

**Mathematics**

Unit T6 Paper 1

**(Non-calculator)**  
Higher Tier



[GMT61]

**MV18**

FRIDAY 30 MAY, 1.30 pm–2.45 pm

**TIME**

1 hour 15 minutes, plus your additional time allowance.

**INSTRUCTIONS TO CANDIDATES**

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

Complete in blue or black ink only.

Answer **all sixteen** questions.

Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

**You must not** use a calculator for this paper.

## INFORMATION FOR CANDIDATES

The total mark for this paper is 50.

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

Functional Elements will be assessed in this paper.

Quality of written communication will be assessed in **question 13**.

You should have a ruler, compasses and a protractor.

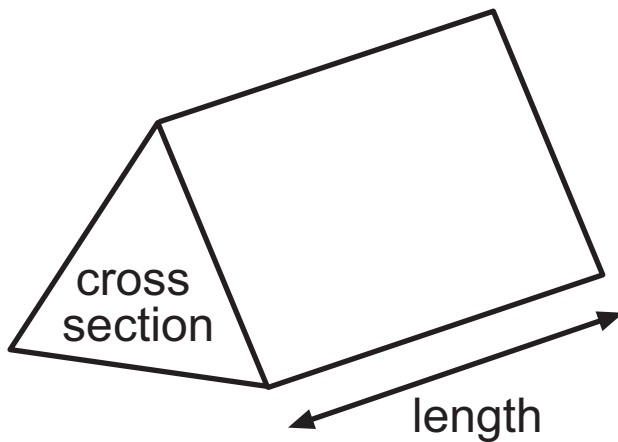
The Formula Sheet is on pages 4 and 5.

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**(Questions start on page 6)**

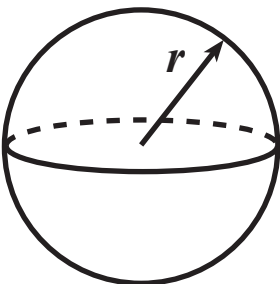
# Formula Sheet

**Volume of prism = area of cross section  $\times$  length**



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

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



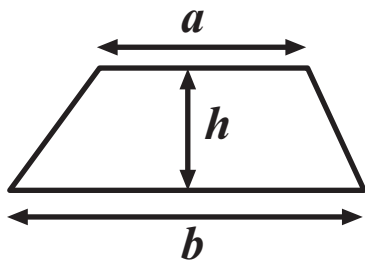
## Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$

where  $a \neq 0$ , are given by

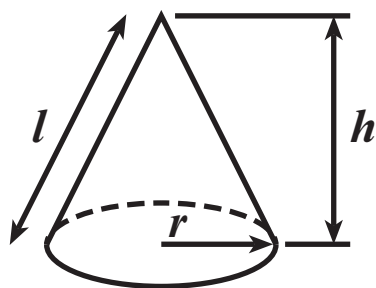
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

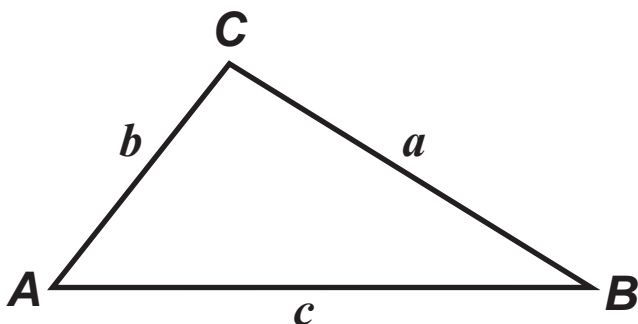


$$\text{Volume of cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Curved surface area of cone} = \pi r l$$



In any triangle **ABC**



$$\text{Sine Rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{Cosine Rule: } a^2 = b^2 + c^2 - 2bc \cos A$$

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

1 Work out the value of  $\frac{Q^2 (4 - R)}{3}$

when  $Q = -3$  and  $R = 6$  [3 marks]

Answer \_\_\_\_\_

2 (a) Given that  $24 \times 640 = 15360$

**write down the answer only** to  $2.4 \times 64$  [1 mark]

Answer \_\_\_\_\_

(b) Given that  $\frac{25600}{80} = 320$

**write down the answer only** to  $\frac{2560}{8}$  [1 mark]

Answer \_\_\_\_\_

3 (a) Calculate  $600 \div 0.2$  [2 marks]

Answer \_\_\_\_\_

(b) Without working out the answer to  $40 \times 0.752$  write down whether it will be greater or less than 40  
Explain your answer clearly. [2 marks]

\_\_\_\_\_ because \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4 Find the area of the shape below. [2 marks]

All lengths are in centimetres.

