

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.

(Turn over)

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 3.14

(Turn over)

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.

(Turn over)

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

(Turn over)

6

[3 marks]

continued on the next page . . .

(Turn over)

Question 1 continued

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

(Turn over)

8

[2 marks]

(Turn over)

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

(Turn over)

Question 2 continued

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

[4 marks]

(Turn over)

- 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.**

(Turn over)

13

[4 marks + 2 marks OCW]

(Turn over)

- 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 $BAP = 30^\circ$**

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]

(Turn over)

5. Estimate the value of

$$\frac{30.21 \times 1.98^3}{0.49}$$

(Turn over)

16

[3 marks]

(Turn over)

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.

(Turn over)

[1 mark]

continued on the next page . . .

(Turn over)

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.**

(Turn over)

[4 marks]

continued on the next page . . .

(Turn over)

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.

(Turn over)

22

[1 mark]

(Turn over)

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]

continued on the next page . . .

(Turn over)

Question 7 (a) continued

7. (a) (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 . . .

(Turn over)

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 . . .

(Turn over)

Question 7 continued

7. (b) Calculate $(3.4 \times 10^{-5}) \times 700$

Give your answer in standard form.

(Turn over)

27

[2 marks]

(Turn over)

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**

continued on the next page . . .

(Turn over)

Question 8 continued

**8. (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]

continued on the next page . . .

(Turn over)

Question 8 continued

- 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]

(Turn over)

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.
-
-

(Turn over)

[2 marks]

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

(Turn over)

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

(Turn over)

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.

(Turn over)

36

[3 marks]

(Turn over)

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

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

(Turn over)

38

[3 marks]

(Turn over)

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.

(Turn over)

41

[2 marks]

(Turn over)

13. (a) Express $0.24\dot{8}$ as a fraction.

(Turn over)

[2 marks]

continued on the next page . . .

(Turn over)

Question 13 continued

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

[2 marks]**(Turn over)**

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 $BEC = 58^\circ$ and

angle $BCA = 35^\circ$

Find the size of angle ABC .

You must show all your working.

(Turn over)

(Turn over)

47

[4 marks]

(Turn over)

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

Circle your answer.

$3\sqrt{5}$	$3\sqrt{15}$	$5\sqrt{3}$	$9\sqrt{5}$	22.5
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[1 mark]

continued on the next page . . .

(Turn over)

Question 15 continued

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

Simplify your answer.

(Turn over)

50

[2 marks]

(Turn over)

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.**

(Turn over)

(Turn over)

[4 marks]
(Turn over)

- 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 . . .

(Turn over)

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]

(Turn over)

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]

continued on the next page . . .

(Turn over)

Question 18 continued

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

(Turn over)

60

[3 marks]

(Turn over)

19. (a) Write the following expression as a single fraction.
Give your answer in its simplest form.

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

(Turn over)

[2 marks]

continued on the next page . . .

(Turn over)

Question 19 continued

19. (b) Solve the following equation.

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

(Turn over)

65

[5 marks]

END OF PAPER

TOTAL 80 MARKS

(Turn over)

[illegible]

(Turn over)

[illegible]

(Turn over)

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

[illegible]

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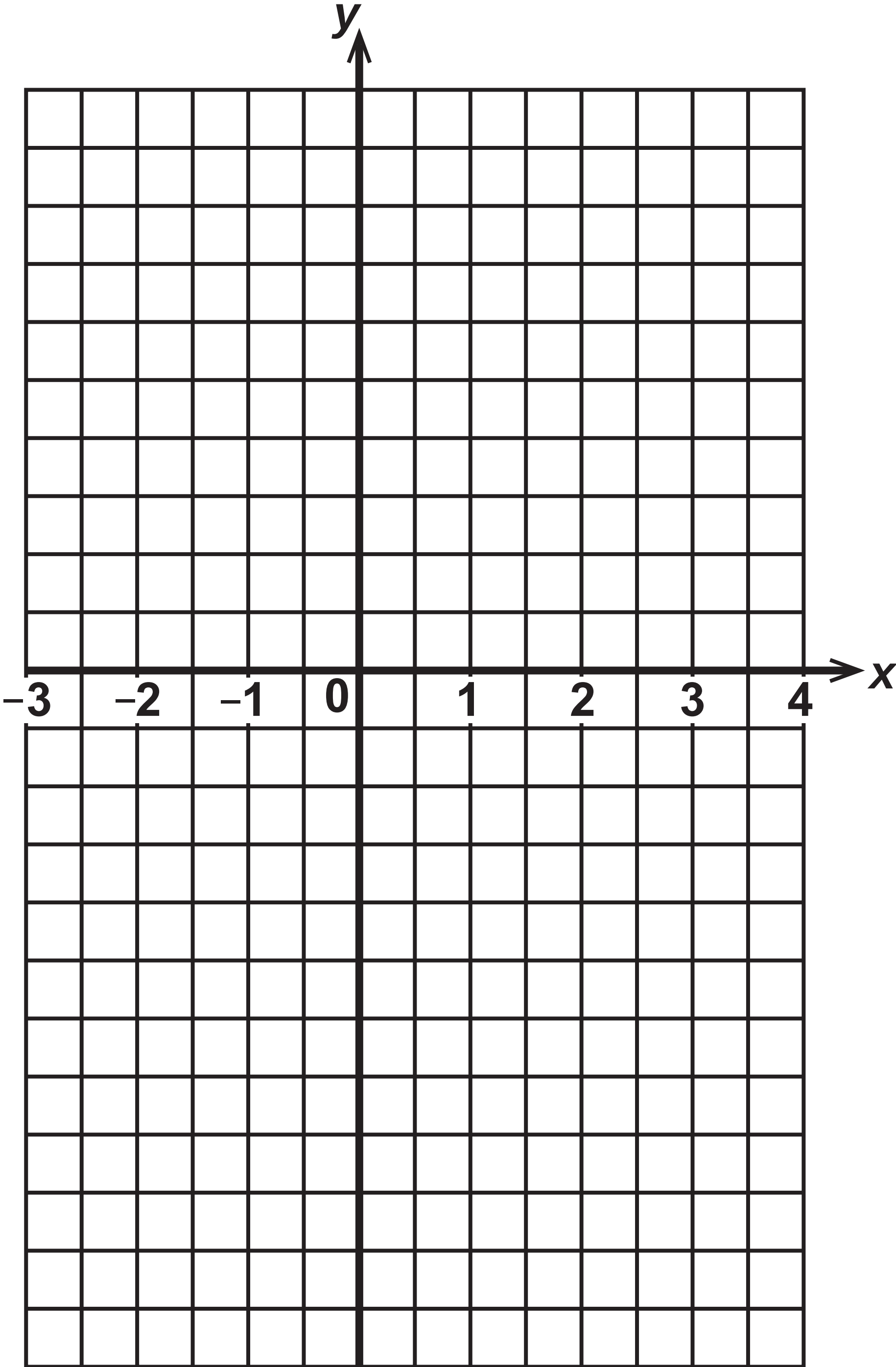
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Diagram Booklet

