GCSE

3300U50-1

MATHEMATICS

UNIT 1: NON – CALCULATOR

HIGHER TIER

TUESDAY,

21 MAY 2019 – MORNING

1 hour 45 minutes

(plus your additional time allowance)

THE USE OF A CALCULATOR IS NOT PERMITTED IN THIS EXAMINATION

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	5	
2.	4	
3.	6	
4.	4	
5.	3	
6.	6	
7.	5	
8.	6	
9.	4	
10.	3	
11.	3	
12.	2	
13.	4	
14.	4	
15.	3	
16.	4	
17.	2	
18.	5	
19.	7	
Total	80	

Surname:	
Other Names:	
Centre Number:	
Candidate Number:	**0**

ADDITIONAL MATERIALS

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

ITEMS INCLUDED WITH QUESTION PAPER

A separate Formula List.

A separate Diagram Booklet.

A spare Diagram Booklet.

Model for Question 16.

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 continuation pages at the back of the booklet.
Question numbers must be given for all work written on the continuation page(s).

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

1. (a) Express 315 as a product of its prime factors in index form.

[3 marks]

Question 1 continued

1. (b) What is the Highest Common Factor (HCF) of 315 and 42?

[2 marks]

2. Complete the table below.

x	$y = 3x^2 - 27$
-3	0
-2	
-1	-24
0	-27
1	-24
2	-15
3	0
4	21

On the graph paper provided for Question 2 in the separate Diagram Booklet, draw the graph of $y = 3x^2 - 27$ for values of x between -3 and 4

You must choose a suitable scale for the y – axis.

[4 marks]

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

Look at the diagram for Question 3 in the separate Diagram Booklet.
The diagram is NOT drawn to scale.

A REGULAR octagon with centre O is shown in the diagram.

CALCULATE the exact size of angle OAB.
You may choose to draw additional lines on the diagram to help you.
You must show all your working.

[4 marks + 2 marks OCW]

4. **Look at the diagram for Question 4 in the separate Diagram Booklet.**

The diagram shows the line AB.

The point P is such that:

- **P lies on the perpendicular bisector of the line AB**
- **Angle $BAP = 30°$**

Using only a ruler and a pair of compasses, show one of the possible positions of P.
All construction lines and arcs must be shown.

[4 marks]

5. Estimate the value of

$$\frac{30{\cdot}21 \times 1{\cdot}98^3}{0{\cdot}49}$$

[3 marks]

6. The Anglesey Show is a two – day event held every August.

(a) On the first day, a random sample of 2000 visitors at the show were asked:

Do you live on Anglesey?

640 of them answered 'Yes'.

What was the relative frequency of those who answered 'Yes'?

Give your answer as a decimal.

_____

_____

_____

_____

_____

[1 mark]

continued on the next page . . .

Question 6 continued

6. (b) On the second day a random sample of 3000 visitors at the show were asked the same question.
The relative frequency of those who answered 'Yes' on this day was 0•42

Calculate the relative frequency of those who said they lived on Anglesey when the samples for BOTH days were combined. Give your answer as a decimal.

[4 marks]

Question 6 continued

6. (c) Which of the following is most likely to give the best estimate for the relative frequency of visitors to the show living on Anglesey?

Circle your answer.

Your answer to part (a)	0•42	Your answer to part (b)

You MUST give an explanation for your choice.

_____

_____

_____

[1 mark]

7. (a) (i) A mass is written as 430 kg, correct to the nearest 10 kg.
Circle the LEAST possible value of this mass.

420 kg	425 kg	429•5 kg	426 kg	424•9 kg

[1 mark]

(ii) A time period is written as 22 seconds, correct to the nearest second.
Circle the LEAST possible value of this time period.

22 seconds	20 seconds	21 seconds
21•5 seconds	21•4 seconds	

[1 mark]

continued on the next page . . .

Question 7 (a) continued

7. (a) (iii) A population is written as 85 people, correct to the nearest five people. Circle the LEAST possible value of this population.

83 people
81 people
84 people
82 people
80 people

[1 mark]

continued on the next page . . .

Question 7 continued

7. (b) Calculate $(3{\bullet}4 \times 10^{-5}) \times 700$

Give your answer in standard form.

[2 marks]

8. Leah is visiting Cardiff.

The probability that she will go on a tour bus is 0•3

The probability of Leah seeing a show at the Millennium Centre is independent of her going on a tour bus.

The probability that she goes on a tour bus and sees a show at the Millennium Centre is 0•24

(a) Look at the diagram for Question 8 (a) in the separate Diagram Booklet.

The diagram is an incomplete tree diagram.

Complete the tree diagram.

[4 marks]

8. (b) Calculate the probability that Leah does not go on a tour bus and does not see a show at the Millennium Centre.

[2 marks]

9. Arthur, Sian and Kezia are all given some £1 coins.

Arthur receives £n.

Sian is given five times as much money as Arthur.

Kezia receives three times as much money as Arthur, plus an extra £7

Sian was given less money than Kezia.

(a) Write down an inequality in terms of n that illustrates the fact that Sian received less money than Kezia.

[2 marks]

Question 9 continued

9. (b) What was the greatest amount of money that Arthur could have been given?

[2 marks]

10. Look at the diagram for Question 10 in the separate Diagram Booklet.

The diagram shows a grid.

Using the axes, find the region which satisfies the following inequalities.

$$x \geq -2$$

$$y + x \leq 1$$

$$2y \geq x$$

Make sure that you clearly indicate the region that represents your answer.

[3 marks]

11. Rearrange the following formula to make x the subject.

$$cx - 3 = 4x + d$$

[3 marks]

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

In the diagram, AE and BD are straight lines and $BC = CE$.

Is it possible to conclude that triangles ABC and DEC are congruent?
You must show all your working and explain your decision.

[2 marks]

13. (a) Express $0{\cdot}24\dot{8}$ as a fraction.

[2 marks]

continued on the next page . . .

Question 13 continued

13. (b) Evaluate $\left(\frac{1}{27}\right)^{-\frac{2}{3}}$

[2 marks]

14. Look at the diagram for Question 14 in the separate Diagram Booklet.
The diagram is NOT drawn to scale.

The points A, B and C lie on the circumference of a circle.
The straight lines EBD and ECF are tangents to the circle.
Angle $BEC = 58°$ and angle $BCA = 35°$

Find the size of angle ABC.
You must show all your working.

[4 marks]

15. (a) Simplify $\sqrt{45}$

Circle your answer.

$3\sqrt{5}$	$3\sqrt{15}$	$5\sqrt{3}$	$9\sqrt{5}$	22•5

[1 mark]

continued on the next page . . .

Question 15 continued

15. (b) Evaluate $\left(2\sqrt{7} - \sqrt{3}\right)^2$

Simplify your answer.

[2 marks]

16. Ask for the model for Question 16.

The model is NOT made to scale.

The model is a cylinder.

The cylinder has a base of radius r and a height of $\frac{r}{6}$

A sphere has radius R.

The volume of the sphere is equal to the volume of the cylinder.

Find R in terms of r.

Give your answer in its simplest form.

[4 marks]

17. (a) Look at the diagrams for Question 17 (a) in the separate Diagram Booklet.

Diagram (i) shows a sketch of the curve $y = f(x)$.

The curve is transformed, as shown in Diagram (ii).

Using function notation, complete the equation of the transformed curve.

$y =$ _____

[1 mark]

continued on the next page . . .

Question 17 continued

17. (b) Look at the diagrams for Question 17 (b) in the separate Diagram Booklet.

Diagram (i) again shows a sketch of the curve $y = f(x)$.

The curve is transformed, as shown in Diagram (iii).

Using function notation, complete the equation of the transformed curve.

$y =$ _____

[1 mark]

18. A box contains 4 yellow cards and 6 red cards. Three cards are chosen at random, one at a time, without replacement.

(a) Calculate the probability that the first two cards are yellow and the third card is red. You must show all your working.

[2 marks]

Question 18 continued

18. (b) Calculate the probability that at least one yellow card is chosen.

[3 marks]

19. (a) Write the following expression as a single fraction.

Give your answer in its simplest form.

$$\frac{1}{x - p} - \frac{1}{x}$$

[2 marks]

continued on the next page . . .

Question 19 continued

19. (b) Solve the following equation.

$$\frac{y - 1}{y(4y + 3)} + 2 = 0$$

[5 marks]