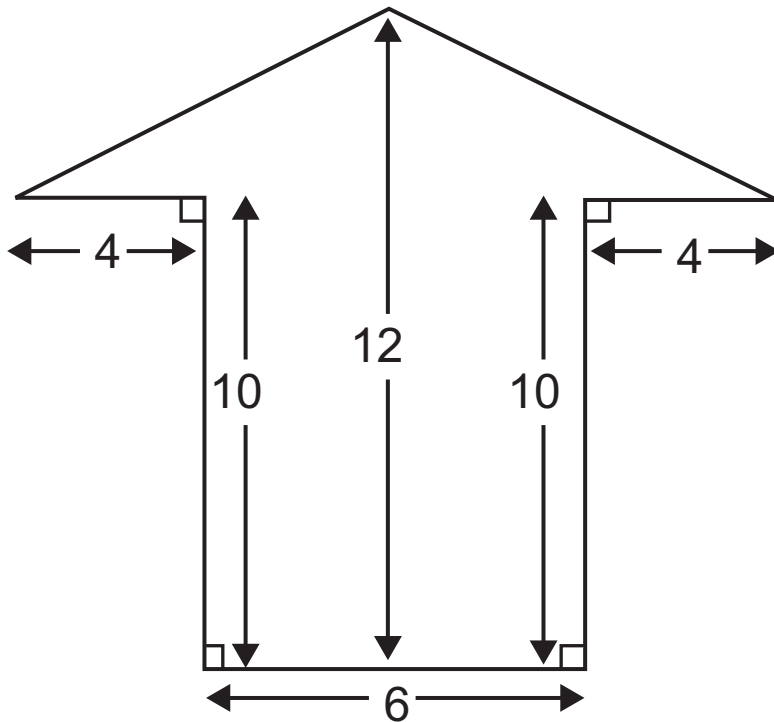


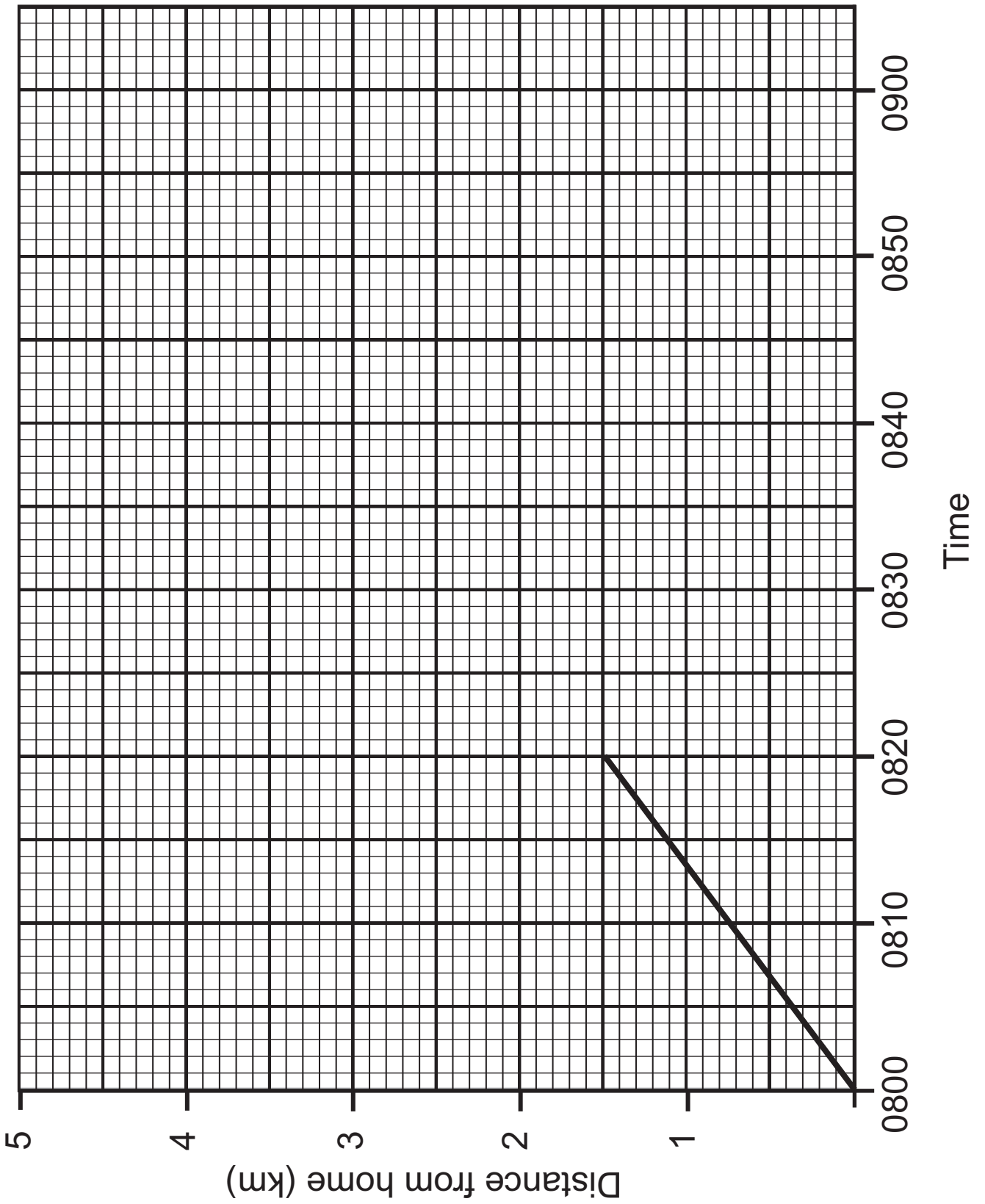
diagram not  
drawn accurately

Answer \_\_\_\_\_  $\text{cm}^2$



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**(Questions continue overleaf)**



**5** Marcus leaves home at 0800 to walk to school. School begins at 0900.  
The distance – time graph on page 10 shows part of his journey.

**(a)** Work out his average speed for this part of the journey.  
Give your answer in kilometres per hour. [2 marks]

Answer \_\_\_\_\_ km/hr

**(b)** At 0820 he stops at a shop for 10 minutes. He then completes his journey to school at 6 km/hr. He arrives in school 2 minutes before the 0900 bell. Complete the travel graph to illustrate his journey. [3 marks]

