GCSE

3300U50 – 1

MONDAY, 11 NOVEMBER 2024 – MORNING

MATHEMATICS
UNIT 1: NON – CALCULATOR
HIGHER TIER

1 hour 45 minutes plus your additional time allowance

THE USE OF A CALCULATOR IS NOT PERMITTED IN THIS EXAMINATION

Surname: _____

First name(s): _____

Centre Number: _____

Candidate Number: 0 _____

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	4	
2.	7	
3.	3	
4.	6	
5.	2	
6.	5	
7.	7	
8.	3	
9.	4	
10.	5	
11.	5	
12.	6	
13.	3	
14.	3	
15.	4	
16.	4	
17.	3	
18.	6	
Total	80	

ADDITIONAL MATERIALS

A ruler, protractor and pair of compasses may be required.

ITEMS INCLUDED WITH QUESTION PAPER

A separate Formula List.

A separate Diagram Booklet.

Model for Question 12.

The Diagram Booklet MUST be handed in to the invigilators and sent for marking.

INSTRUCTIONS TO CANDIDATES

Use black ink, black ball–point pen, black felt tip or your usual method.

Write your name, centre number and candidate number in the spaces on the front cover.

Answer ALL questions.

Write your answers in the spaces provided. If you run out of space, use the additional page(s) at the back of this booklet, taking care to number the question(s) correctly.

Take π as $3 \cdot 14$

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part–question.

In question 2, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

1. The table below shows some of the values of $y = 2x^2 + x + 3$ for values of x from -2 to 3

x	$y = 2x^2 + x + 3$
−2	
−1	4
0	3
1	6
2	
3	24

(a) Complete the table by finding the values of y for $x = -2$ and for $x = 2$

[2 marks]

continued on the next page . . .

Question 1 continued

1. (b) On the graph paper provided for Question 1 (b) in the separate Diagram Booklet, draw the graph of $y = 2x^2 + x + 3$ for values of x from -2 to 3

[2 marks]

2. IN THIS QUESTION, YOU WILL BE ASSESSED ON THE QUALITY OF YOUR ORGANISATION, COMMUNICATION AND ACCURACY IN WRITING.

Look at the diagrams for Question 2 in the separate Diagram Booklet. The diagrams are pie charts. The pie charts show the distributions of Year 7, Year 8 and Year 9 pupils in two schools, Ysgol Afon and Ysgol Twyn.

There are 254 YEAR 7 pupils in Ysgol Afon. The TOTAL number of pupils in Year 7, Year 8 and Year 9 in Ysgol Twyn is 480

One pupil is chosen at random from all the Year 7, Year 8 and Year 9 pupils in these two schools. What is the probability that this pupil is in Year 9?

[5 marks + 2 marks OCW]

3. Express 945 as a product of its prime factors in index form.

[3 marks]

4. A cyclist travels for 2 hours at an average speed of x miles per hour.

She then travels for a further 3 hours at an average speed of $(x + 6)$ miles per hour.

She travels a total distance of 78 miles.

Form an equation, in terms of x, to represent the total distance she travels.

Solve your equation and use your solution to complete the statements below.

First, the cyclist travels for 2 hours at an average speed of _____ miles per hour.

Then, she travels for a further 3 hours at an average speed of _____ miles per hour.

[6 marks]

5. **Look at the diagrams for Question 5 in the separate Diagram Booklet. The diagrams are NOT drawn to scale.**

There are two diagrams: Shape 1 and Shape 2

The two shapes are mathematically similar.

In Shape 1:

***AB* = 9 cm**

***BC* = 18•9 cm**

In Shape 2:

***DE* = 6 cm**

***EF* = *w* cm**

Calculate the value of *w*.

[2 marks]

6. Evan and Jane each shoot one arrow at a target.

The probability that Evan hits the centre of the target is $0 \cdot 4$

The probability that Jane hits the centre of the target is $0 \cdot 45$

(a) Look at the diagram for Question 6 (a) in the separate Diagram Booklet. The diagram shows an incomplete tree diagram.

Complete the tree diagram.

[3 marks]

(b) Find the probability that Evan and Jane both hit the centre of the target.

[2 marks]

7. A rectangle has length $(x + 5)$ cm and width $(x + 3)$ cm.

The area of the rectangle is $120\ \text{cm}^2$

(a) Show that $x^2 + 8x - 105 = 0$

[2 marks]

continued on the next page . . .

Question 7 continued

7. (b) Factorise $x^2 + 8x - 105$ and hence solve

$$x^2 + 8x - 105 = 0$$

[3 marks]

continued on the next page . . .

Question 7 continued

7. (c) Use your solutions from part (b) to find the dimensions of the rectangle.

You must justify any decisions that you make.

Length of rectangle = _____ cm

Width of rectangle = _____ cm

[2 marks]

8. Convert $3 \cdot 2 \times 10^4$ metres into MILES.

$3 \cdot 2 \times 10^4$ metres is _____ miles

[3 marks]

9. Look at the diagram for Question 9 in the separate Diagram Booklet. The diagram is NOT drawn to scale. The diagram shows points *A, B, C* and *D* on the circumference of a circle with centre *O.*

(a) Calculate the value of *x*.

Circle your answer.

55°	70°	110°	125°	135°

[1 mark]

(b) Calculate the value of *y*.

[3 marks]

10. (a) On the graph paper provided for Question 10 (a) in the separate Diagram Booklet, draw the region that satisfies all of the following conditions.

$$y - x \leq 1$$

$$y \geq \frac{x}{2}$$

$$x \leq 3$$

Clearly indicate the region that represents your answer.

[3 marks]

continued on the next page . . .

Question 10 continued

10. (b) (i) What is the LEAST possible value of *x* so that all three conditions are met?

***x* = _____**

[1 mark]

(ii) What is the GREATEST possible value of *y* so that all three conditions are met?

***y* = _____**

[1 mark]

11. In a science experiment, Jamil collects the following pairs of data values for two variables, x and y.

x	4	7	8
y	80	245	320

(a) Using the values in the table, show that y is NOT directly proportional to x.

[2 marks]

continued on the next page . . .

Question 11 continued

11. (b) Given that y is directly proportional to x^2, find a formula for y in terms of x.

[3 marks]

12. Ask for the model for Question 12. The model is NOT to scale. The model represents a solid cone.

Look at the diagrams for Question 12 in the separate Diagram Booklet. The diagrams are NOT drawn to scale.