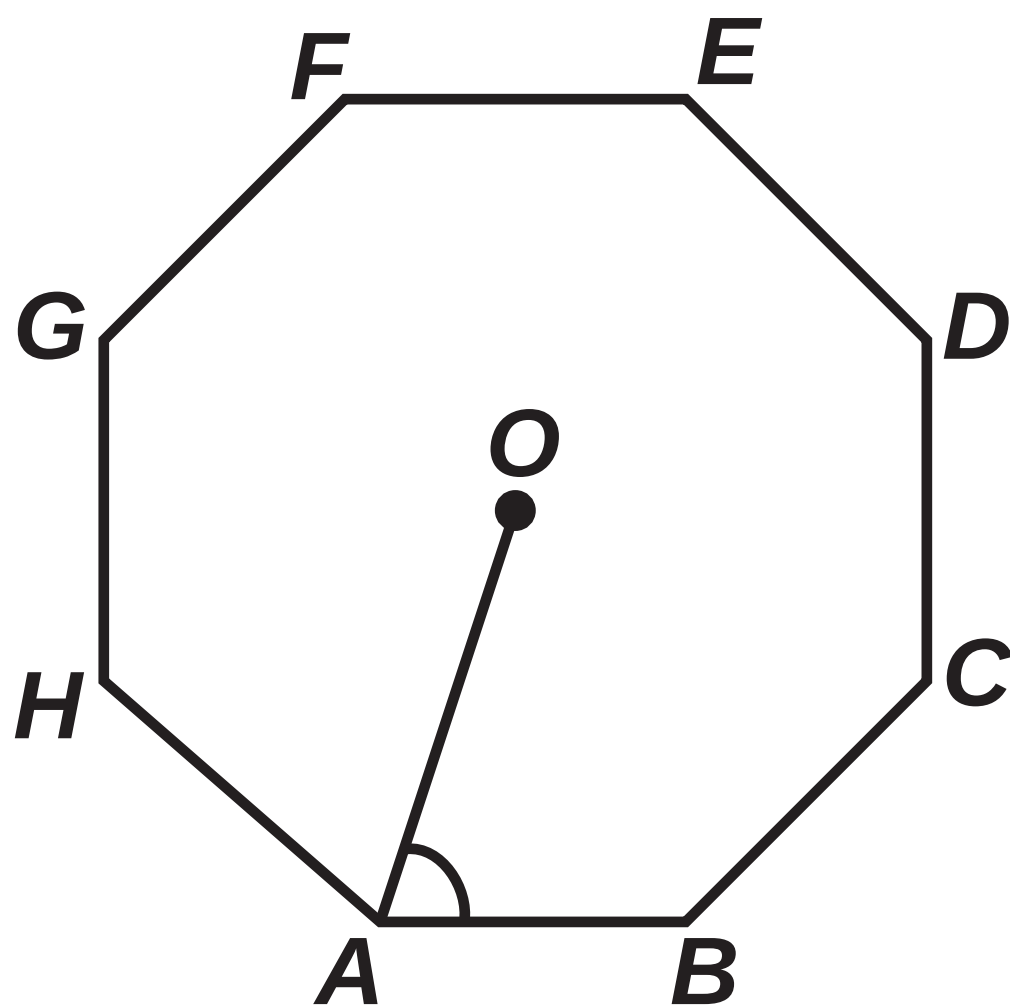
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Other Names:	
Centre Number:	
Candidate Number:	0