**(c)** Hence determine the distance from the shop to school. [2 marks]

Answer \_\_\_\_\_ km

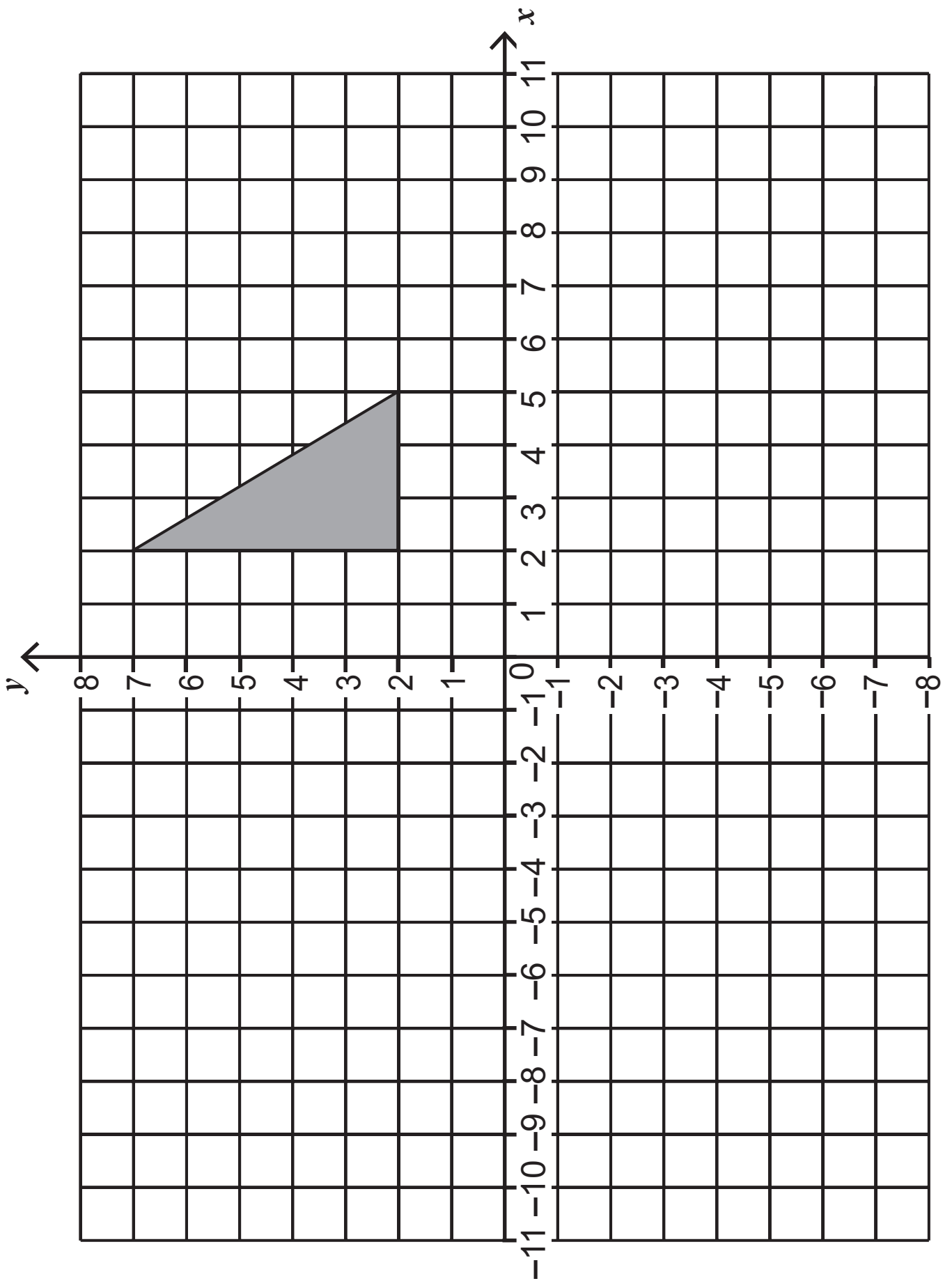
**6** The table shows some of the probabilities of when patients arrive for dental appointments.

Patient arrives	Probability
Early	0.1
Exactly on time	0.58
Late	
Not at all	0.06

Calculate the probability that a patient

**(a)** is late, Answer \_\_\_\_\_ [2 marks]

**(b)** arrives. Answer \_\_\_\_\_ [2 marks]



7 On page 12 draw and shade the image of the triangle after a  $90^\circ$  anticlockwise rotation about the point  $(-1, 1)$ .  
[2 marks]

8 Niamh carries out an experiment dropping pieces of toast to see if they land jam up or jam down.  
Here are her results.

Number of trials	10	50	100	500	1000
Jam Down	4	29	61	308	623
Relative Frequency	0.4		0.61	0.616	0.623

(a) Complete the missing relative frequency value in the table. [1 mark]

(b) From the results of Niamh's experiment, would you say that a piece of toast is more likely to land jam up or jam down? Explain your answer. [1 mark]

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9 (a) Make  $x$  the subject in  $y - kx = t$  [2 marks]

Answer  $x =$  \_\_\_\_\_

(b) Make  $r$  the subject in  $t = \frac{r}{p} + 1$  [2 marks]