Diagram 1 is a simplified 2D diagram of the solid cone.
The vertical height is 8 cm.
The radius of the base is 6 cm.

Diagram 2 is a circle with radius r cm.

The CURVED surface area of the cone equals the area of the circle.

continued on the next page . . .

Question 12 continued

By expressing any areas in terms of π, find the value of r.

Give your answer in the form $a\sqrt{b}$, where a and b are integers, and b is as small as possible.

[6 marks]

13. Prove that $(8n + 1)^2 - 3$ is always an even number, for all integers n.

You must use an algebraic method.

[3 marks]

14. Evaluate $\left(\frac{4}{3}\right)^{-1} + 16^{-\frac{3}{4}}$

[3 marks]

15. Simplify the following expression.

$$\left(5 + \sqrt{3}\right)\left(1 - \sqrt{3}\right) - \left(\sqrt{3}\right)^5$$

[4 marks]

16. Simplify $\dfrac{16s^2 - t^2}{8s^2 + 2st}$

[4 marks]

17. Megan is a netball player.

She repeatedly attempts to throw the ball through the net.

On each throw, the probability that Megan gets the ball through the net is $0 \cdot 7$
Each throw is independent of any previous throw.

Megan claims that the probability of getting the ball through the net for the first time on either the first or second throw is greater than 90%

Is Megan correct?

Yes ☐ No ☐

You must show all your working.

[3 marks]

18. Look at the diagram for Question 18 in the separate Diagram Booklet. The diagram shows a sketch of $y = \cos x$ for values of x from 0° to 360°

(a) Given that $\cos 58^\circ = 0 \cdot 5299$ correct to 4 decimal places, write down all the solutions of the equation

$$\cos x = -0 \cdot 5299$$

for values of x from 0° to 360°

[2 marks]

18. (b) (i) Look at the diagram for Question 18 (b) (i) in the separate Diagram Booklet. The diagram shows a set of axes. On the axes sketch the graph of $y = 2\cos x$ for values of x from 0° to 360°

You must indicate any important values on the $y-$axis.

[2 marks]

continued on the next page . . .

Question 18 (b) continued

18. (b) (ii) Look at the diagram for Question 18 (b) (ii) in the separate Diagram Booklet. The diagram shows a set of axes. On the axes sketch the graph of $y = -\cos x$ for values of x from 0° to 360°

You must indicate any important values on the $y-$axis.

[2 marks]

END OF PAPER

TOTAL MARKS 80

Question Number	Additional pages, if required. Write the question number(s) in the left – hand margin.

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3300U50-1

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MATHEMATICS

UNIT 1: NON – CALCULATOR

HIGHER TIER

The Diagram Booklet MUST be handed in to the invigilators and sent for marking.