Question 2



Question 3

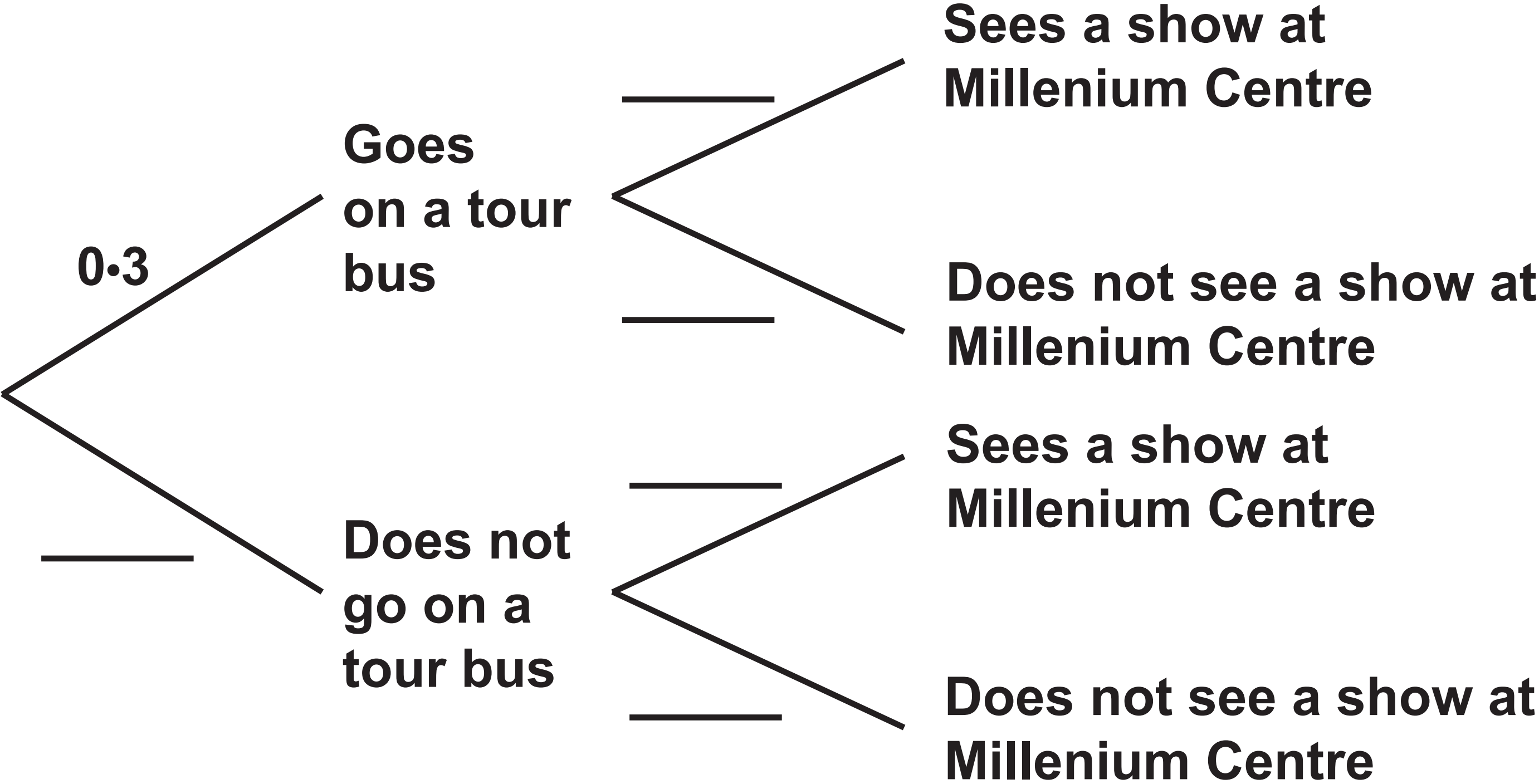
Diagram NOT drawn to scale