END OF PAPER

TOTAL 80 MARKS

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

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MATHEMATICS

UNIT 1: NON – CALCULATOR

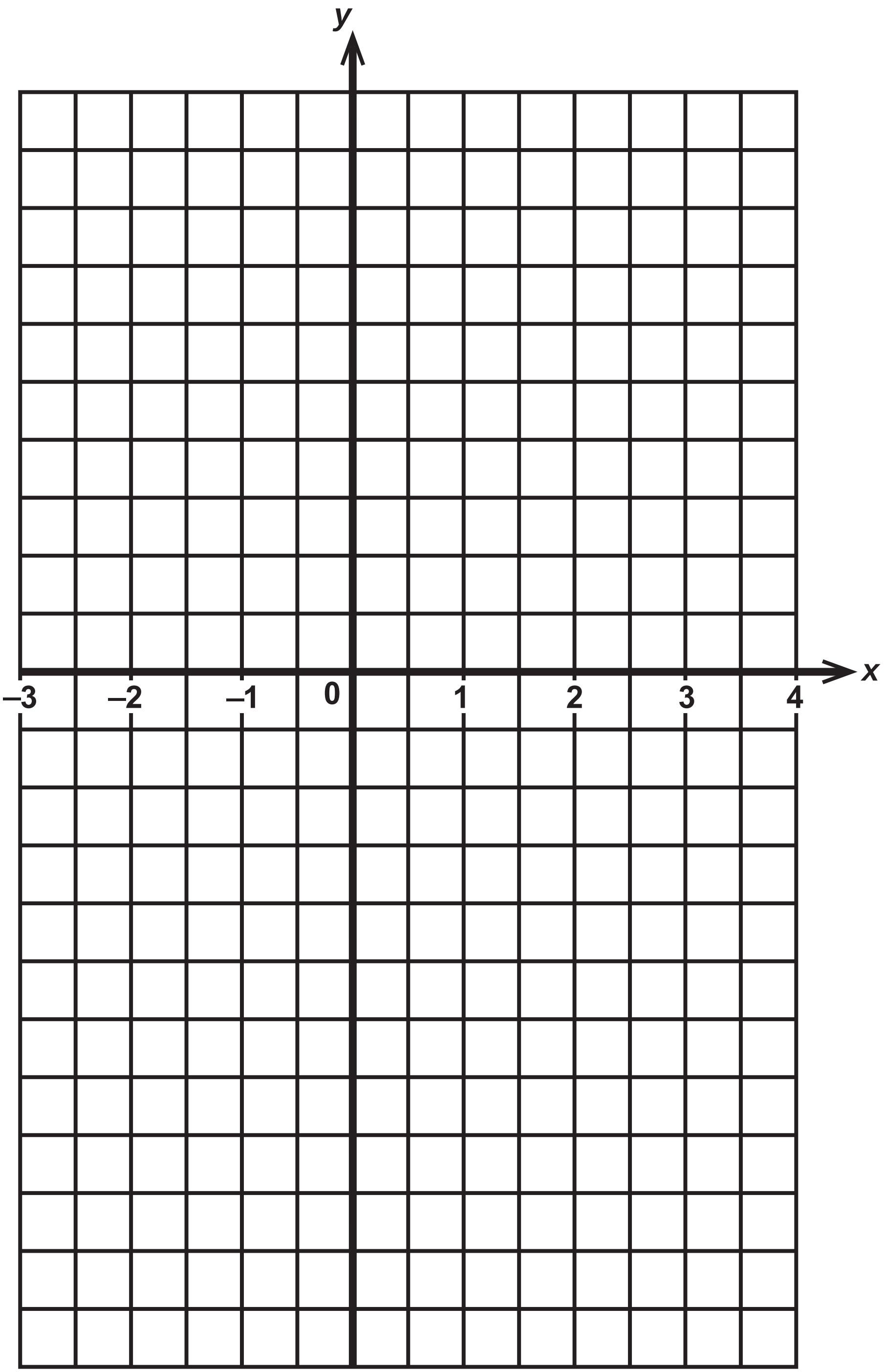
HIGHER TIER

TUESDAY, 21 MAY 2019 – MORNING

Diagram Booklet

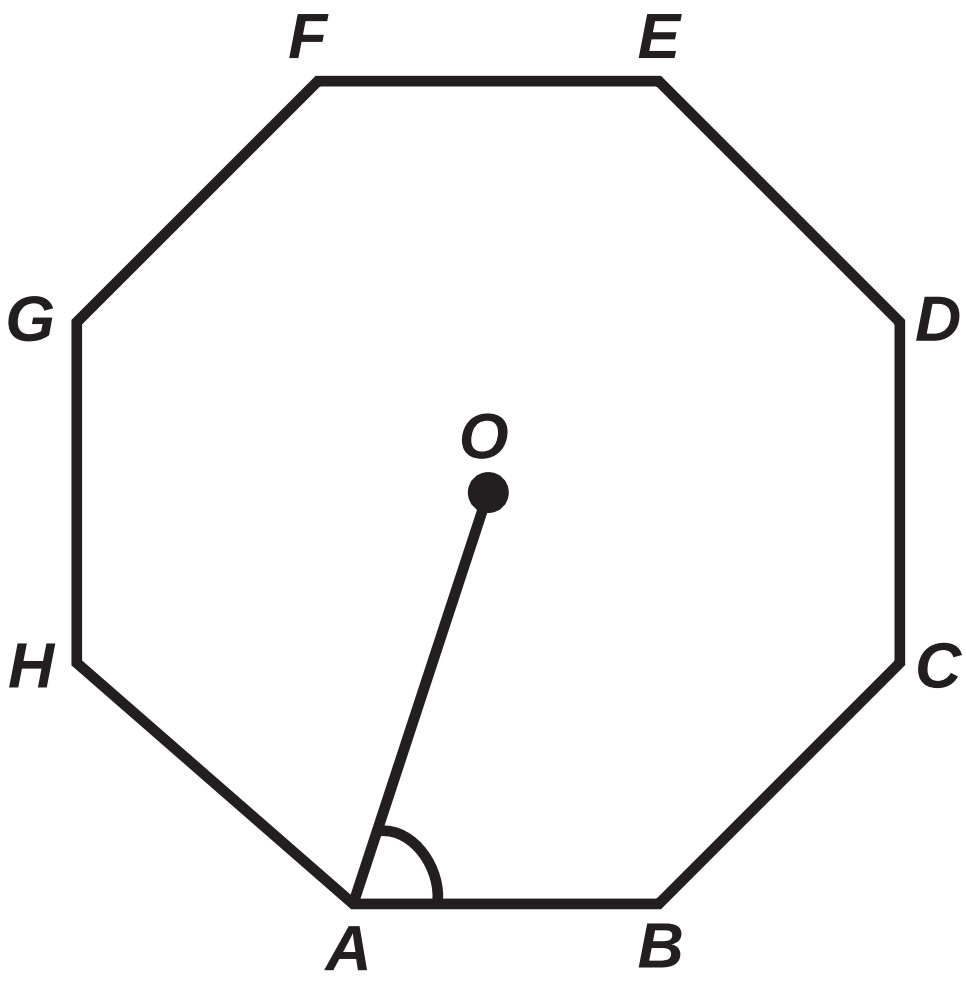
Surname:	
Other Names:	
Centre Number:	
Candidate Number:	**0**

Question 2



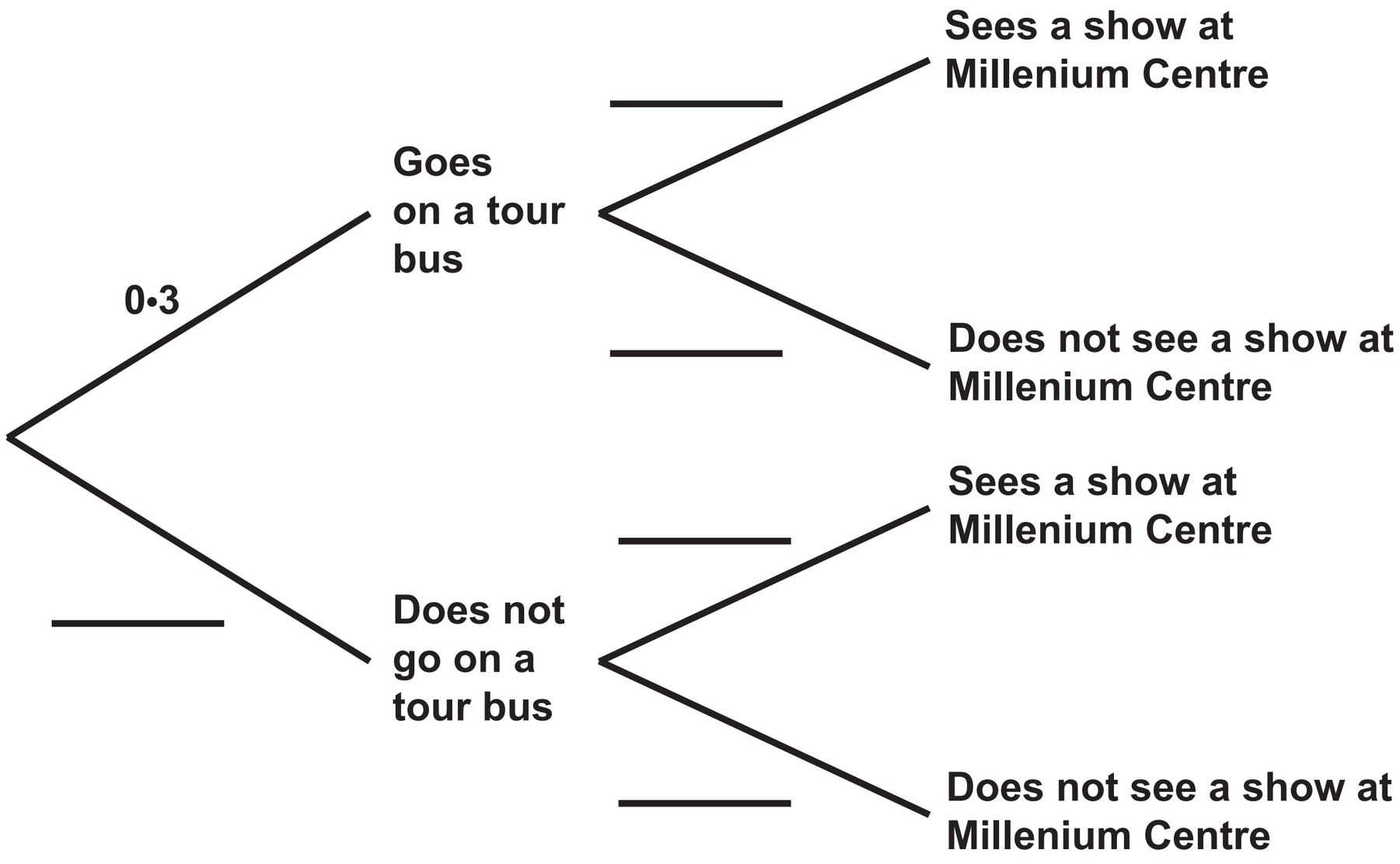
Question 3

Diagram NOT drawn to scale

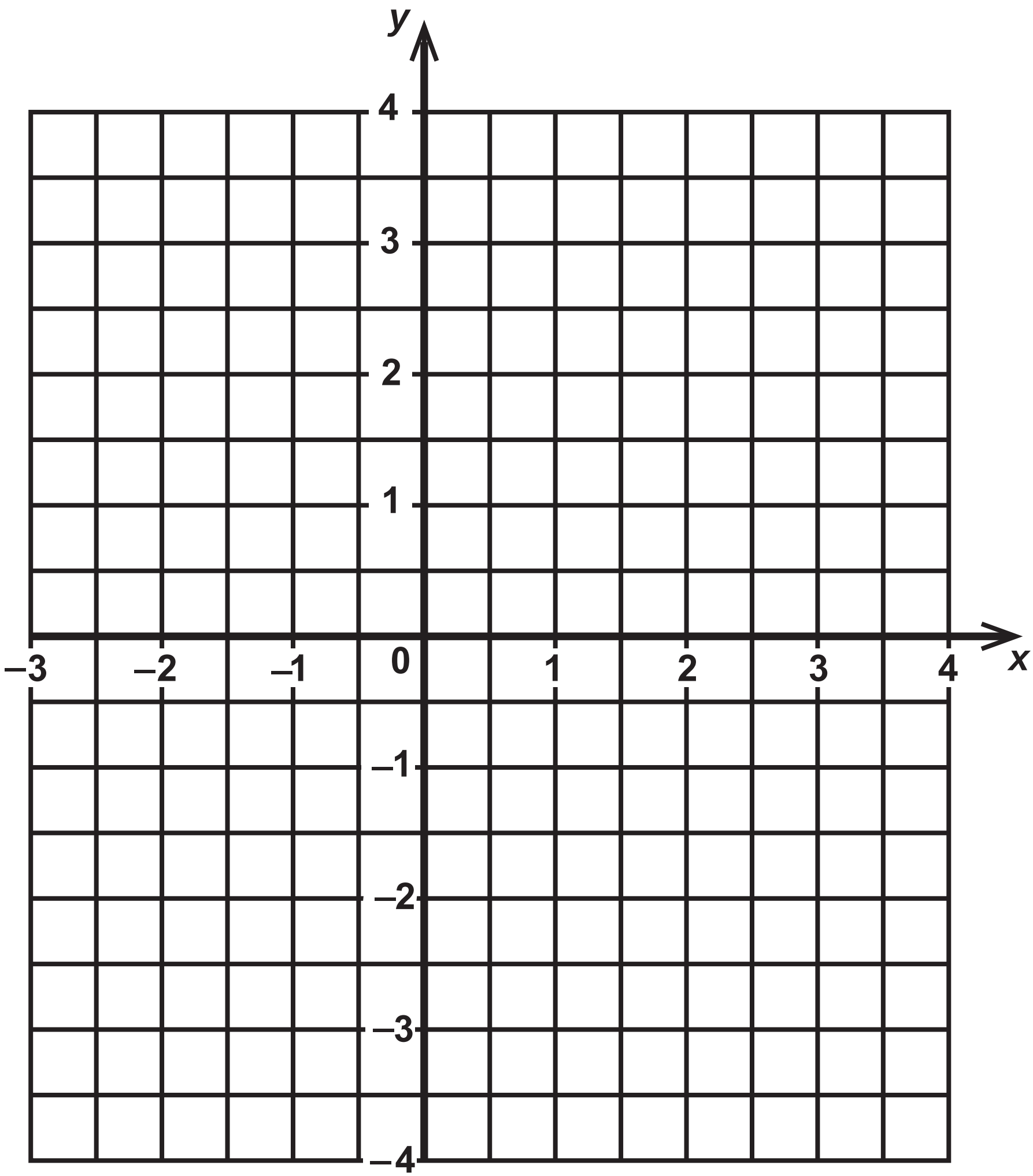


Question 4

Question 8 (a)