Diagram Booklet

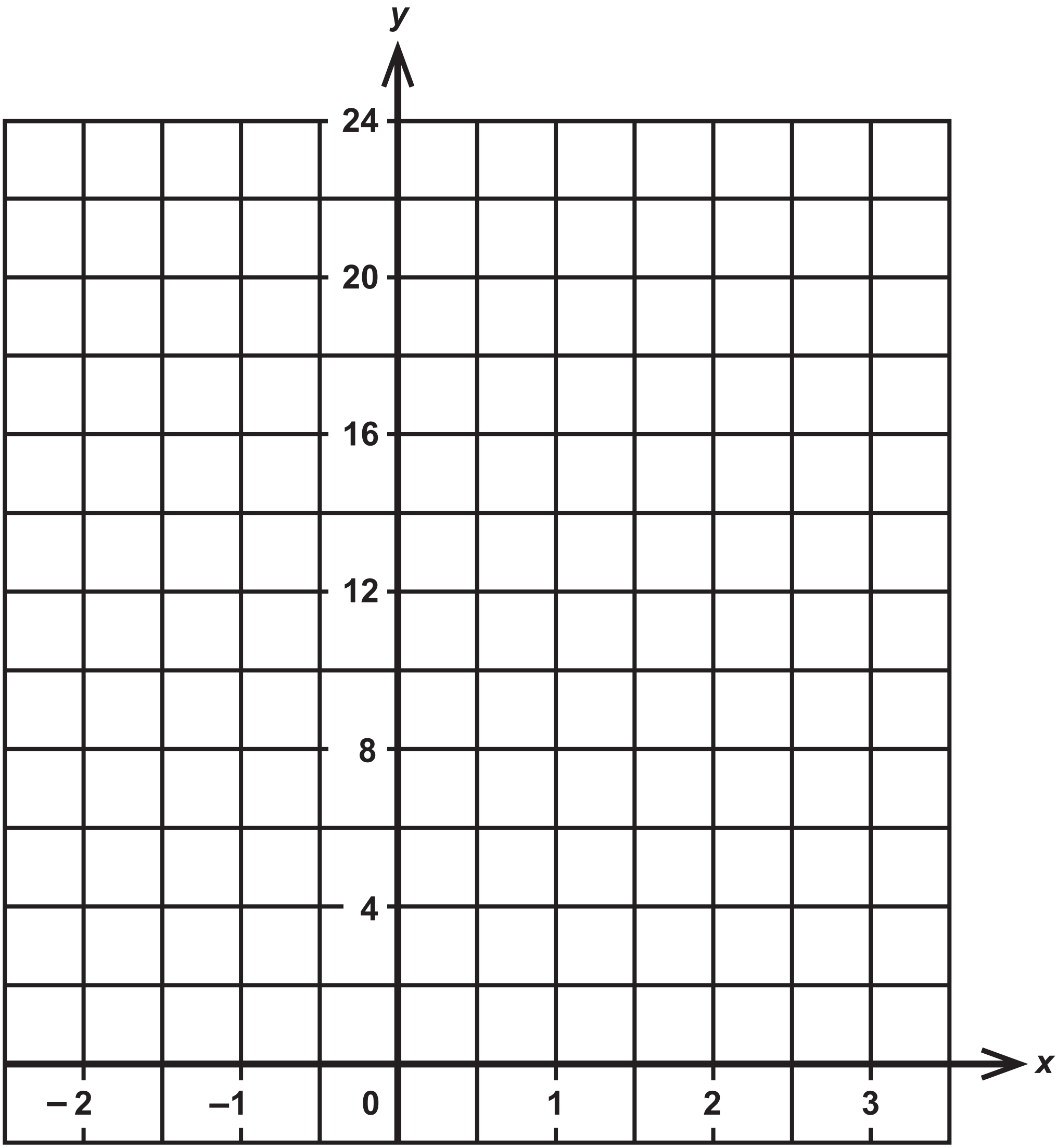
Surname: _____

First name(s): _____

Centre Number: _____

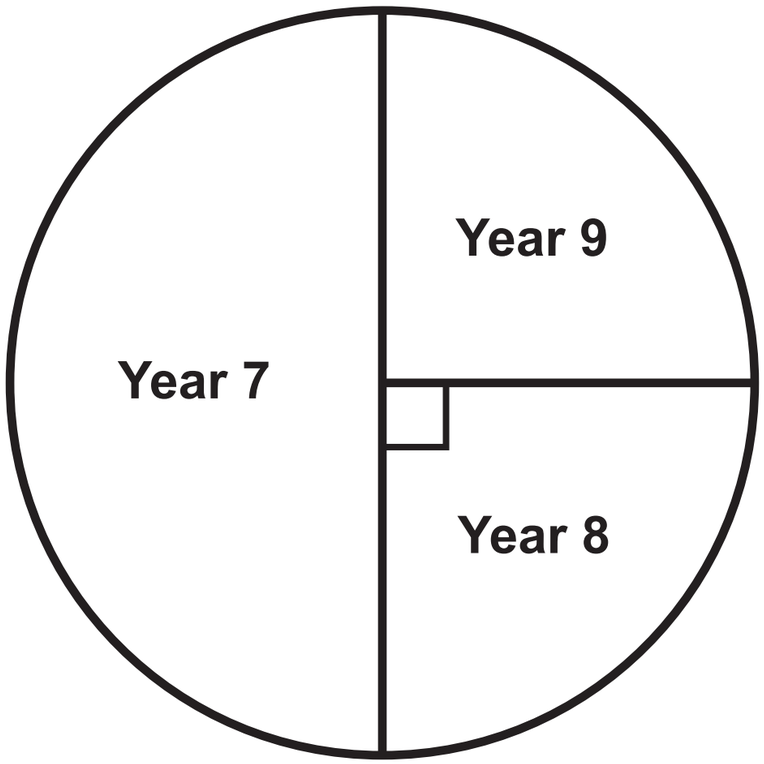
Candidate Number: 0_____

Question 1 (b)