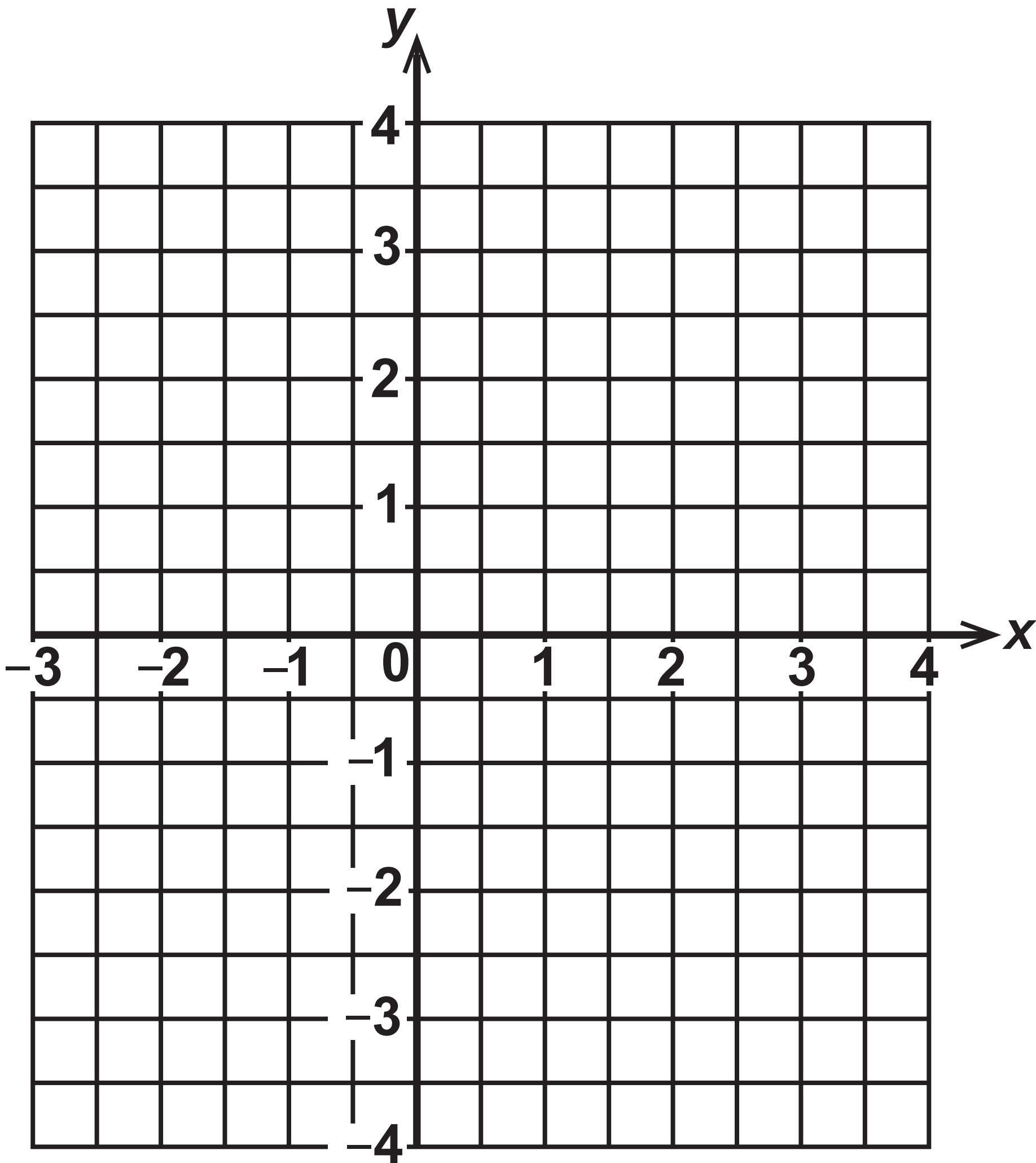
Question 4

A |—————| ***B***

Question 8 (a)