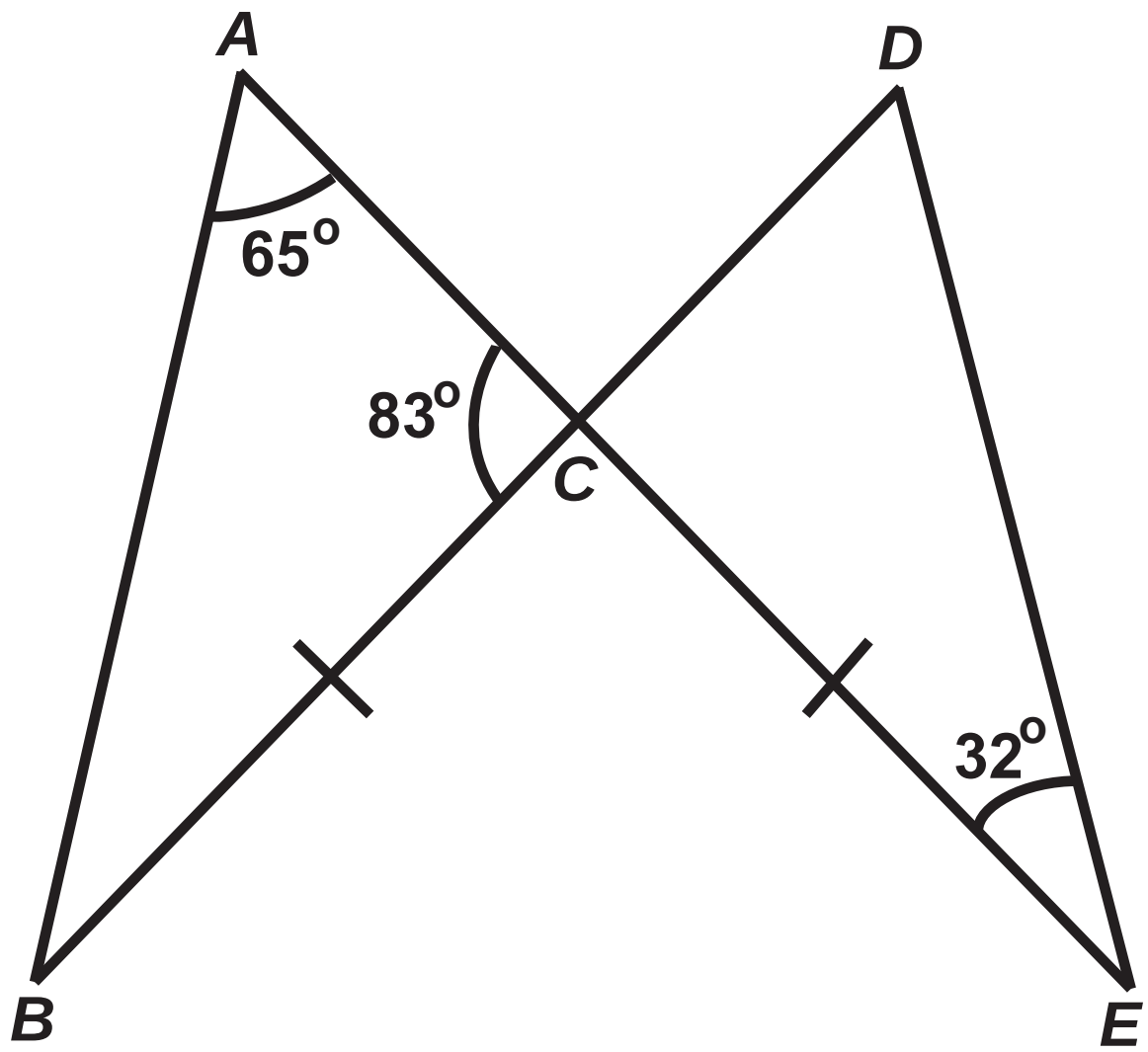

0•3
Goes on a tour bus
Sees a show at Millenium Centre
Does not see a show at Millenium Centre
Does not go on a tour bus
Sees a show at Millenium Centre
Does not see a show at Millenium Centre

Question 10



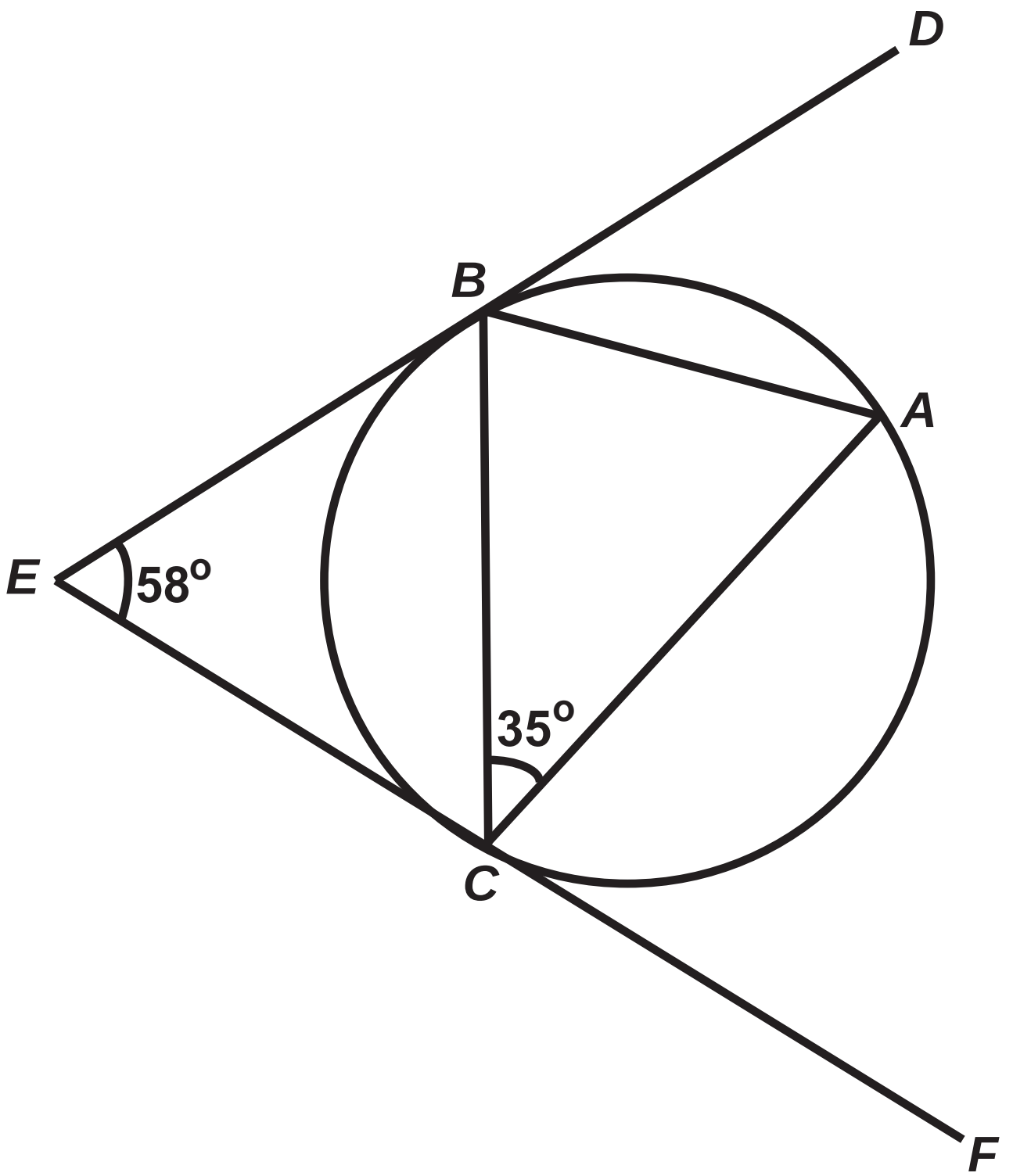
Question 12

Diagram NOT drawn to scale



Question 14

Diagram NOT drawn to scale



Question 17 (a)

Diagram (i)

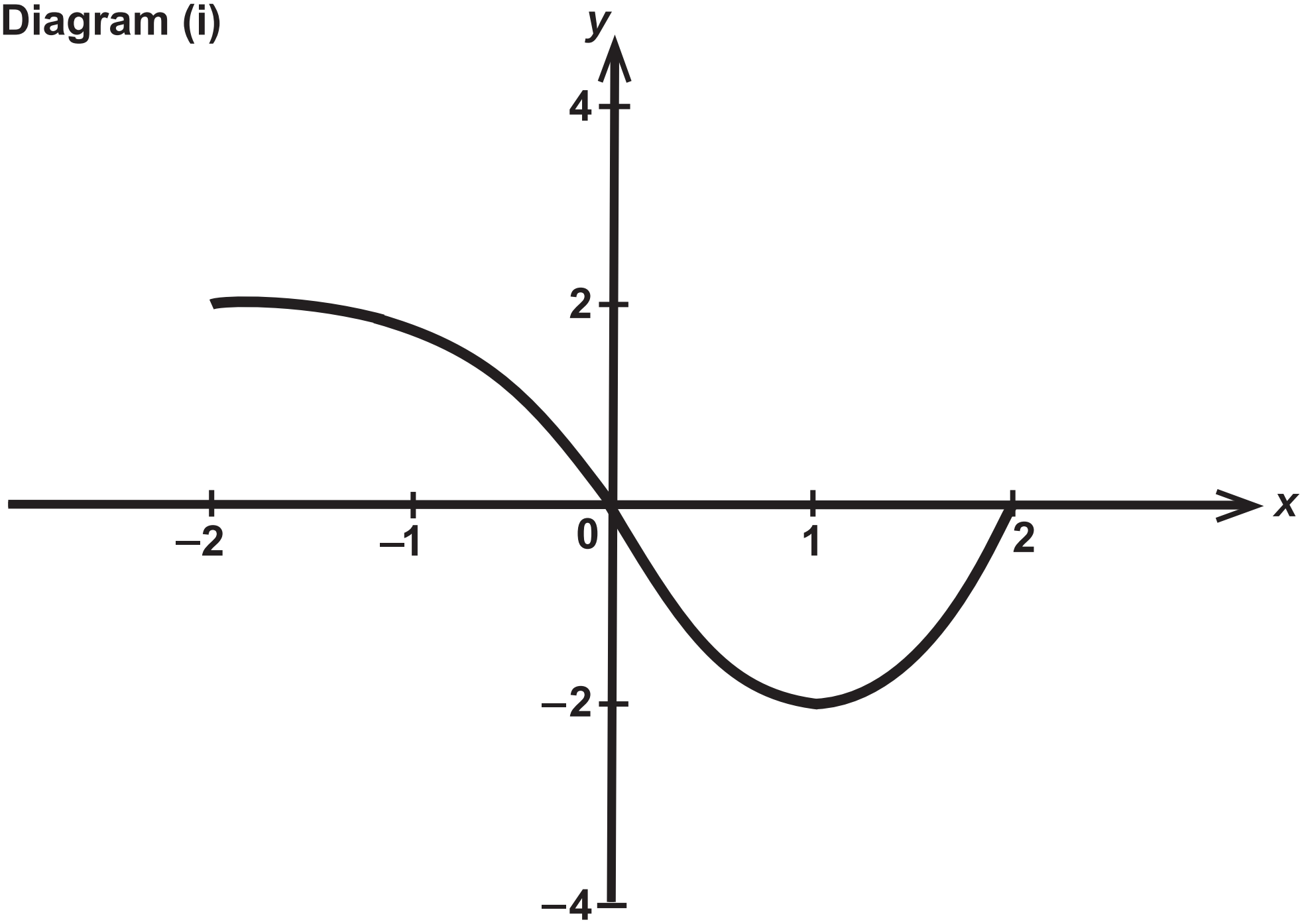
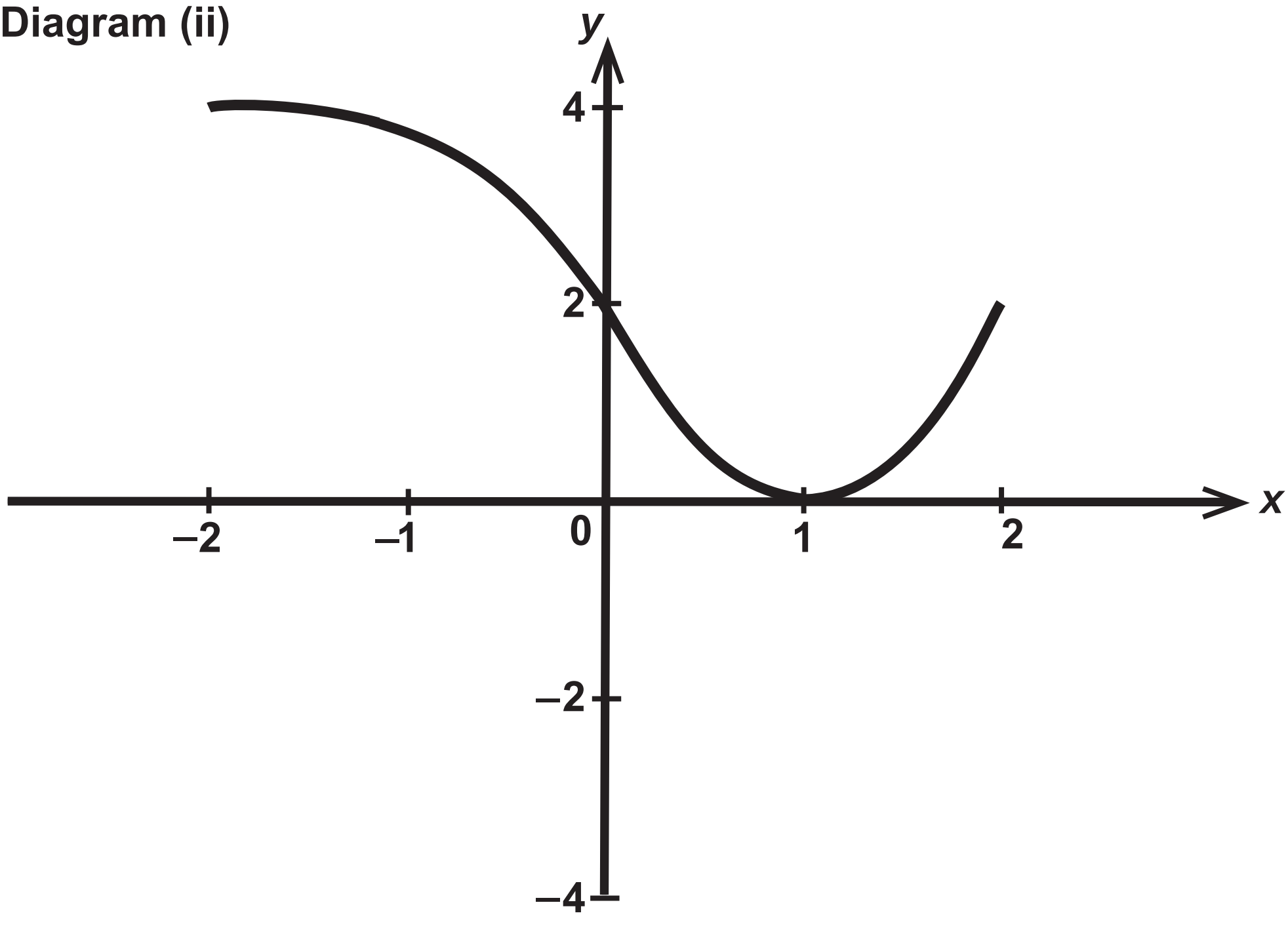