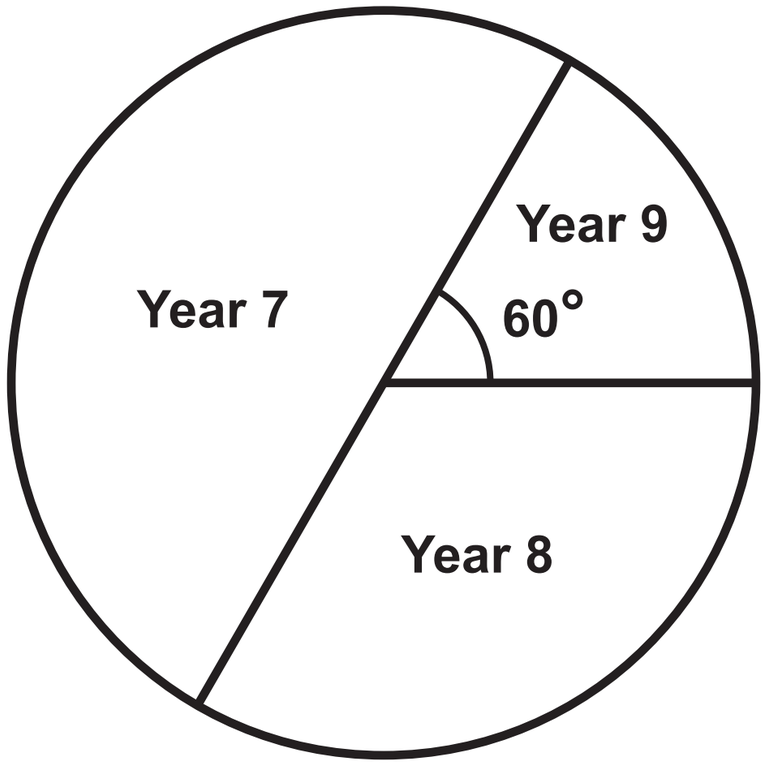


Question 2

YSGOL AFON



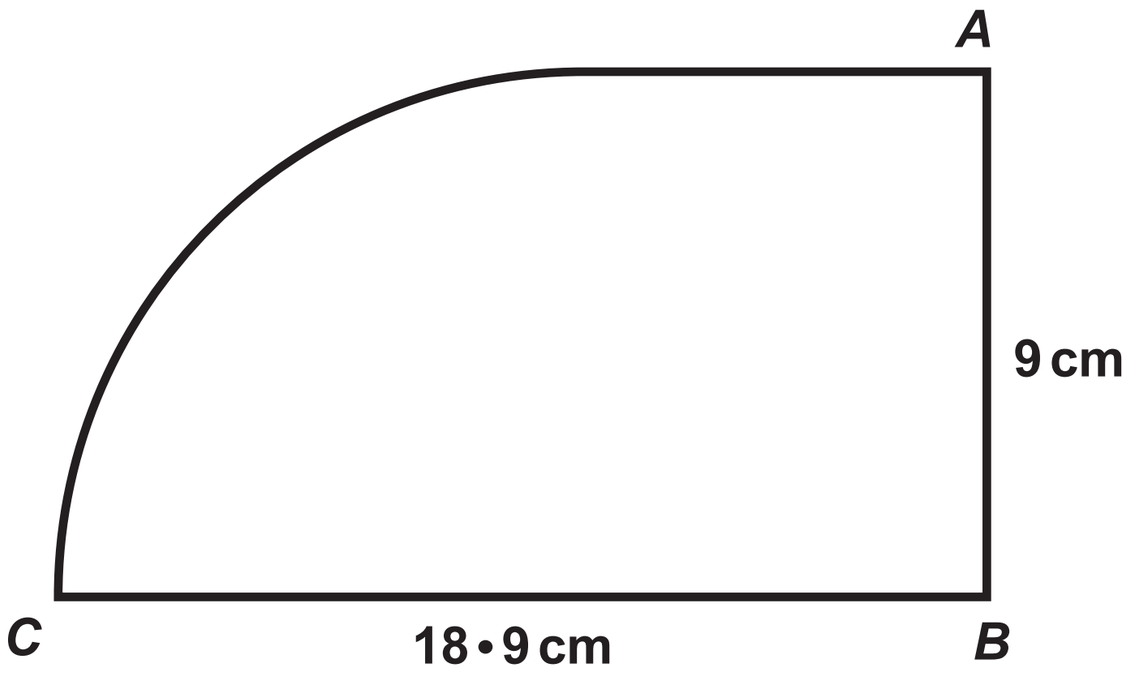
YSGOL TWYN



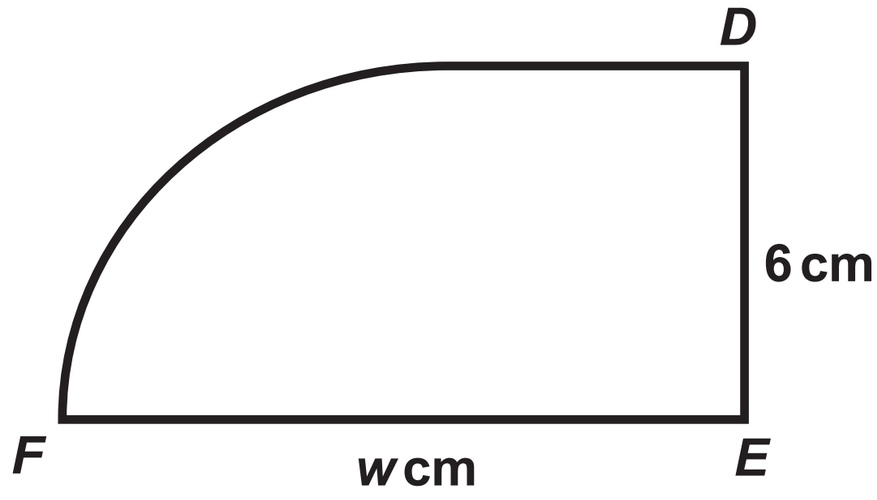