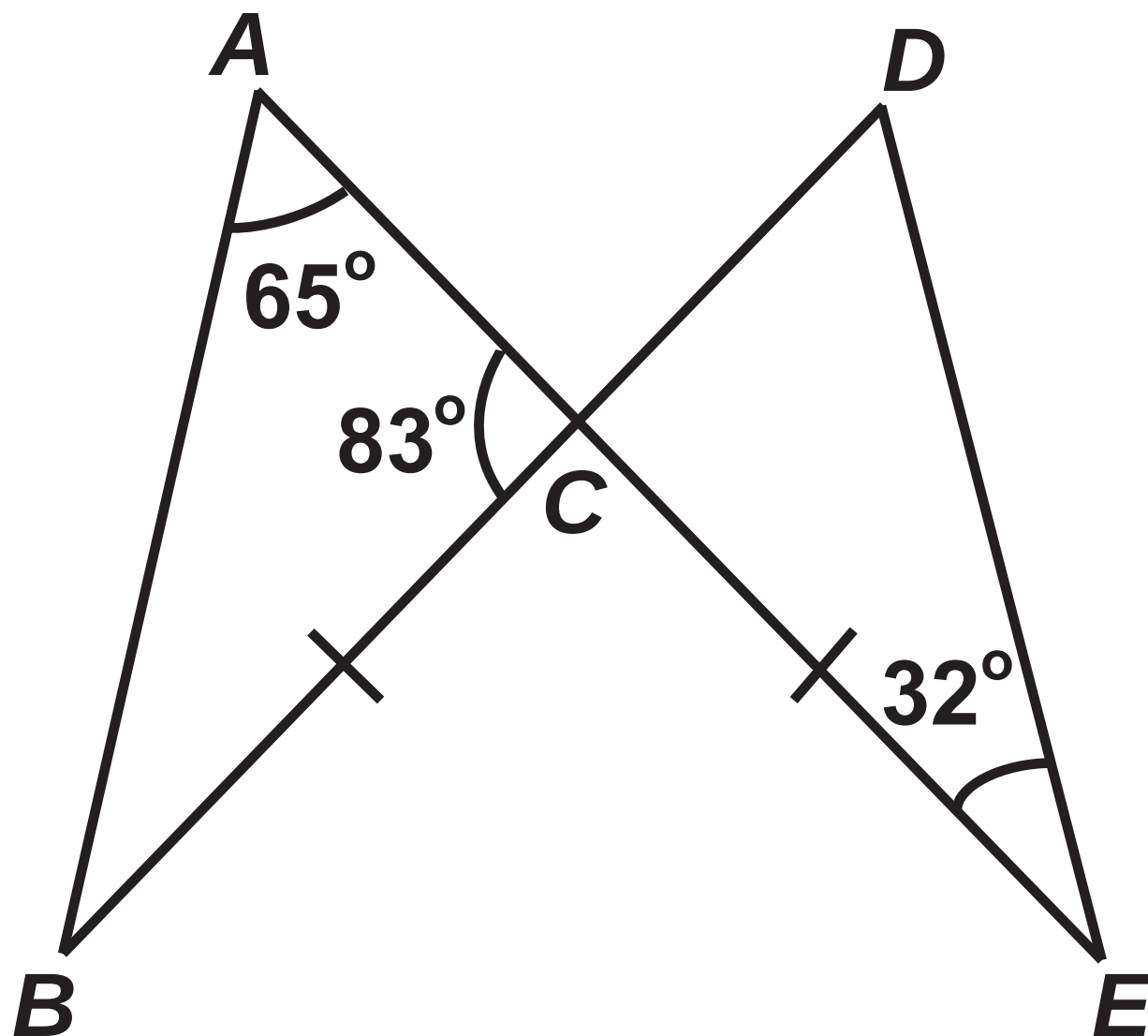


Question 10



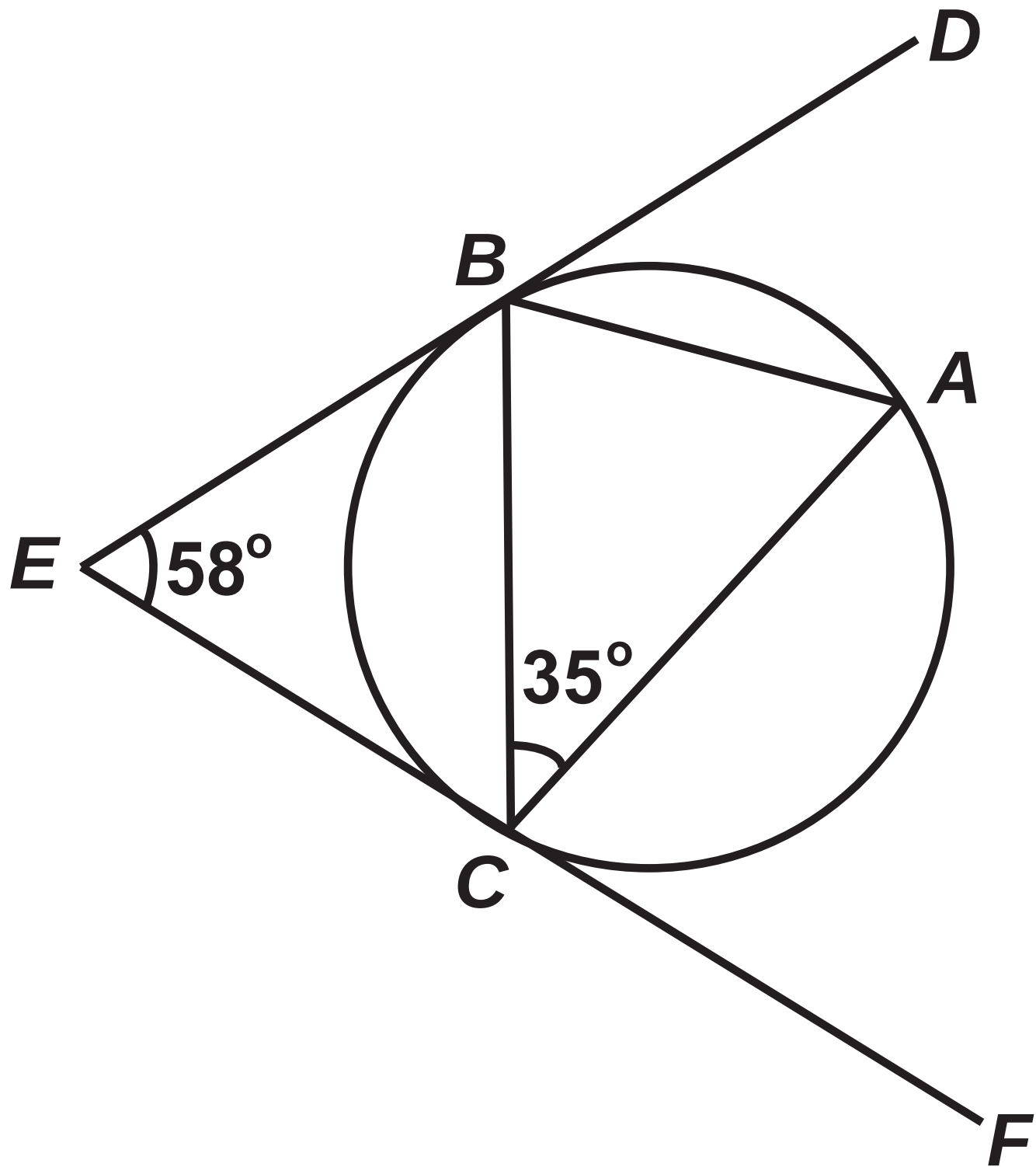
Question 12

Diagram NOT drawn to scale



Question 14

Diagram NOT drawn to scale



Question 17 (a)