Diagram (ii)



Question 17 (b)

Diagram (i)

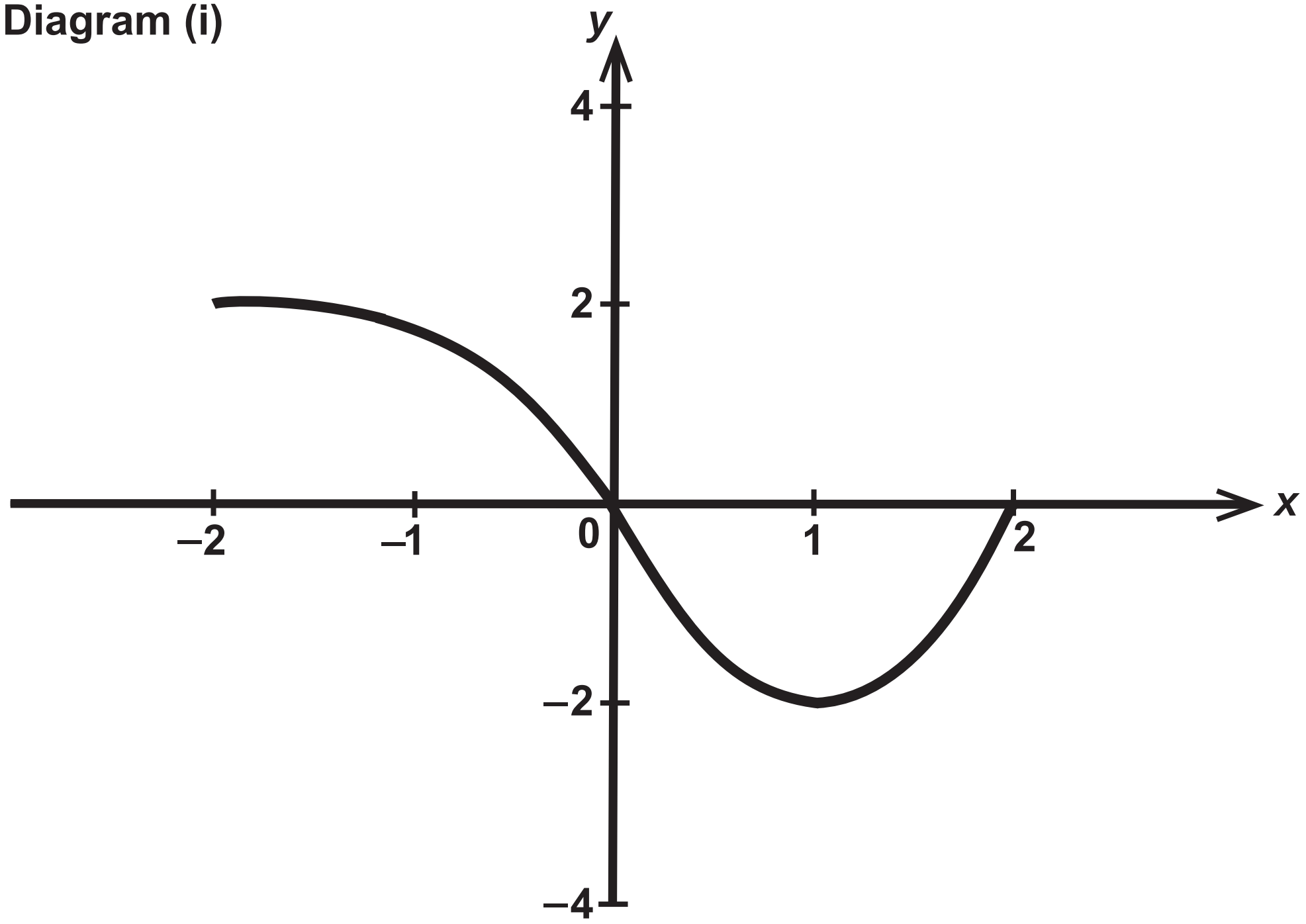
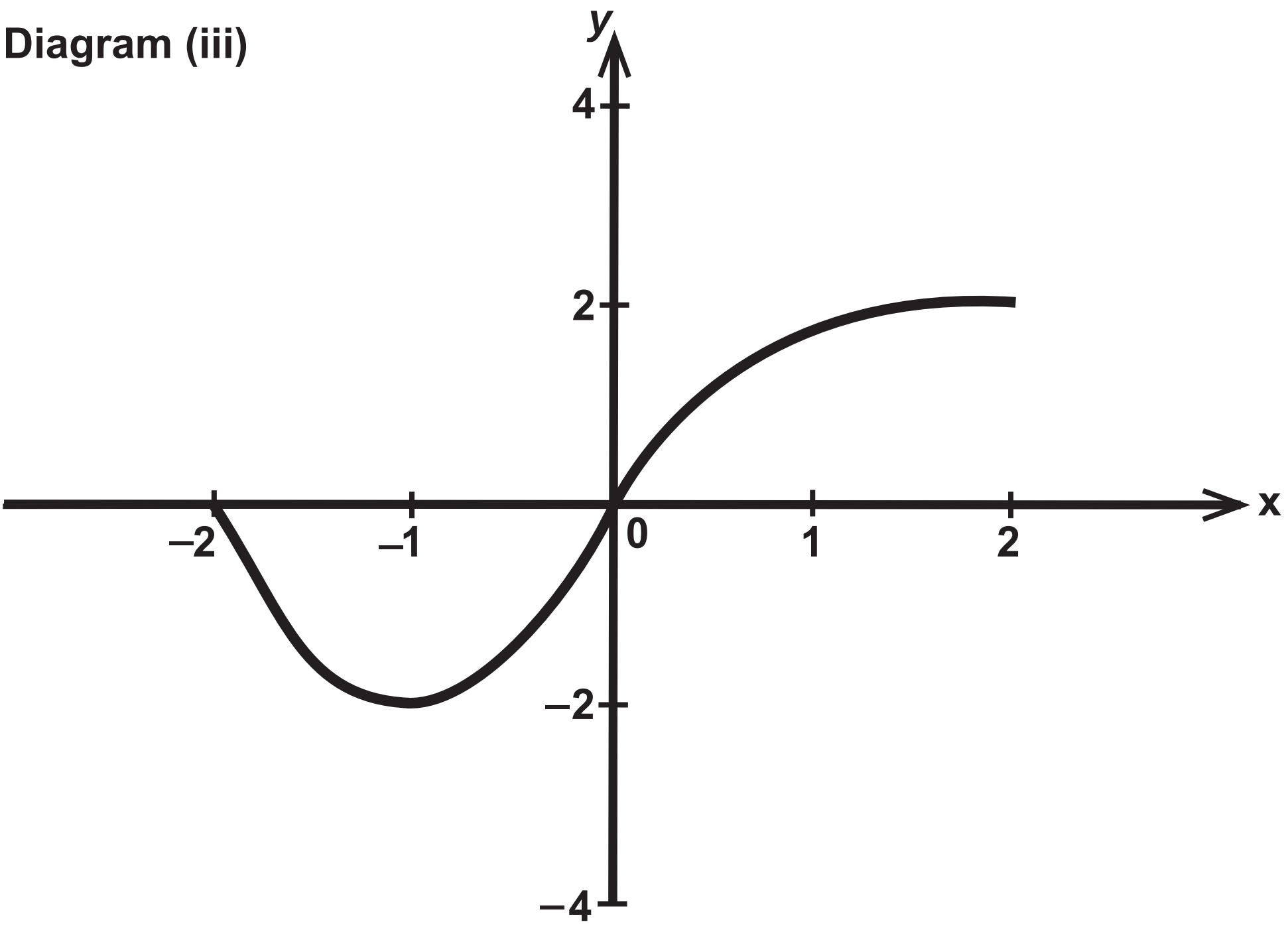


Diagram (iii)