Question 5

Diagrams NOT drawn to scale

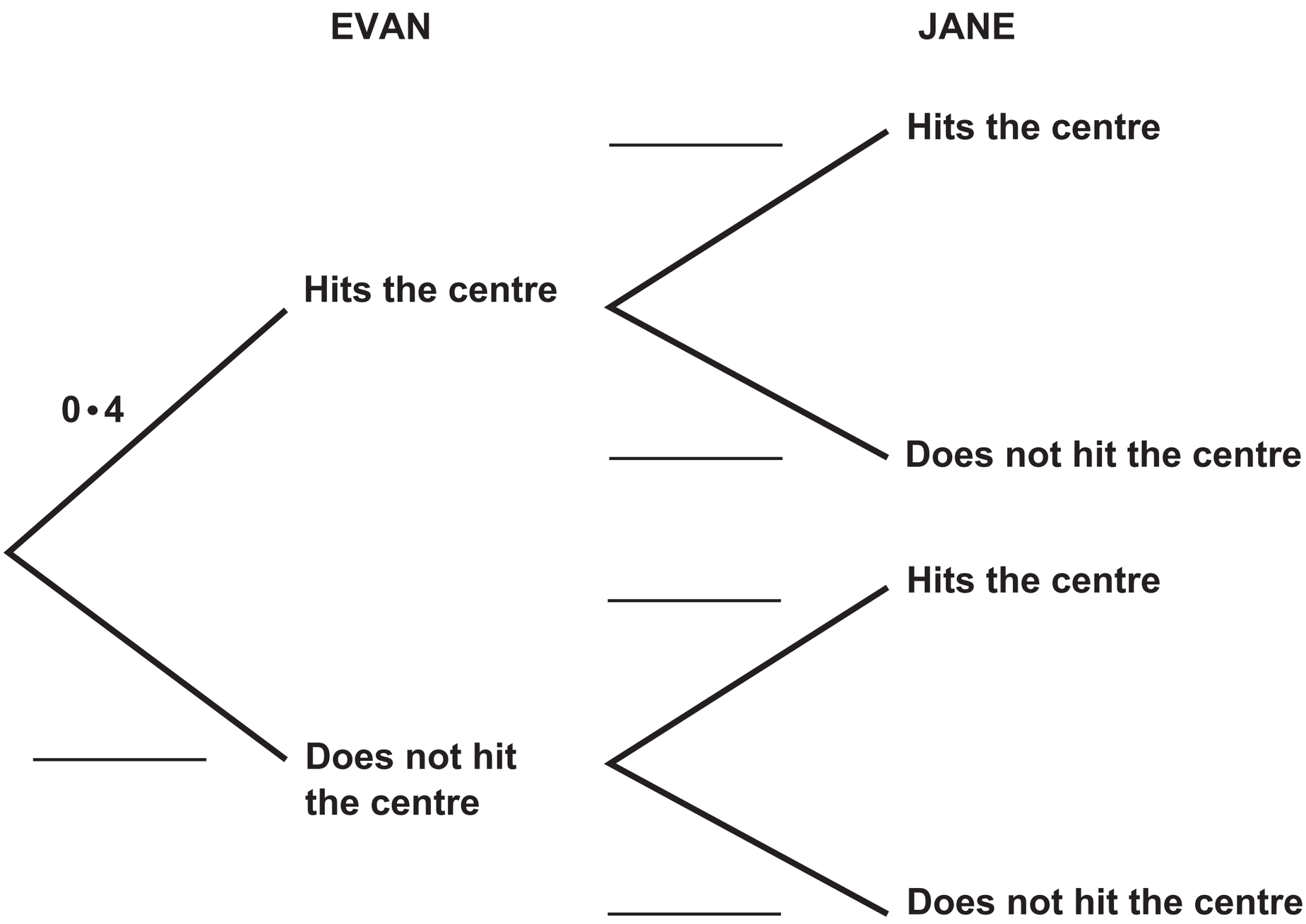
Shape 1



Shape 2

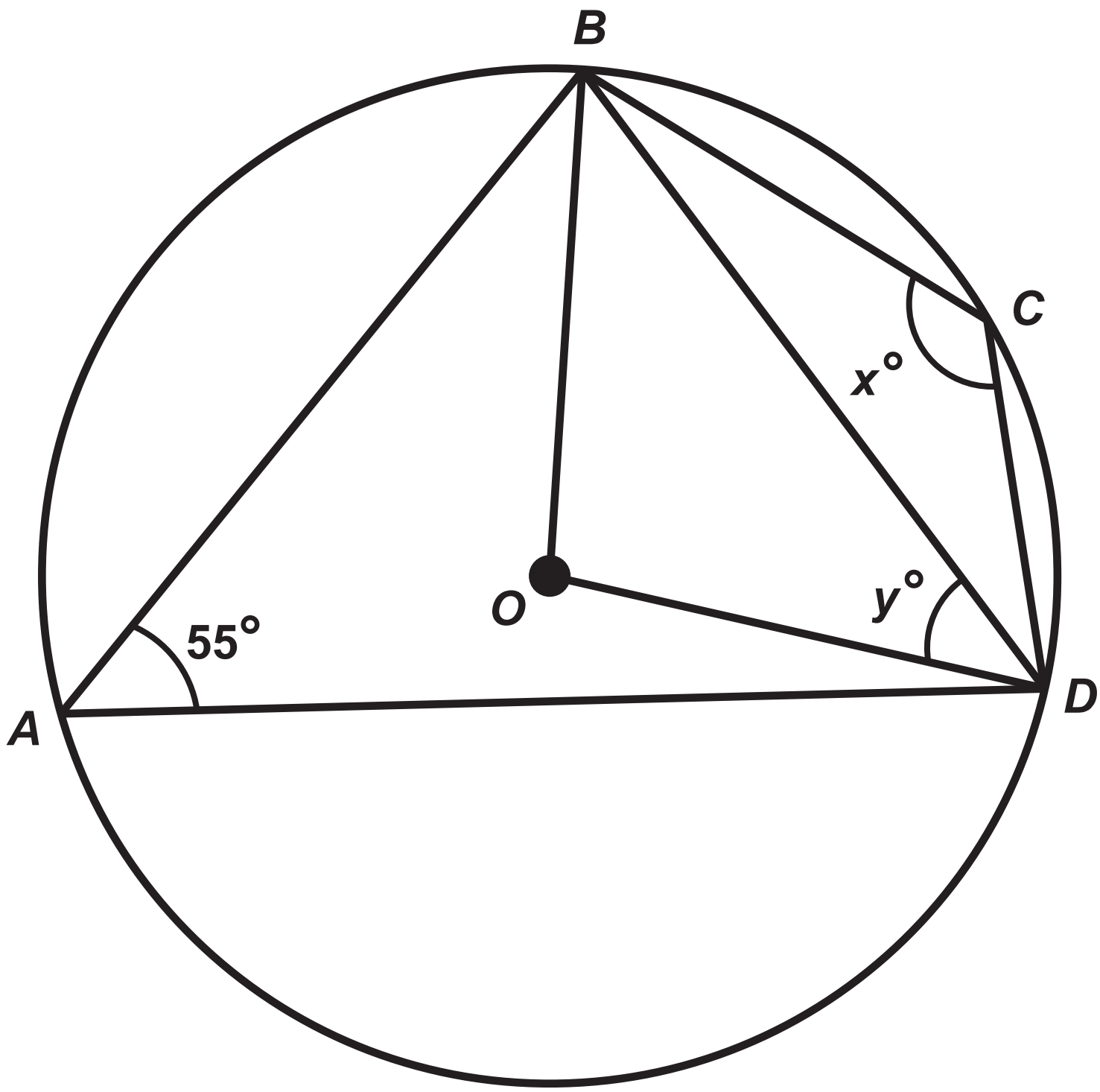


Question 6 (a)