Answer  $r =$  \_\_\_\_\_

**10 Simplify**

**(a)**  $m^3 \times m^3$  [1 mark]

Answer \_\_\_\_\_

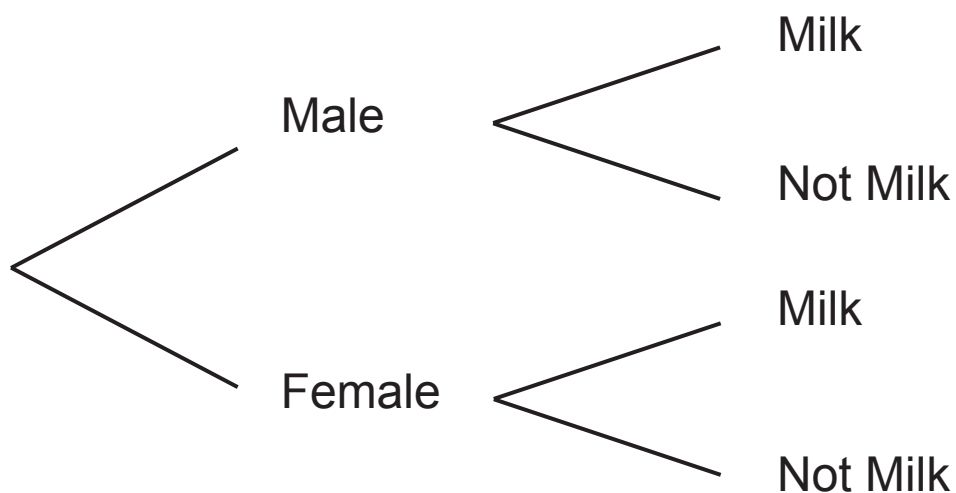
**(b)**  $\sqrt{\frac{\pi x^3}{9\pi x}}$  [2 marks]

Answer \_\_\_\_\_

11 Students in 6th Form were asked about the type of drink they chose most often at lunch.

	Water	Milk	Fizzy Drink	Total
Male	32	13	85	130
Female	16	30	74	120
Total	48	43	159	250

A student is selected at random from the 6th Form. Use the information in the table to complete the probability tree diagram. [3 marks]



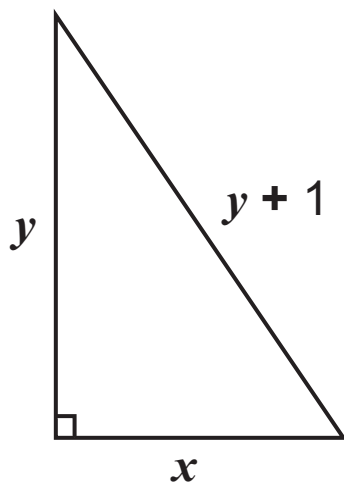


12 Write the recurring decimal  $0.14\overline{5}$  as a fraction. [2 marks]

Answer \_\_\_\_\_

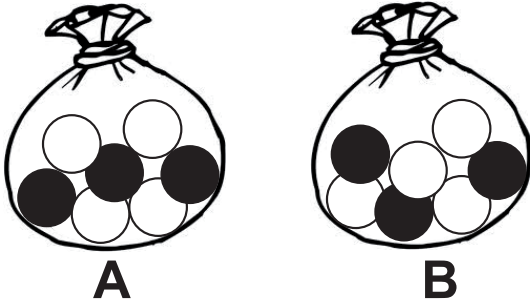
**Quality of written communication will be assessed in this question.**