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MATHEMATICS

UNIT 1: NON – CALCULATOR

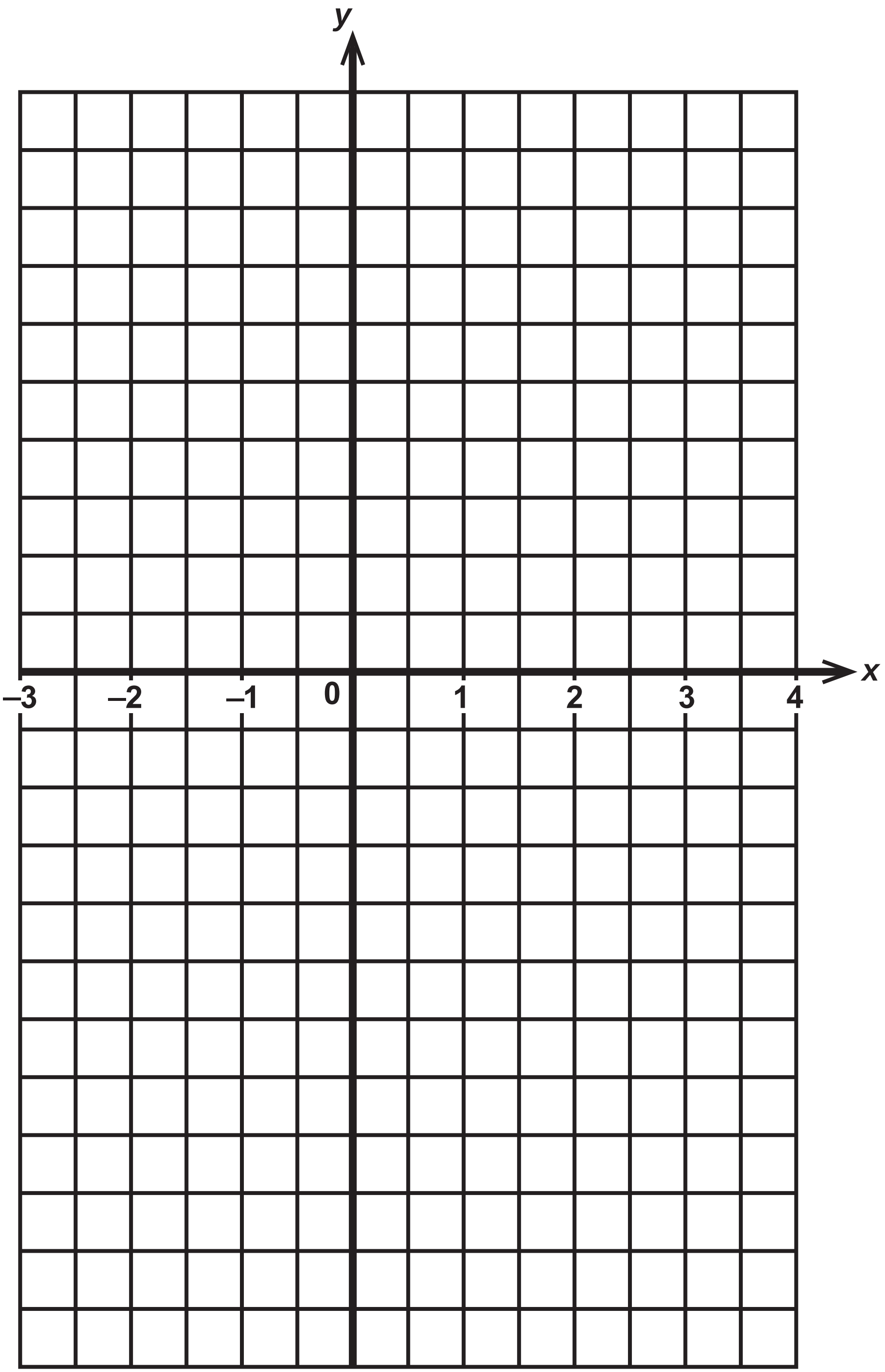
HIGHER TIER

TUESDAY, 21 MAY 2019 – MORNING

Spare Diagram Booklet

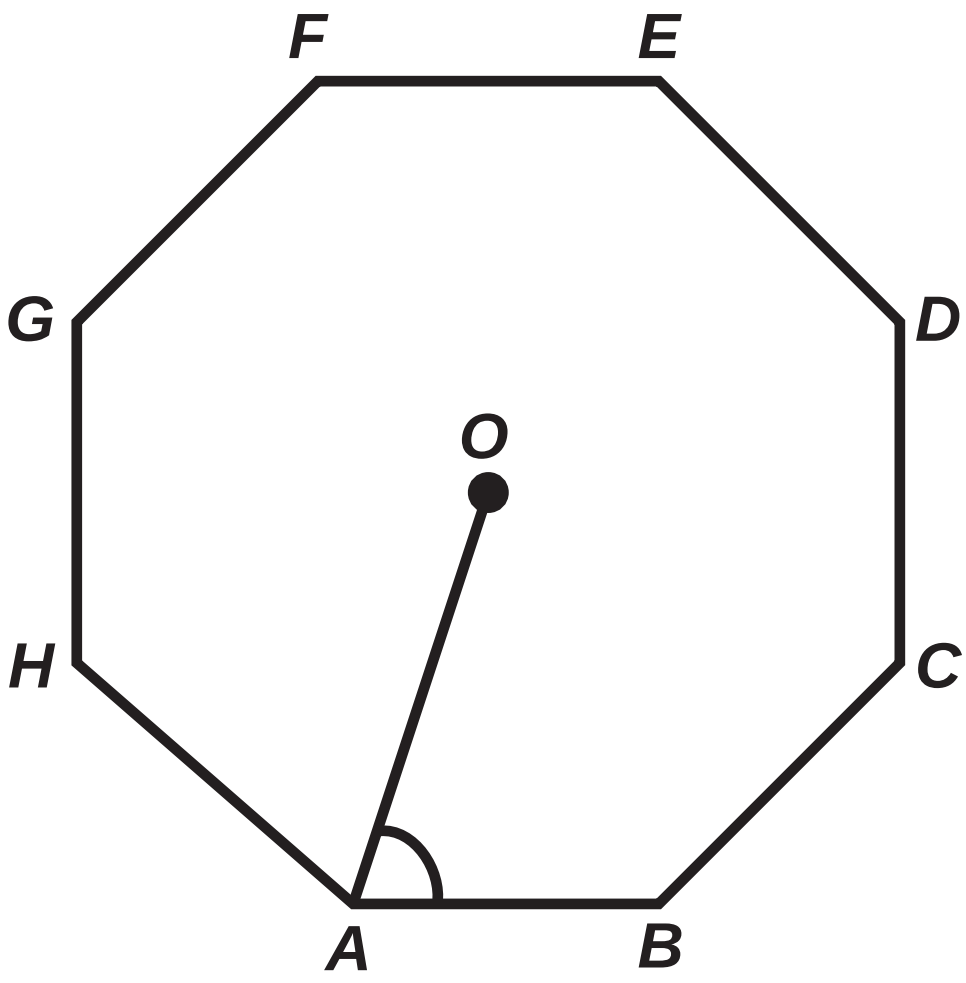
Surname:	
Other Names:	
Centre Number:	
Candidate Number:	**0**

Question 2



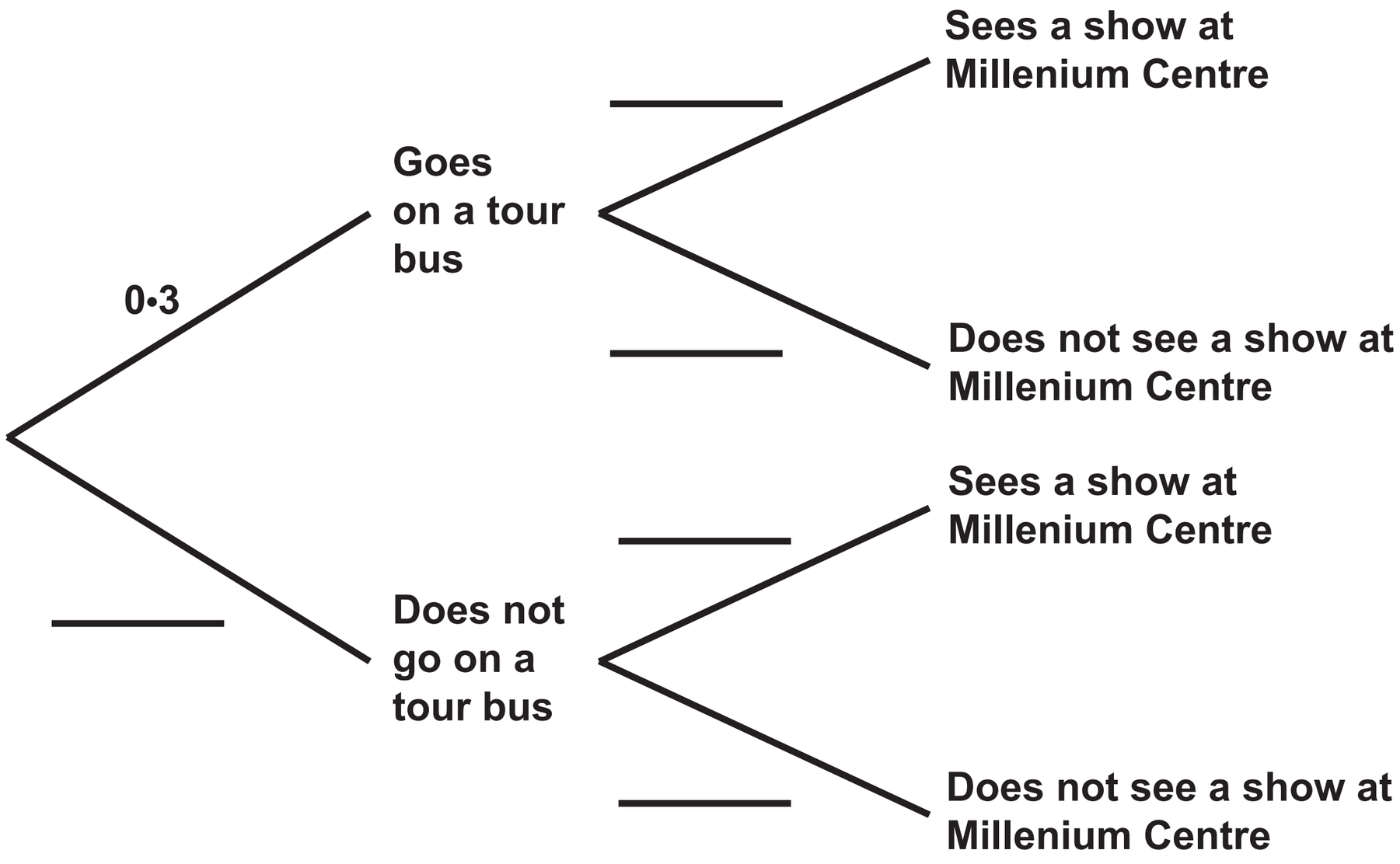
Question 3

Diagram NOT drawn to scale

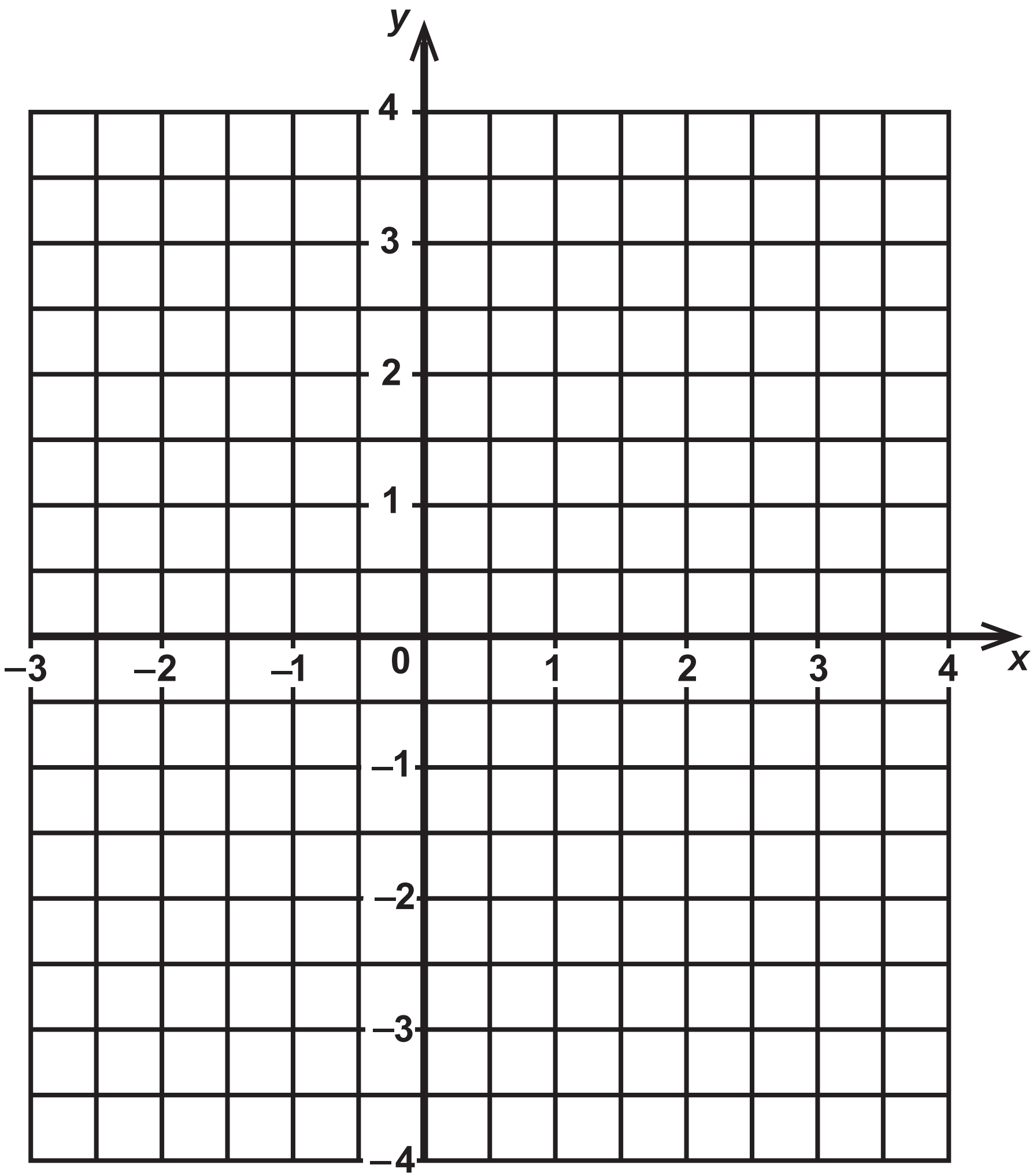


Question 4

Question 8 (a)