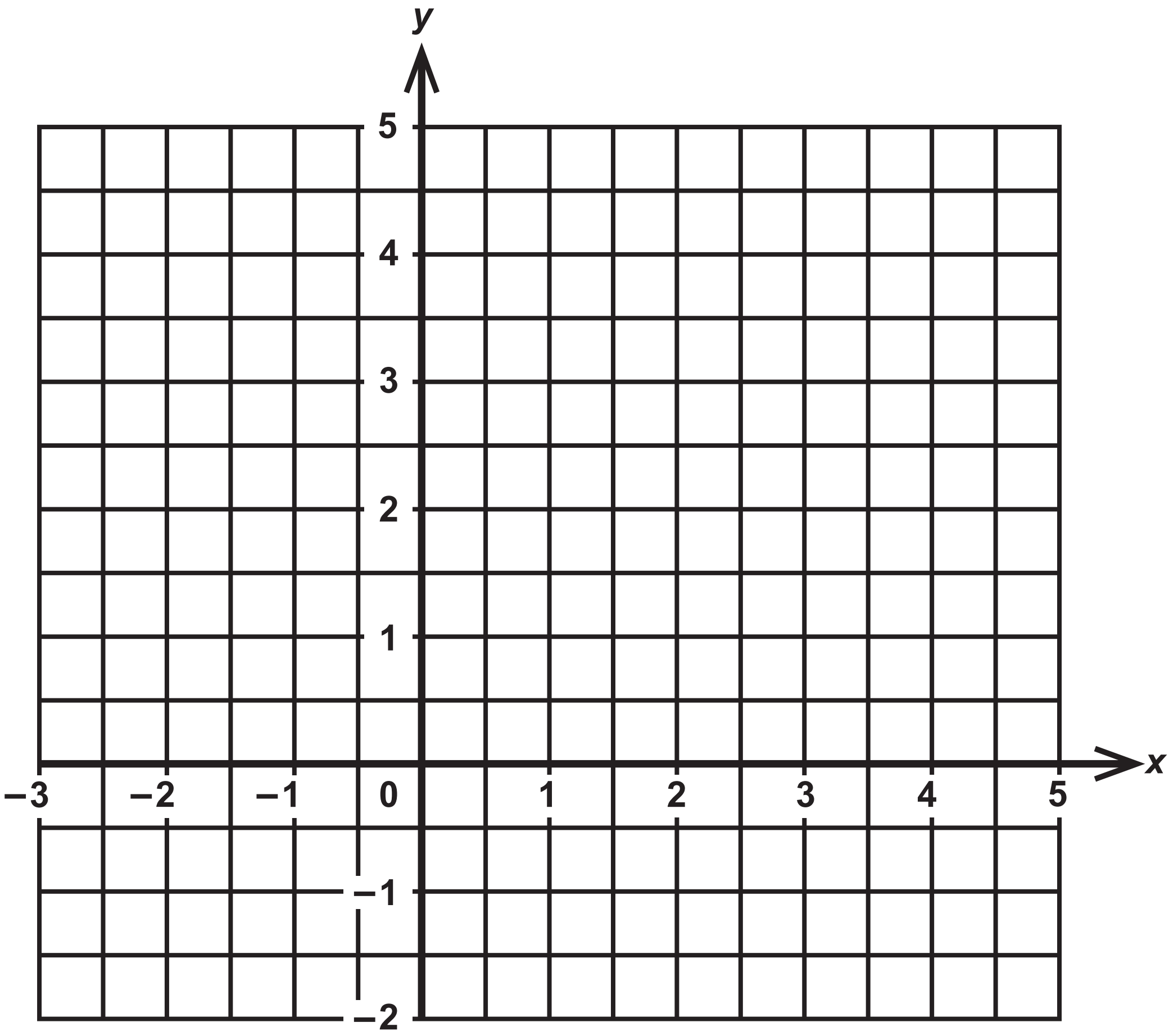

EVAN
JANE
Hits the centre
0•4
Does not hit the centre
Hits the centre
Does not hit the centre
Hits the centre
Does not hit the centre