**13** The right-angled triangle has sides  $x$ ,  $y$  and  $y + 1$  as shown, where  $x$  and  $y$  are integers.



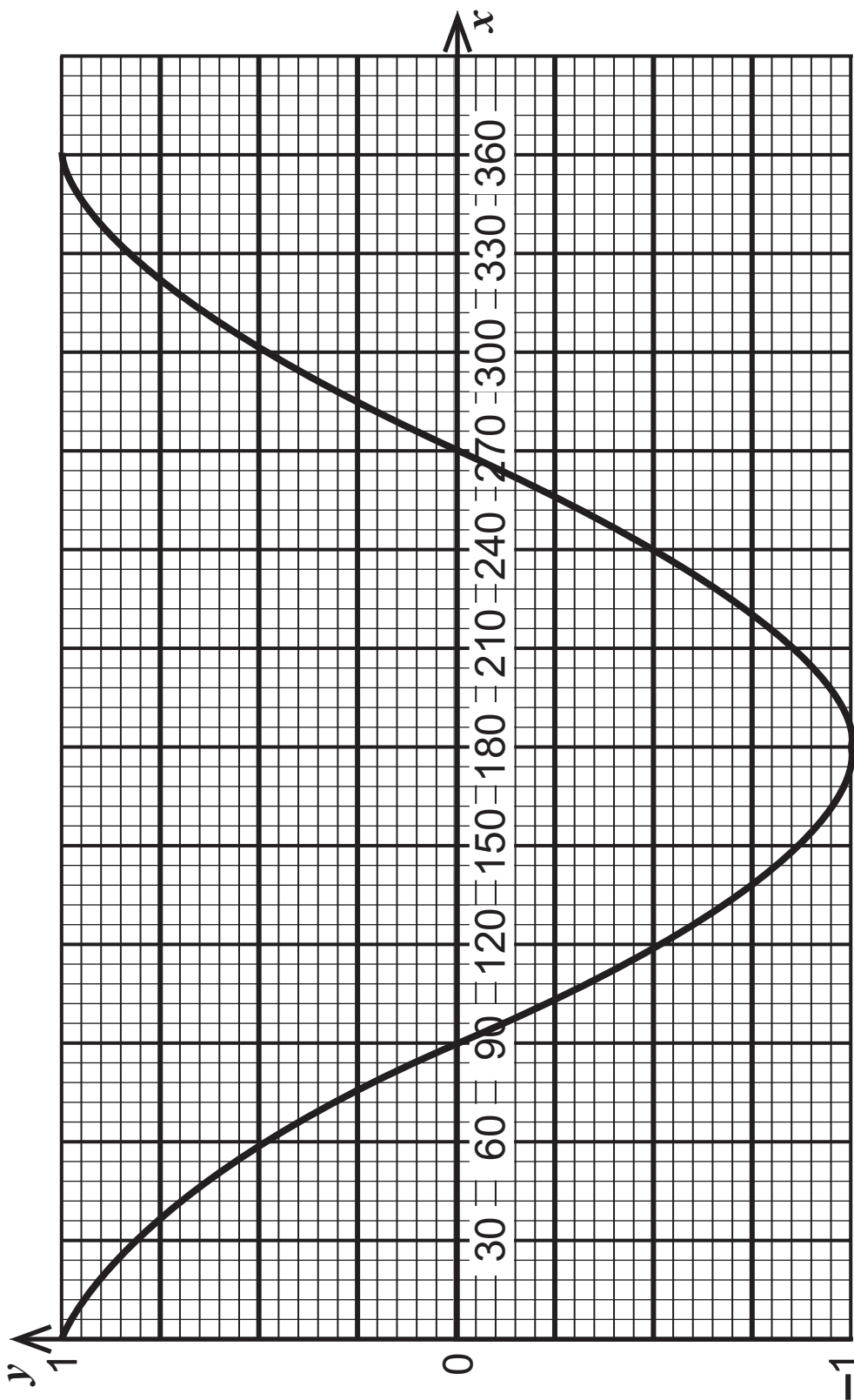
Prove that  $x$  must be odd. **Explain your working clearly.**  
[4 marks]