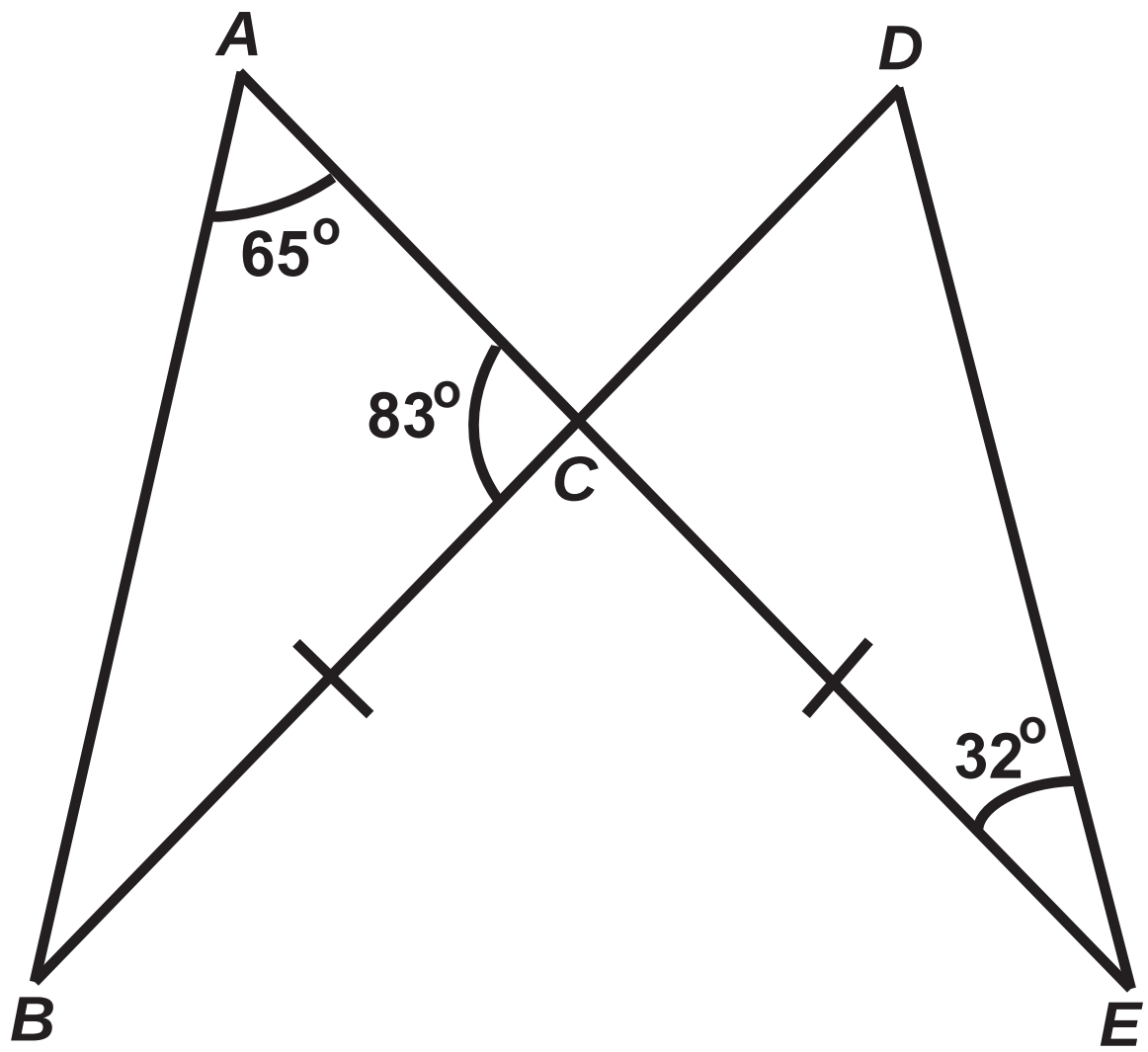

0•3
Goes on a tour bus
Sees a show at Millenium Centre
Does not see a show at Millenium Centre
Does not go on a tour bus
Sees a show at Millenium Centre
Does not see a show at Millenium Centre

Question 10



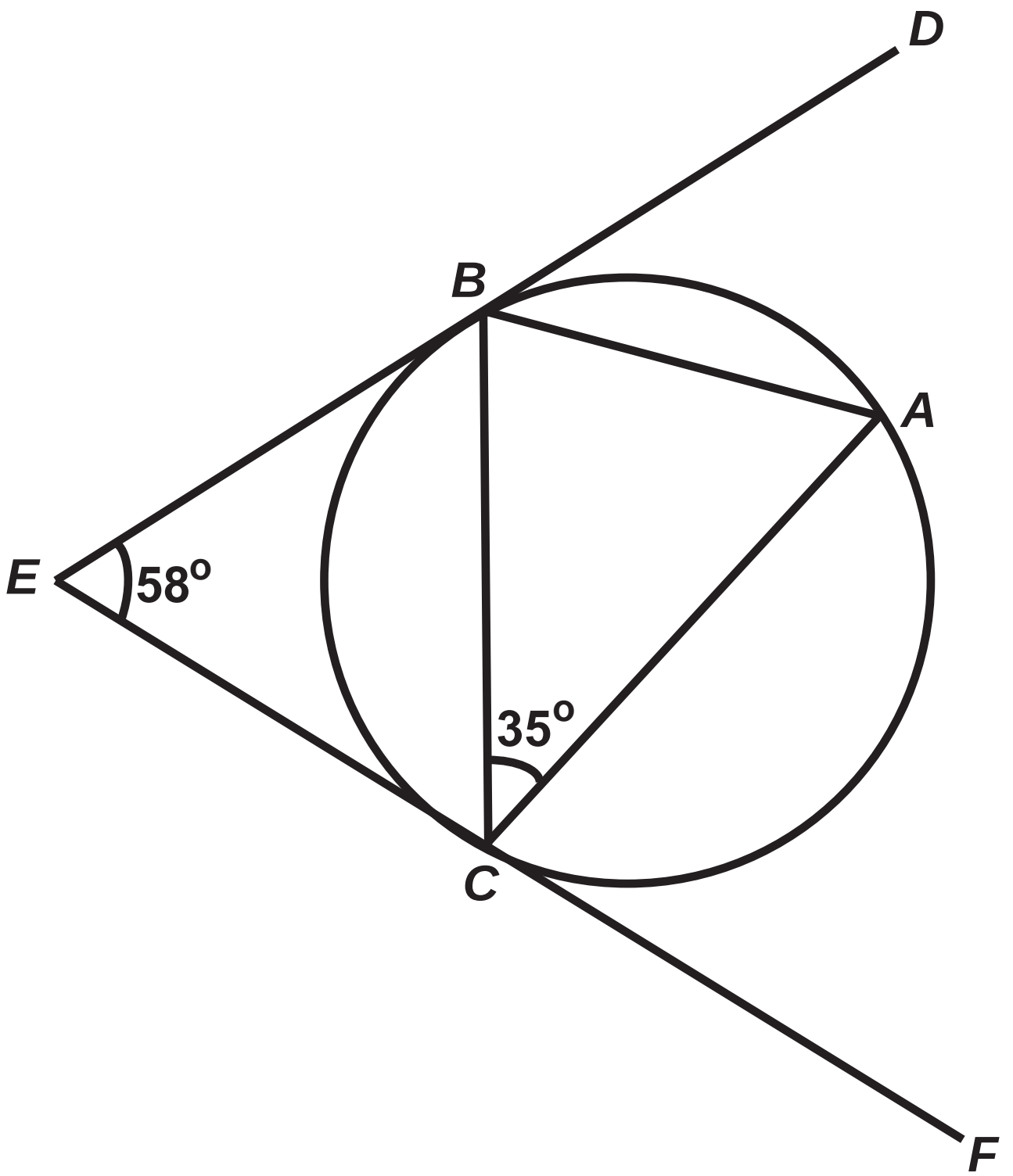
Question 12

Diagram NOT drawn to scale



Question 14

Diagram NOT drawn to scale



Question 17 (a)

Diagram (i)

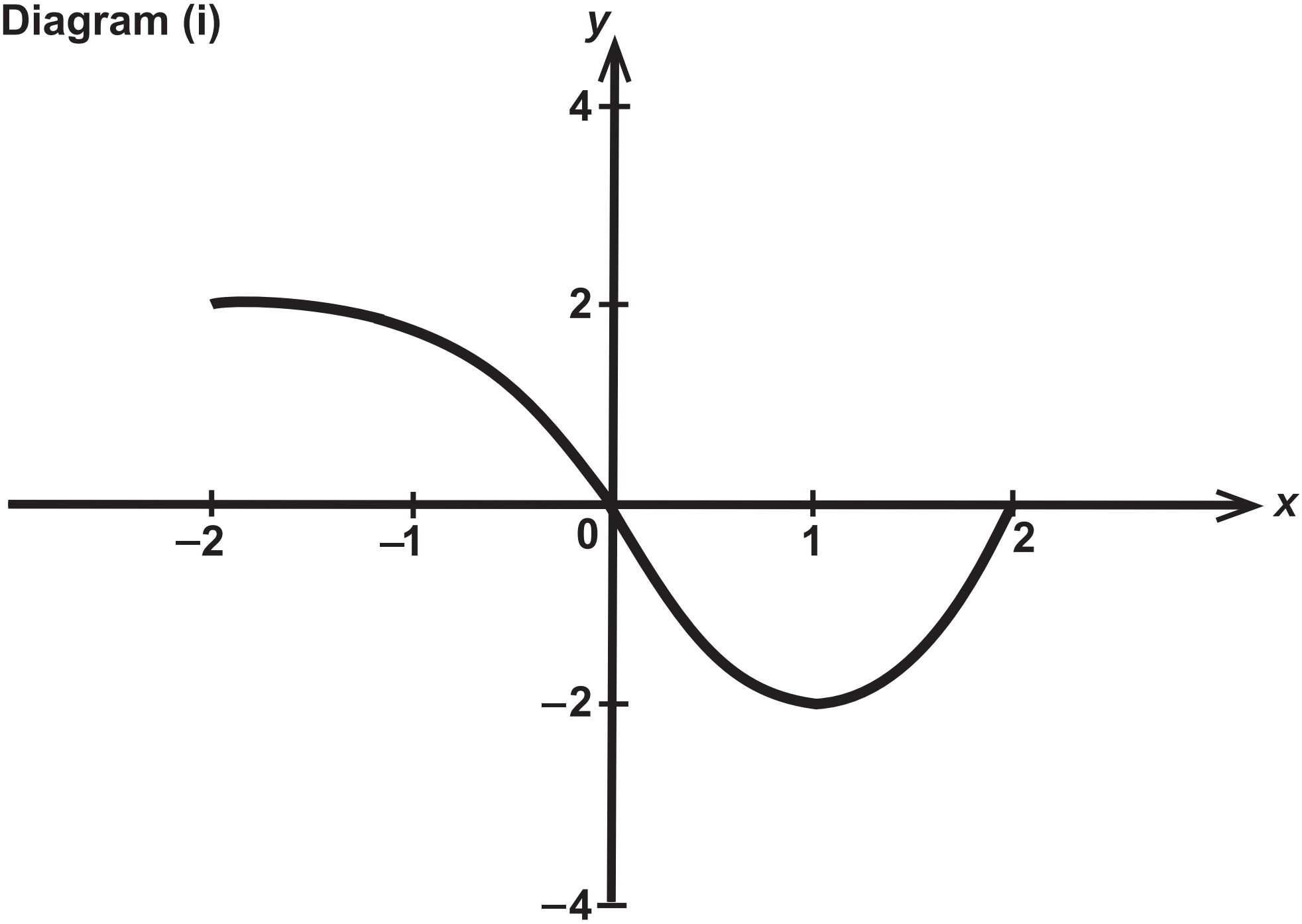
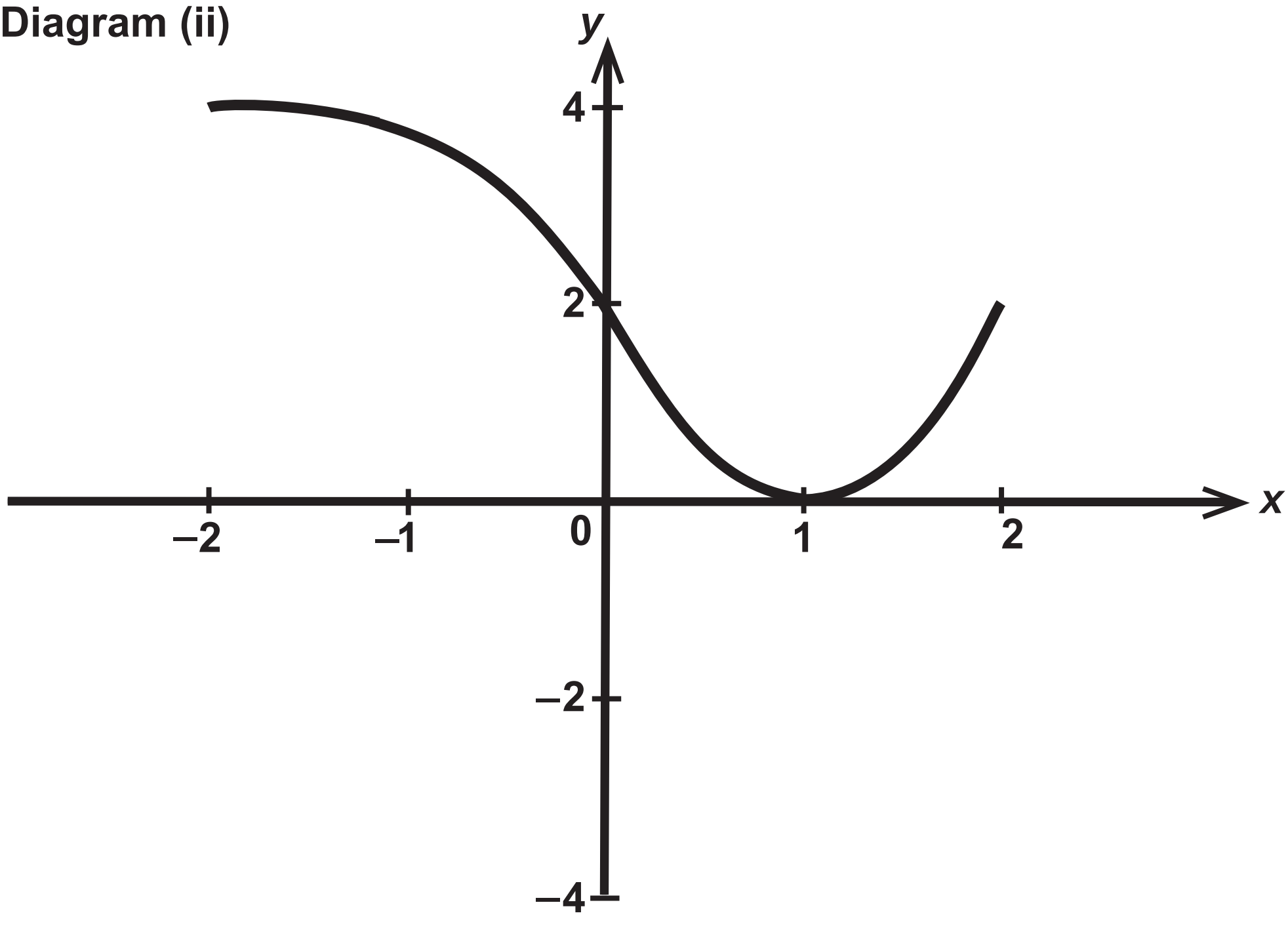