Question 9

Diagram NOT drawn to scale



Question 10 (a)



Question 12

Diagrams NOT drawn to scale

Diagram 1

Simplified 2D diagram of the solid cone

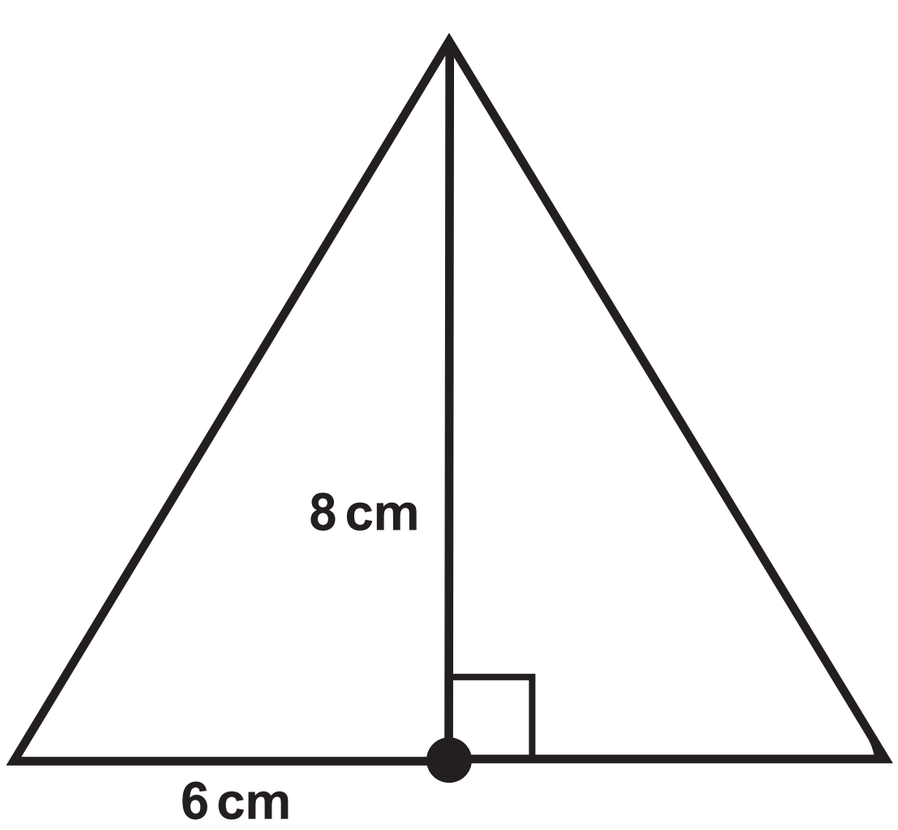
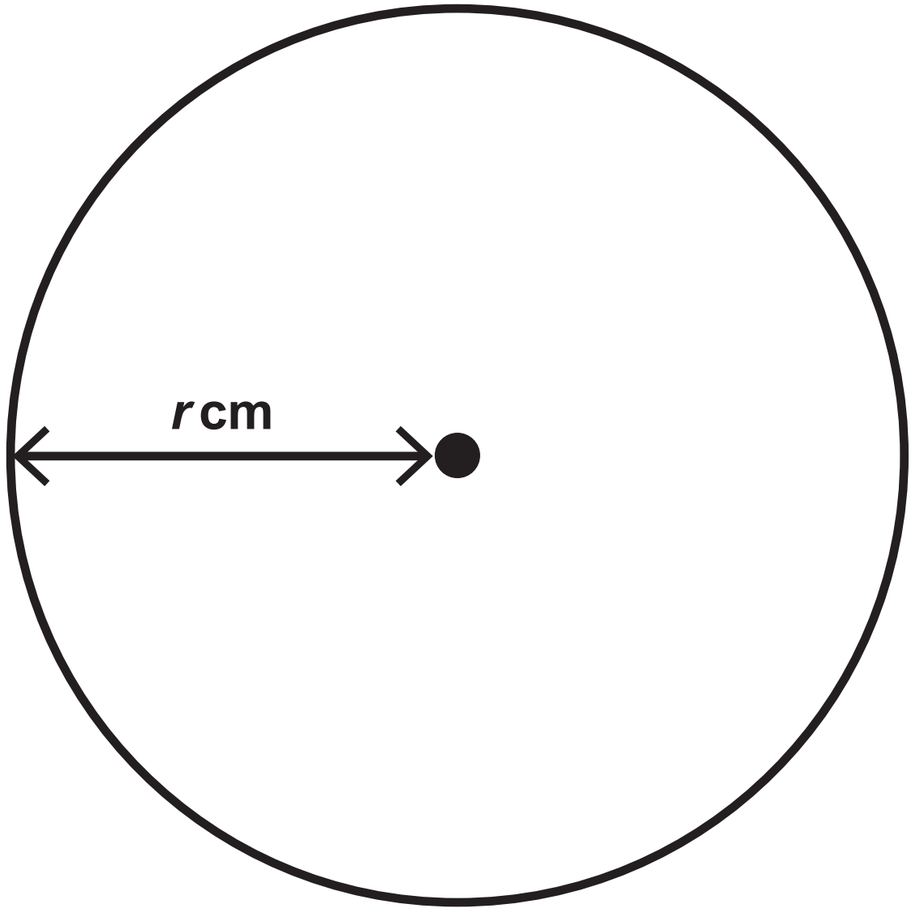
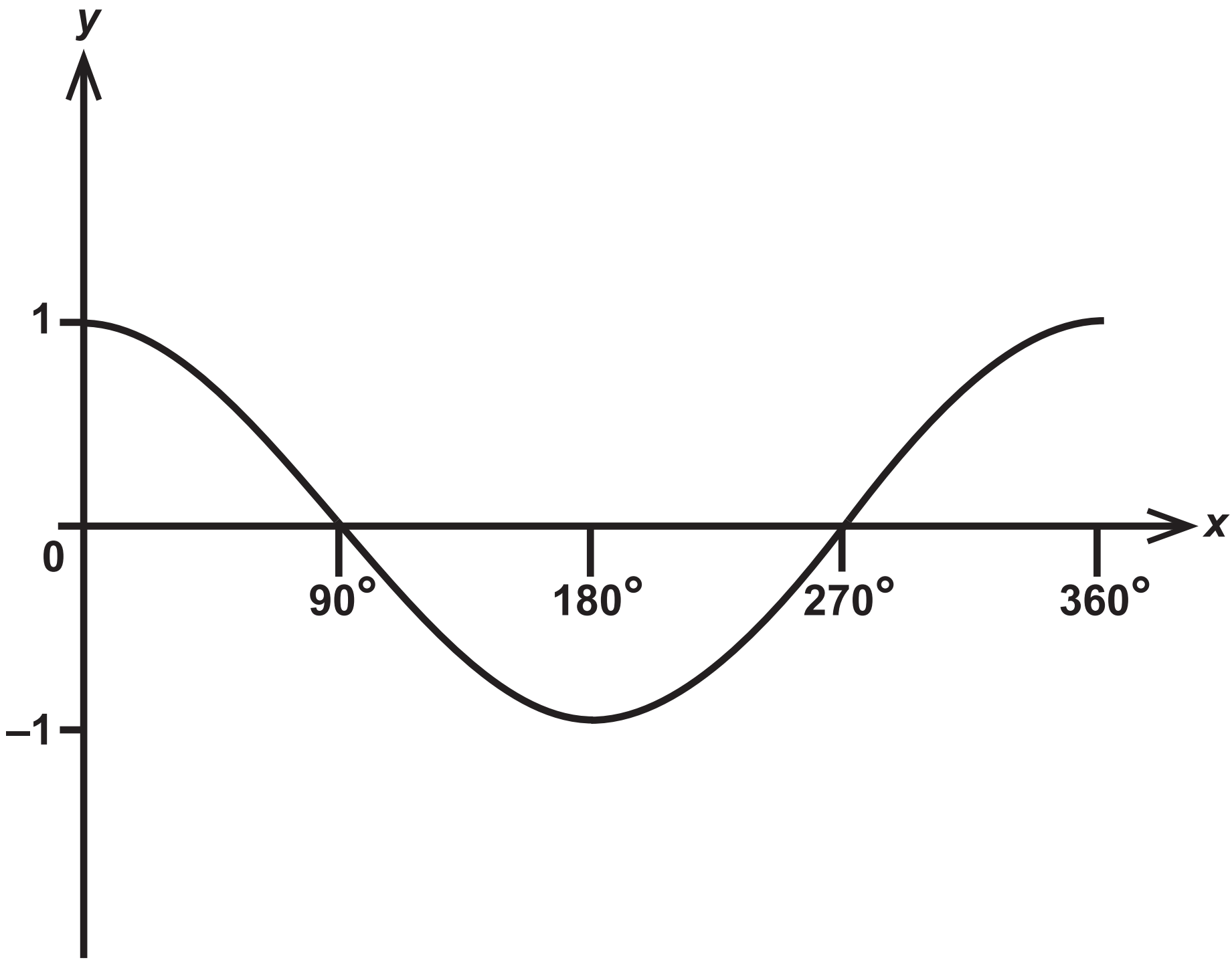