Diagram (i)

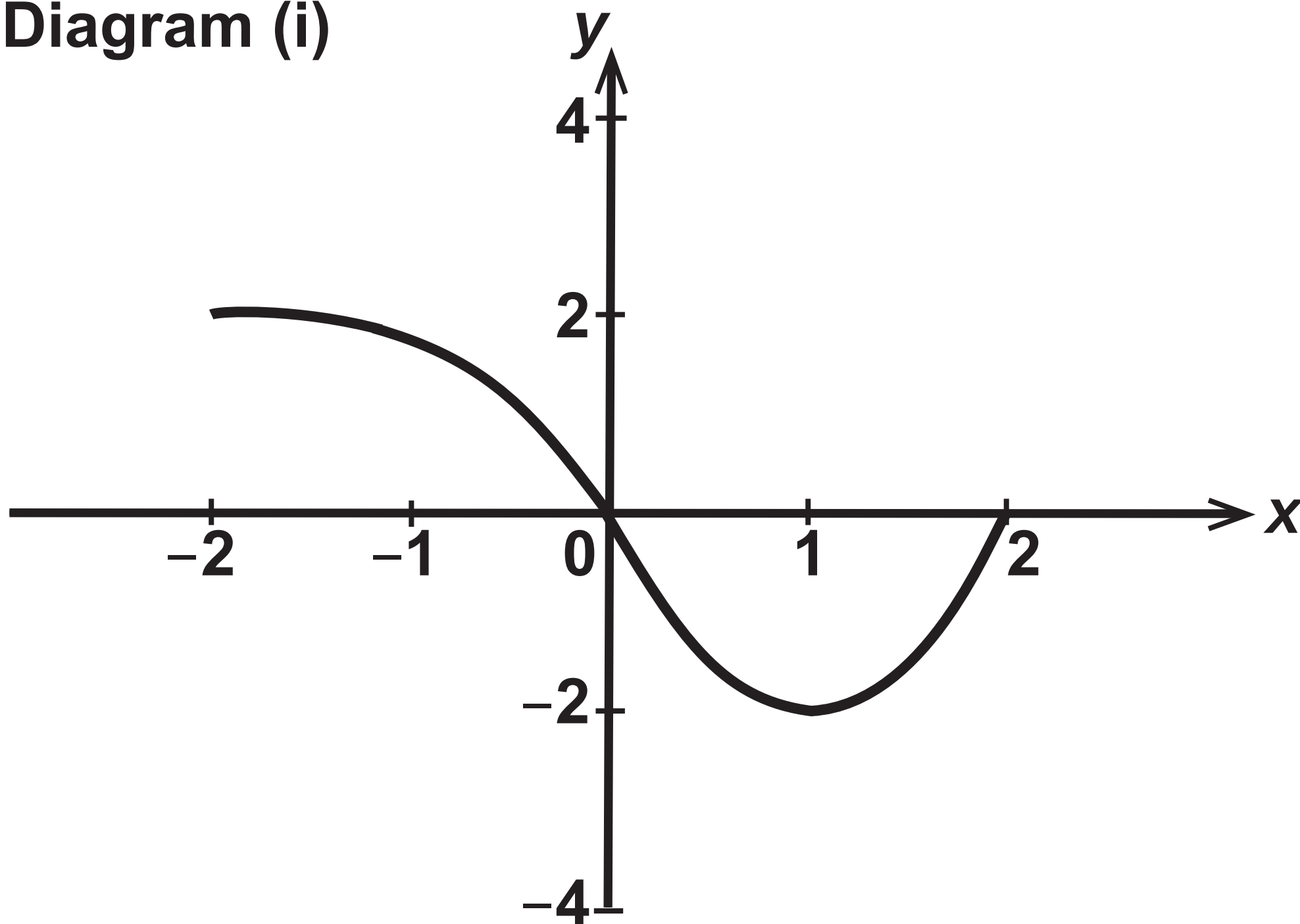
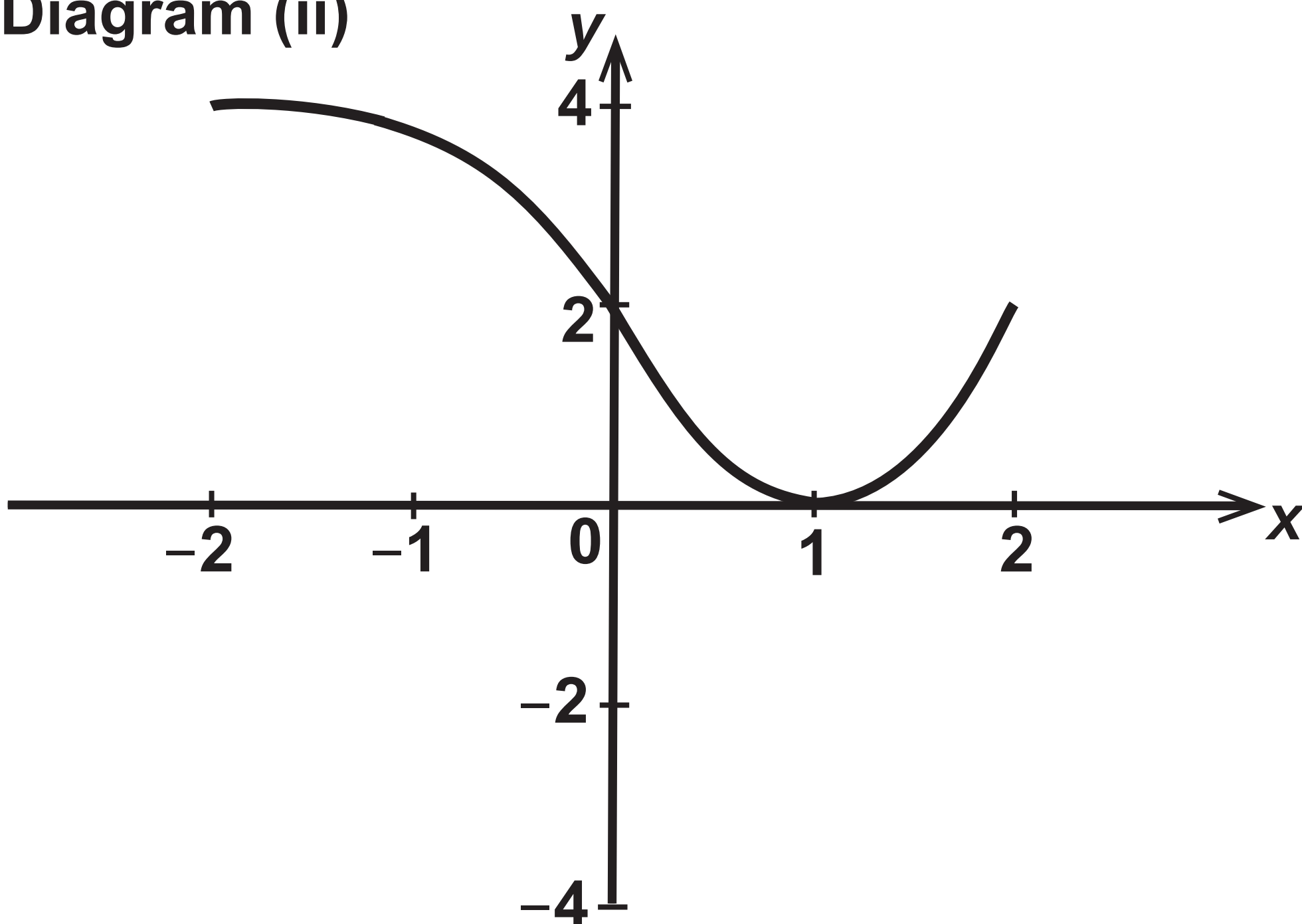