Diagram (ii)



Question 17 (b)

Diagram (i)

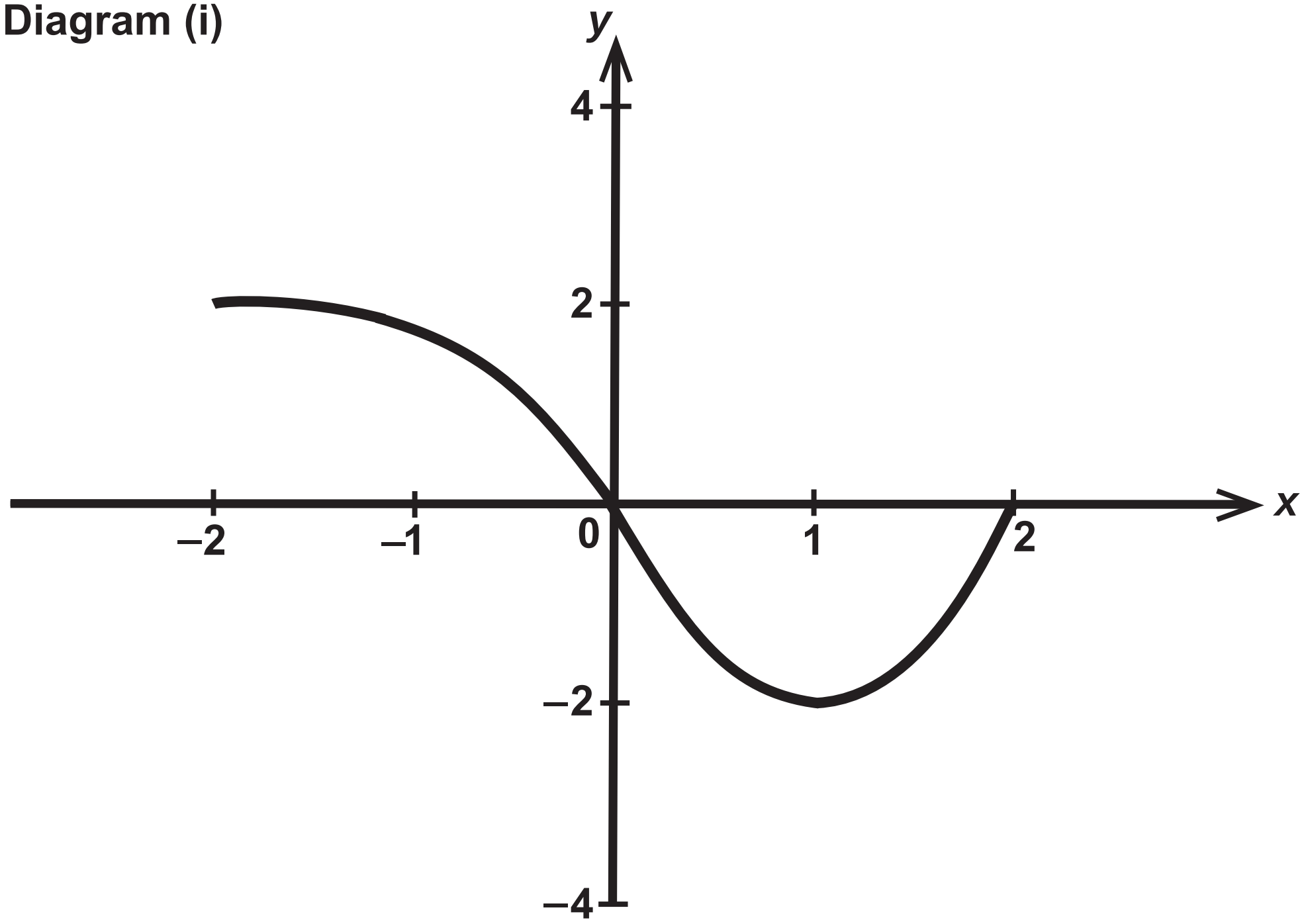
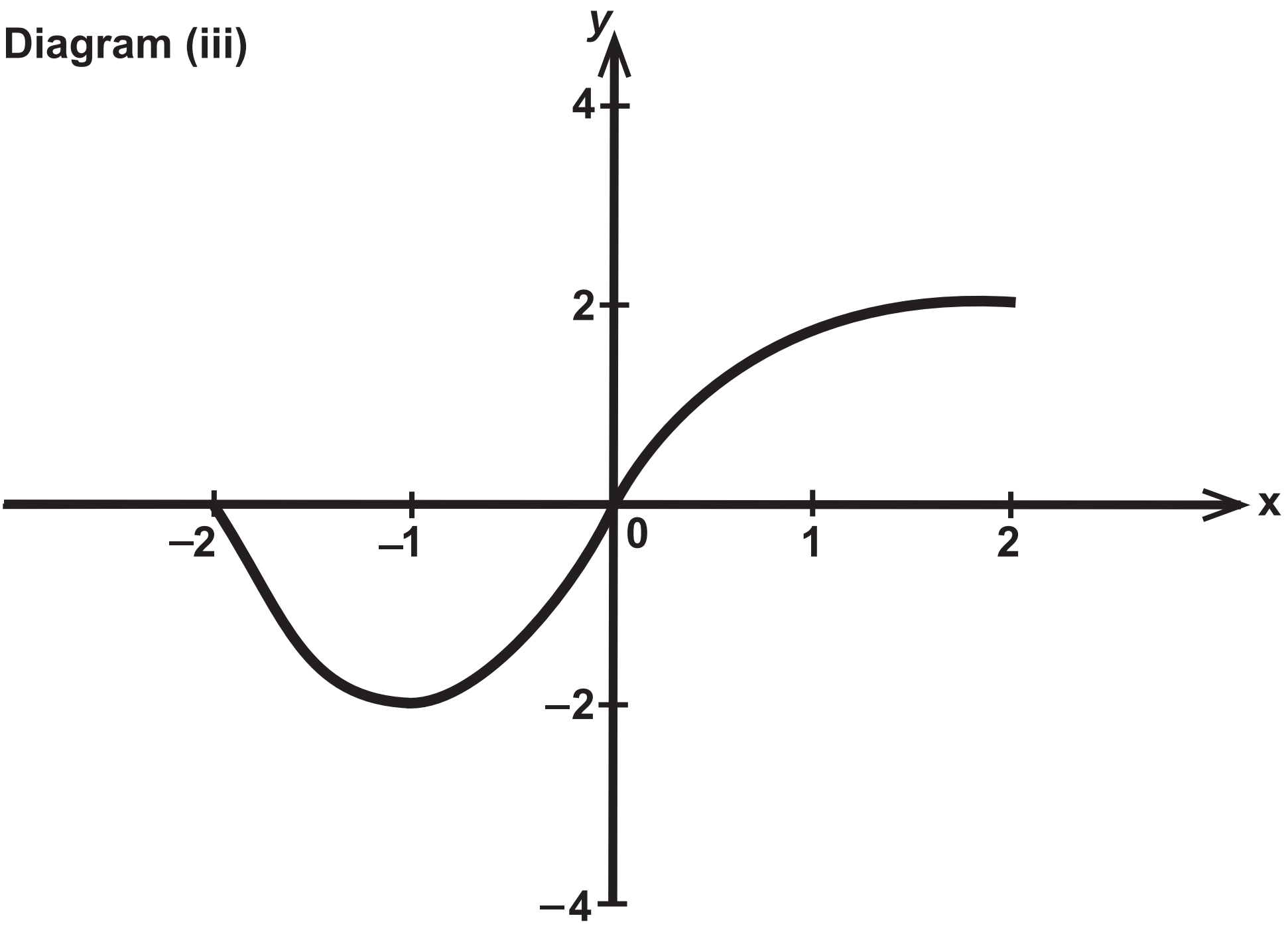


Diagram (iii)



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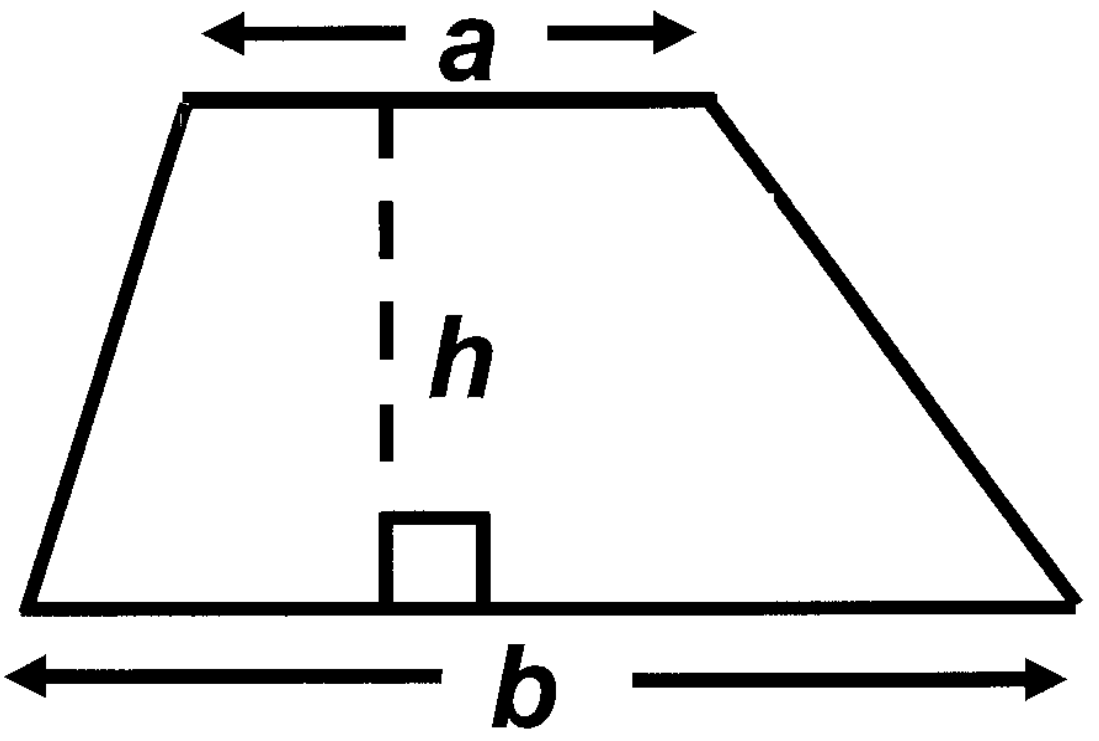
FORMULA LIST
HIGHER TIER
GCSE

You must not write on these formula pages.