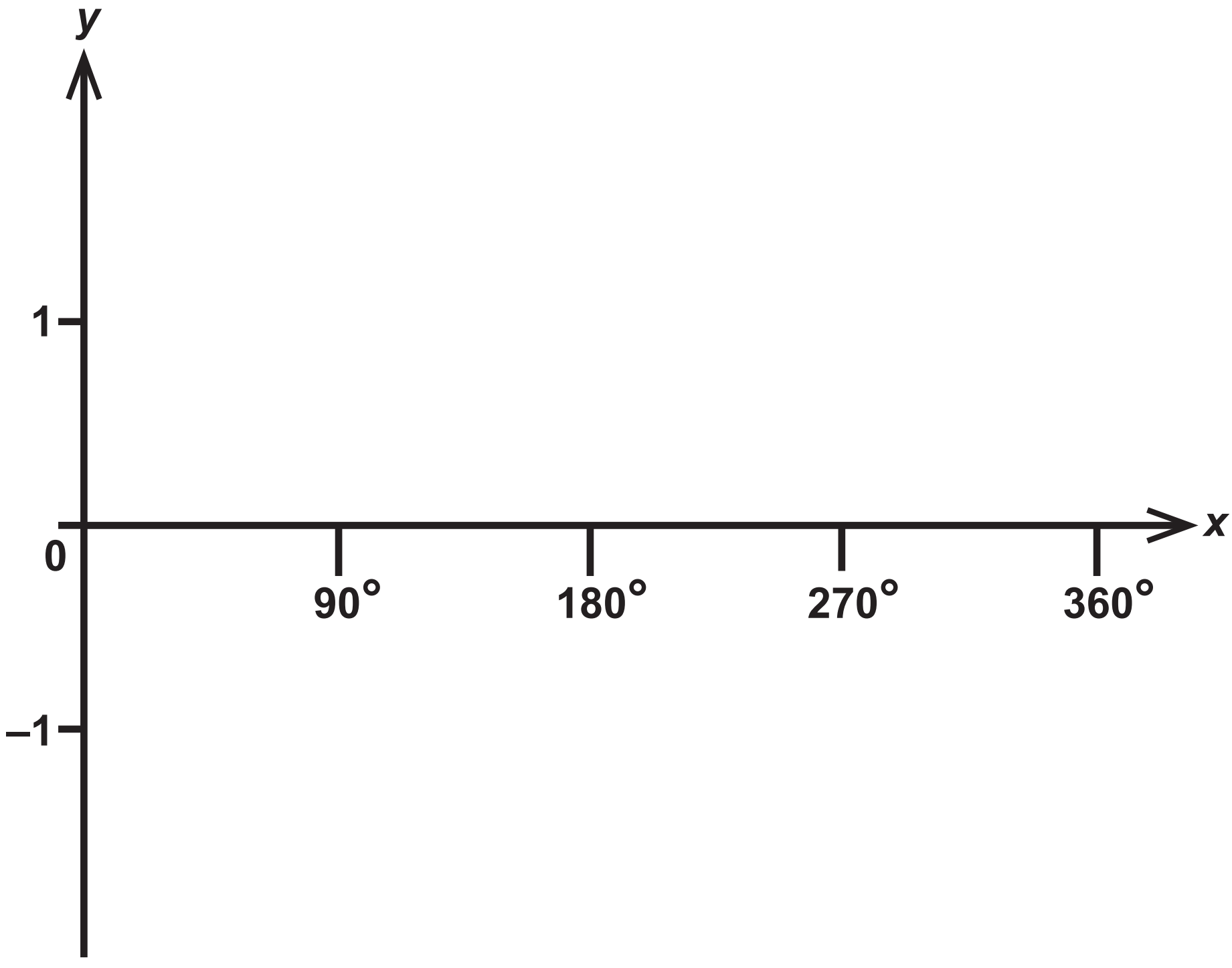
Diagram 2



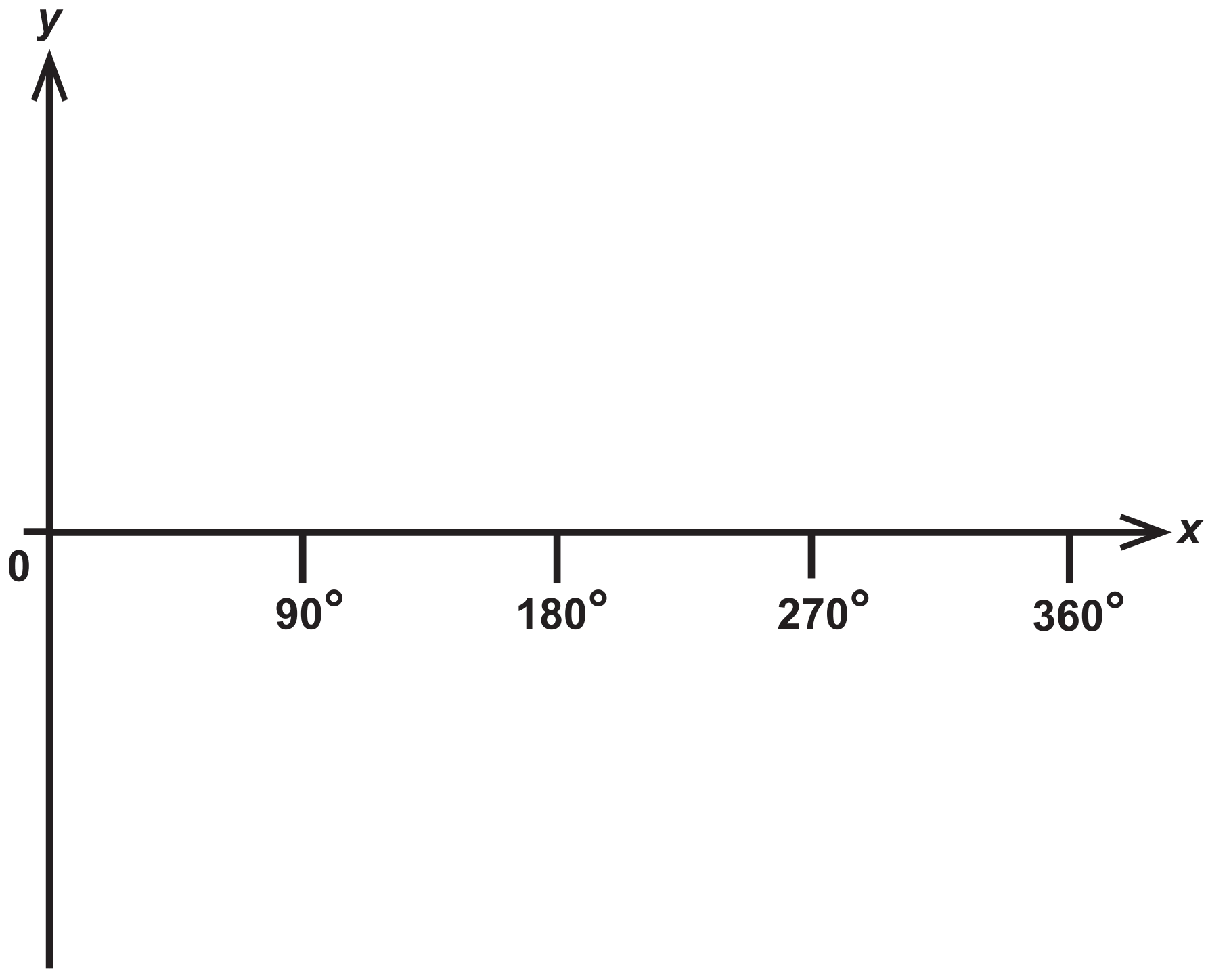
Question 18



Question 18 (b) (i)



Question 18 (b) (ii)



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MATHEMATICS

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MATHEMATICS – NUMERACY

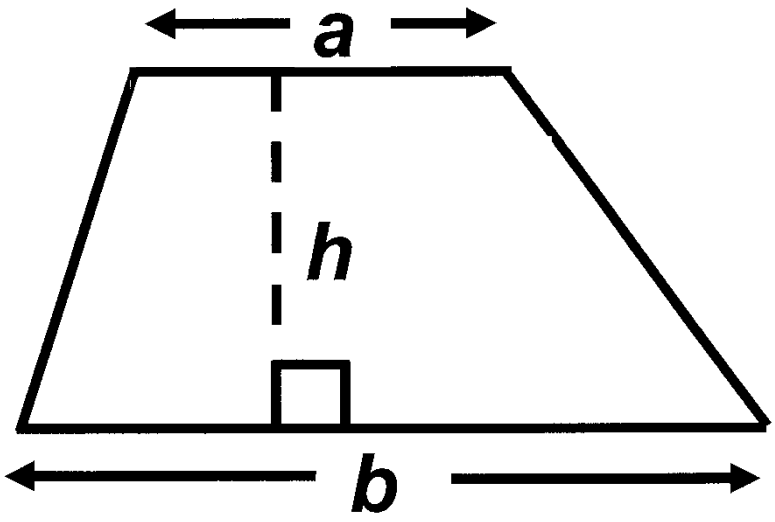
FORMULA LIST
INTERMEDIATE TIER
GCSE

You must not write on these formula pages.

Anything you write on these formula pages will gain NO credit.

Formula List – Intermediate Tier

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



Volume of prism =

area of cross – section × length