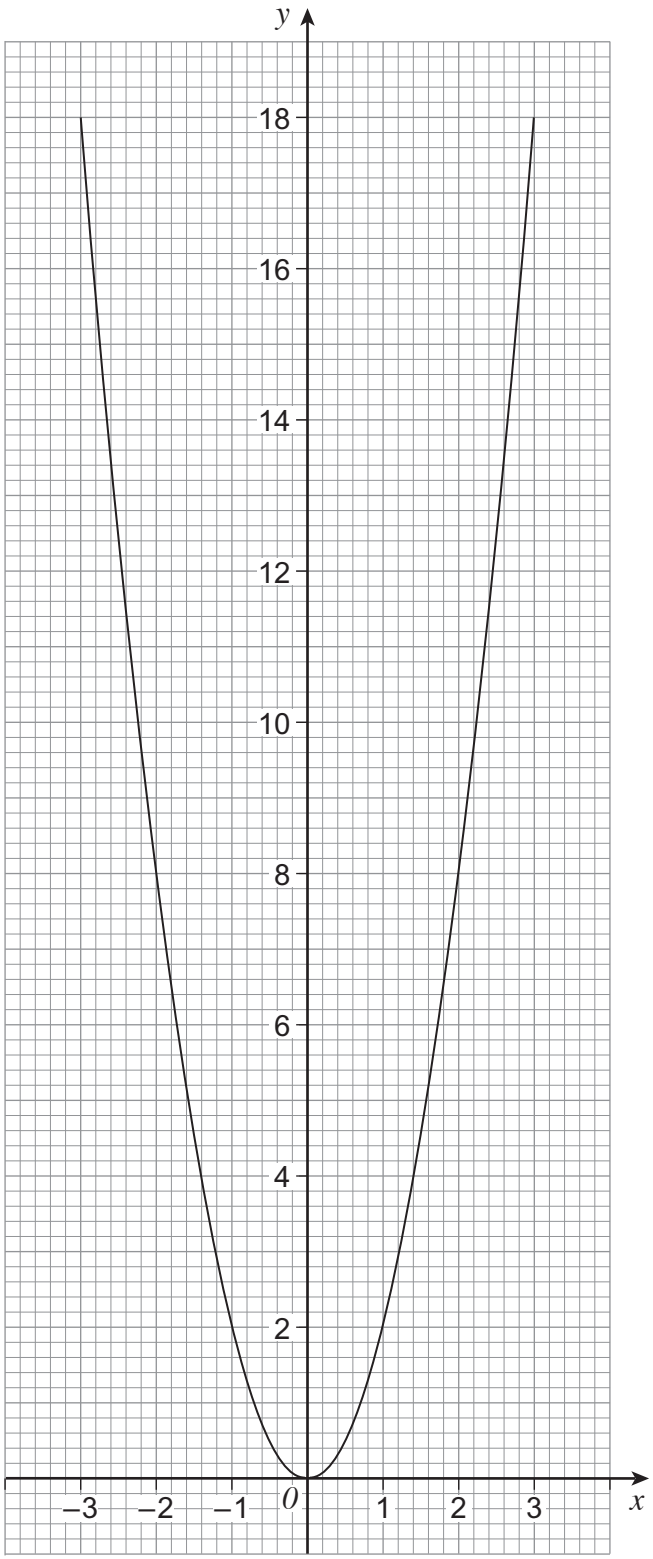
[3 marks]

Answer _____

Turn over for the next question

6

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 $\dfrac{(5-\sqrt{3})(3-\sqrt{3})}{2}$