14



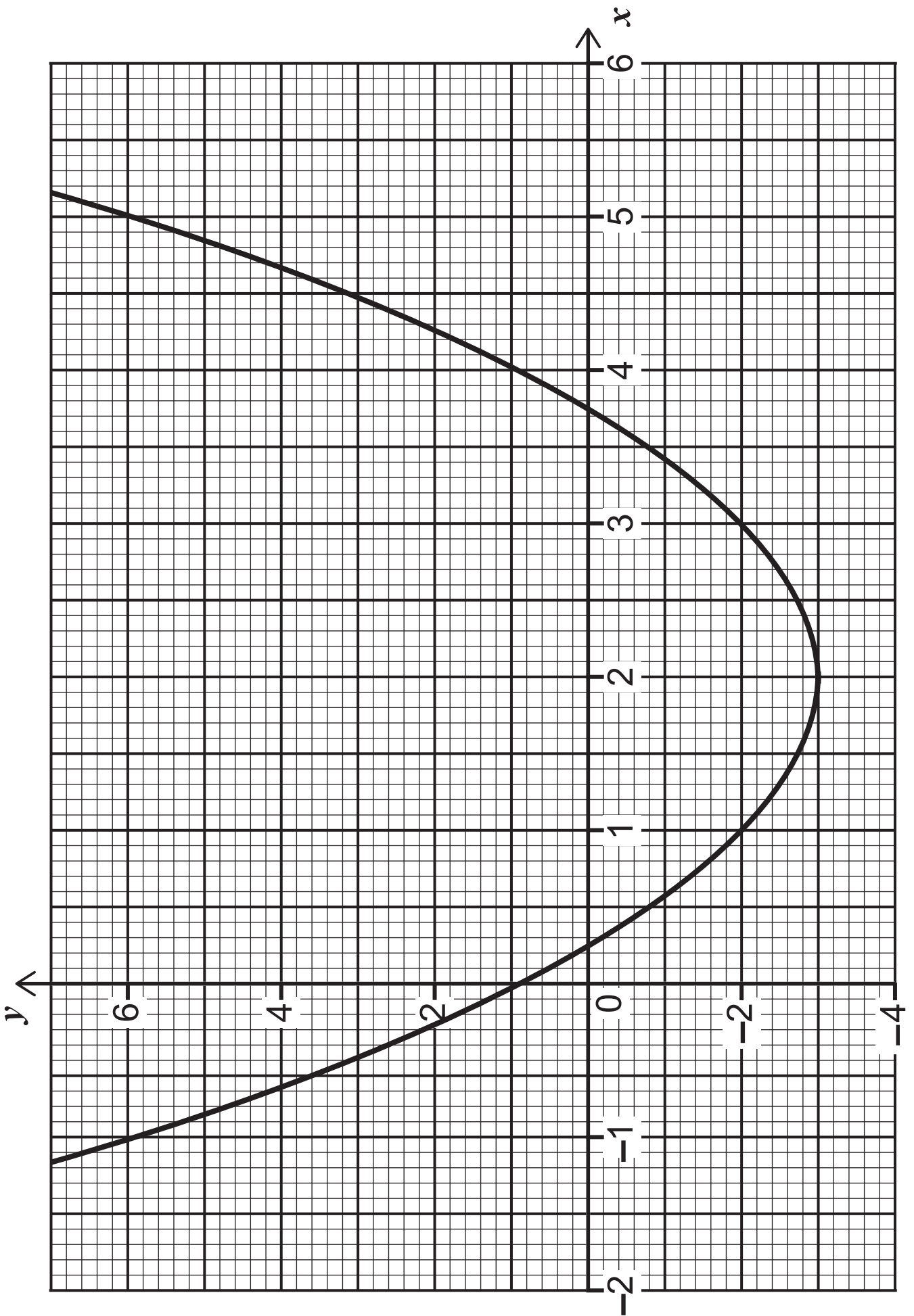
Two identical bags each contain seven balls. In each bag, four of the balls are white and three of the balls are black. Stephen takes at random one ball from each bag. Calculate the probability that at least one ball is black. [3 marks]

Answer \_\_\_\_\_



**15** Use the graph of  $y = \cos x$  on page 20 to solve the equation  $\cos x = -0.85$  [2 marks]

Answer  $x =$  \_\_\_\_\_



**16** On page 22 the graph of  $y = x^2 - 4x + 1$  is drawn.

By drawing an appropriate straight line on the grid, solve the equation  $x^2 - 3x - 2 = 0$  [3 marks]

Answer  $x =$  \_\_\_\_\_

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**THIS IS THE END OF THE QUESTION PAPER**

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For Examiner's use only	
Question Number	Marks
1	
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<b>Total Marks</b>	
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Examiner Number

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