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

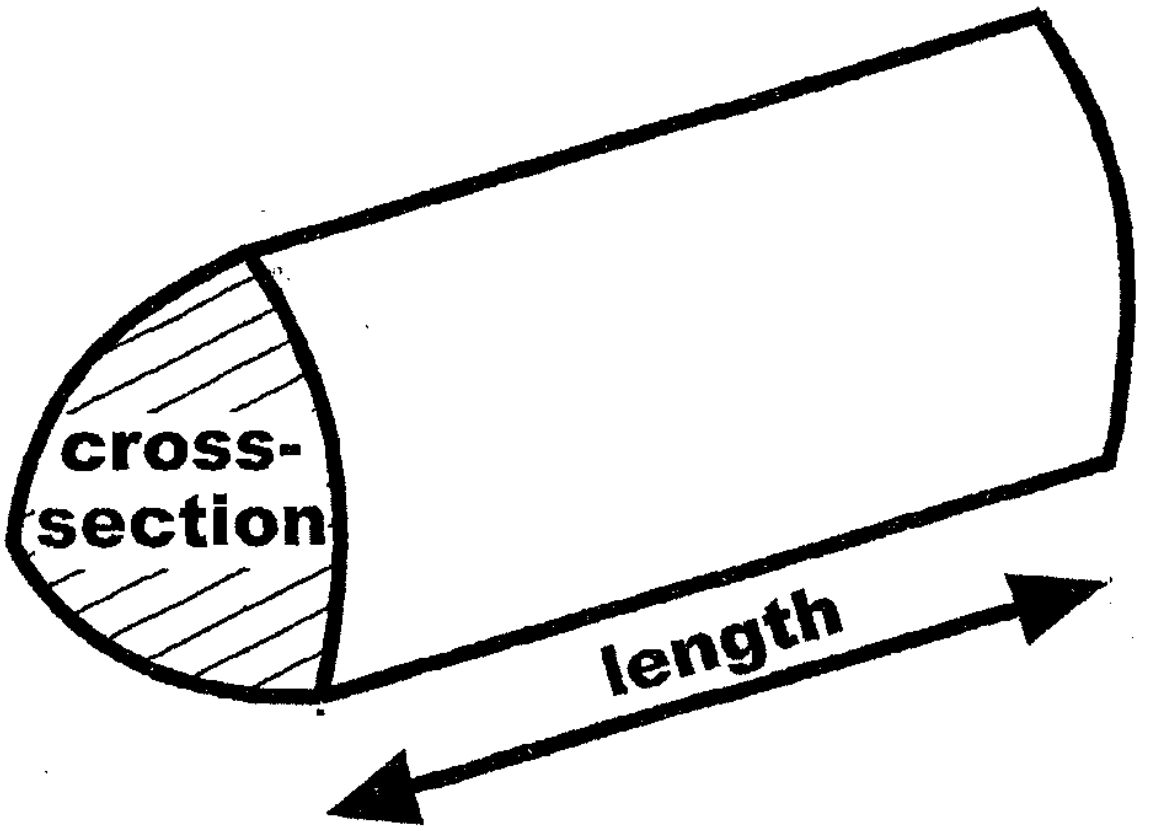
Formula List – Higher Tier

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



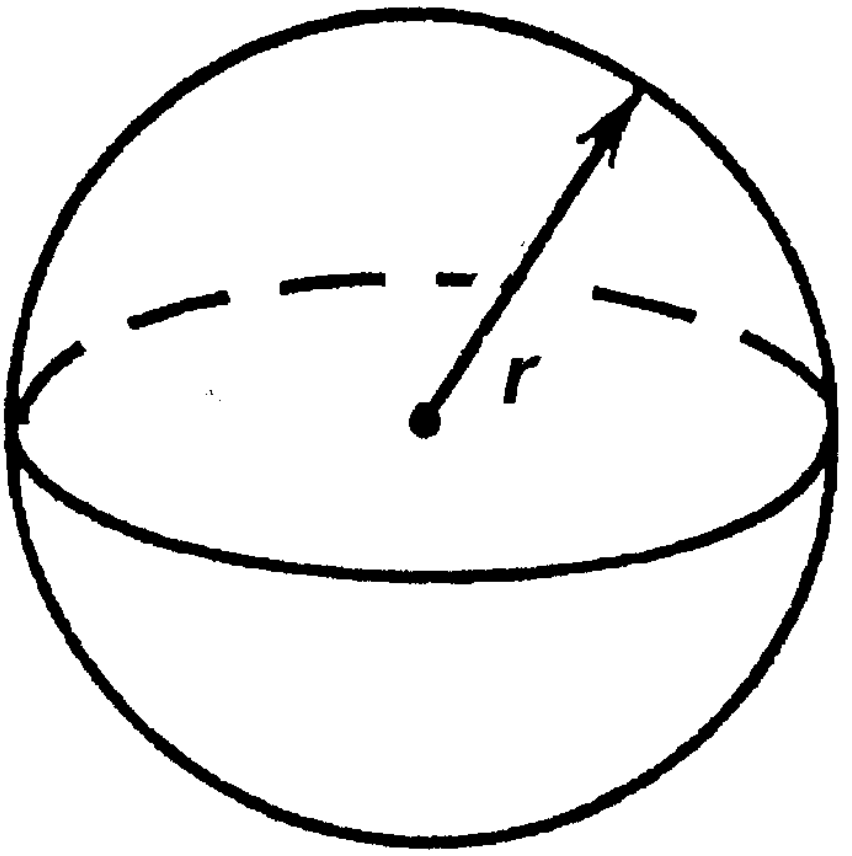
Volume of prism =

area of cross – section × length



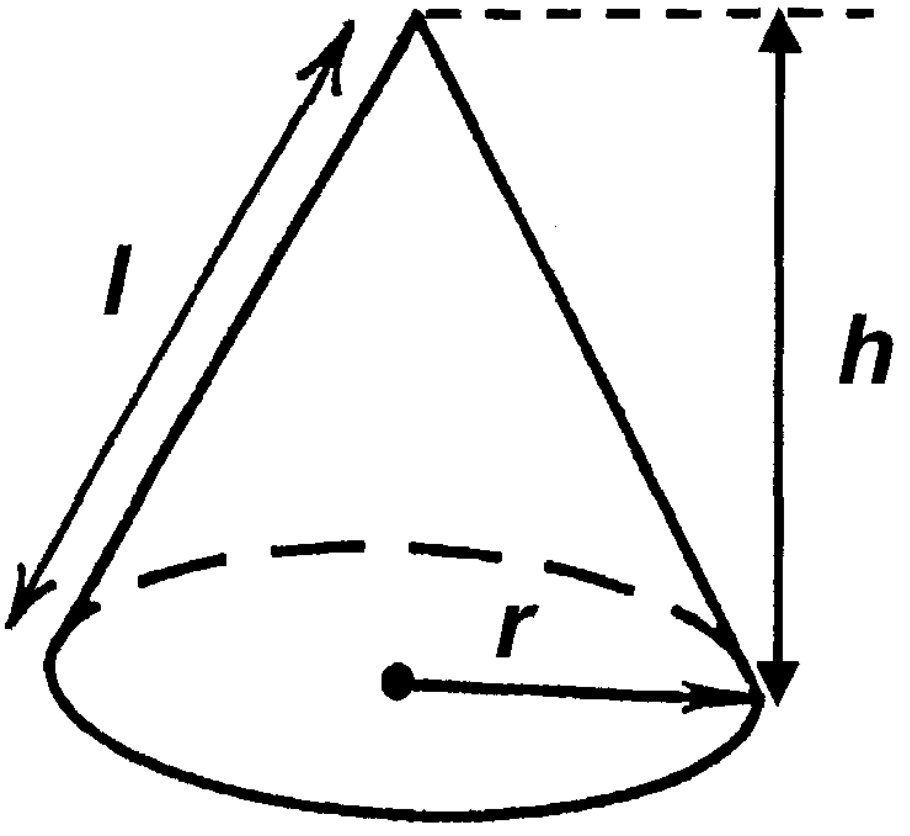
Volume of sphere $= \frac{4}{3}\pi r^3$

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

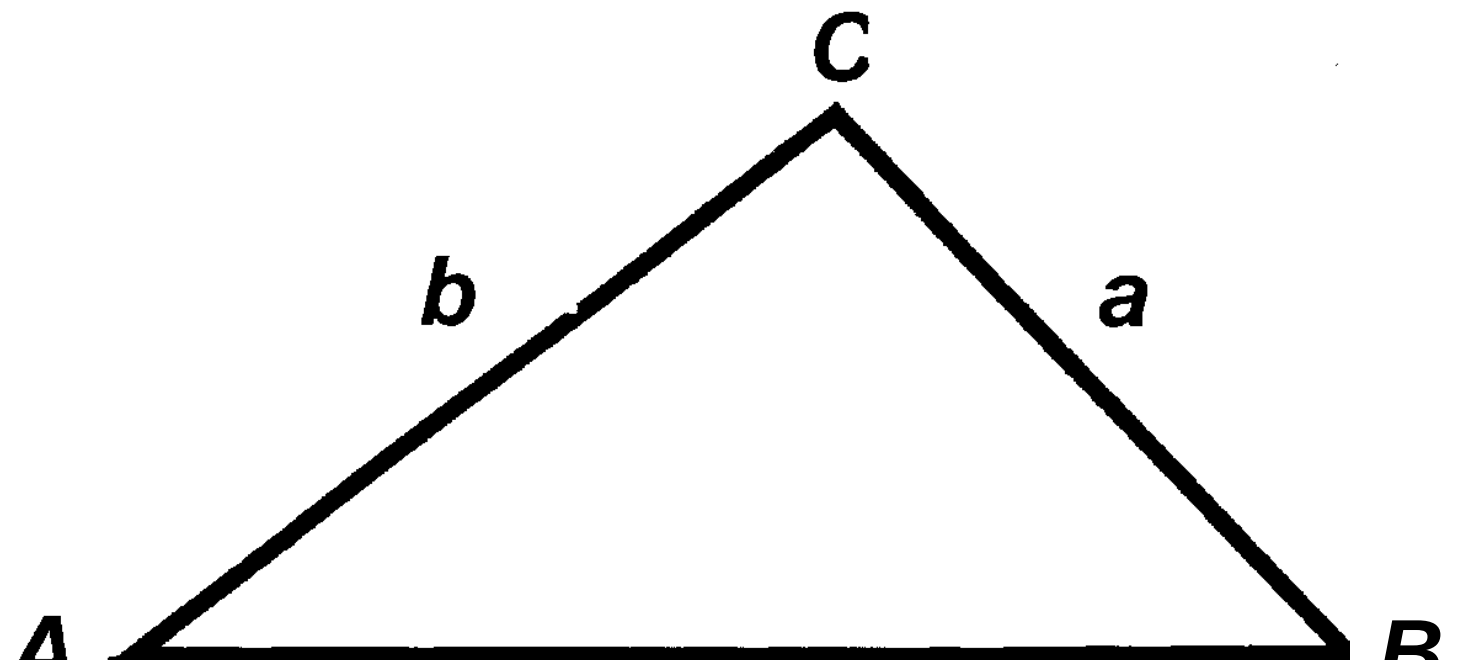


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



Sine Rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

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

The Quadratic Equation

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

where $a \neq 0$, are given by

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

Annual Equivalent Rate (AER)

AER, as a decimal, is calculated using the formula $\left(1 + \frac{i}{n}\right)^n - 1$, where i is the nominal interest rate per annum as a decimal and n is the number of compounding periods per annum.