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

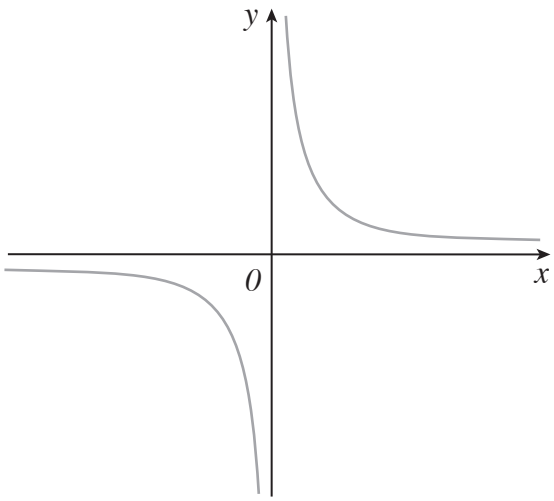
[3 marks]

Answer _____

7

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

[1 mark]

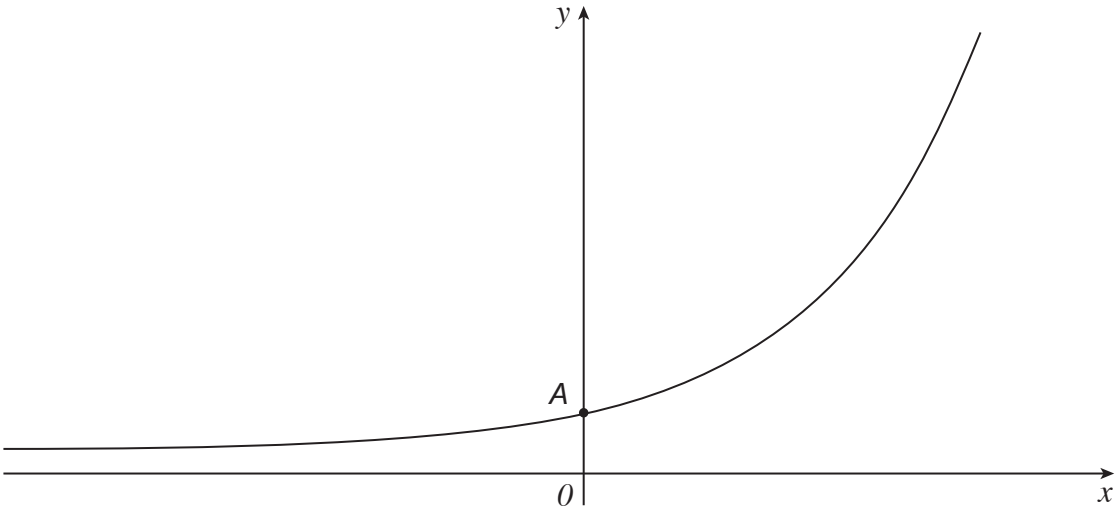


$y = x^3$ $y = \frac{1}{x}$ $y = \cos x$ $y = \sin x$

19 (b) This is the graph of $y = 2^x$

Write down the co-ordinates of A.

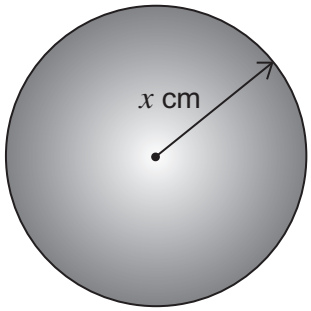
[1 mark]

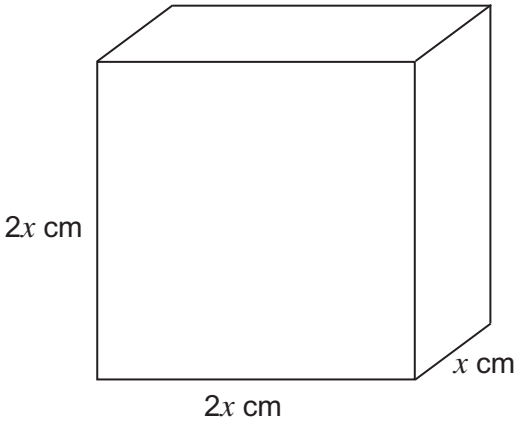


Answer (_____ , _____)

***20** A sphere has a radius of x cm

A 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

5

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