Diagram (ii)



Question 17 (b)

Diagram (i)

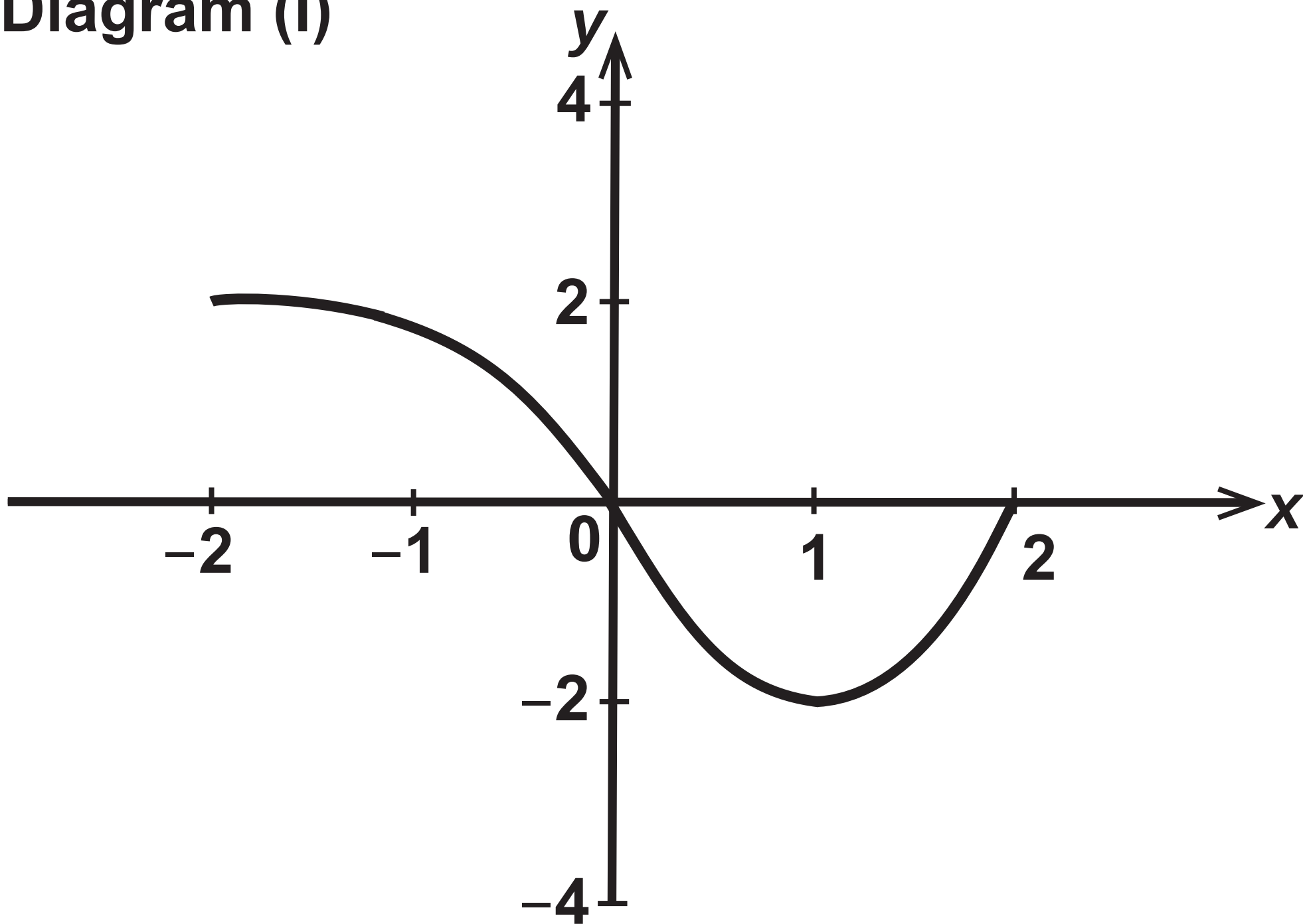
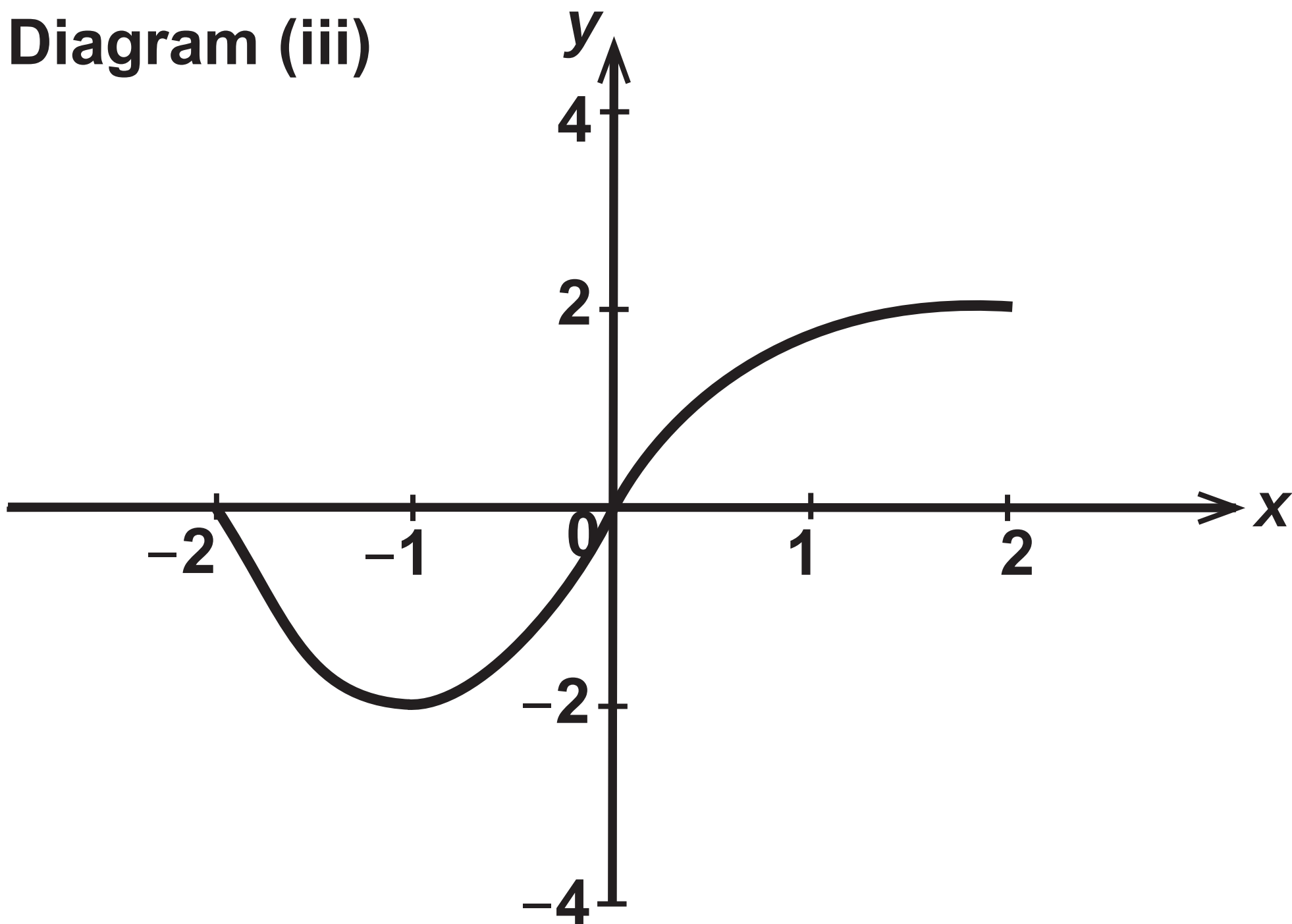


Diagram (iii)



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UNIT 1: NON – CALCULATOR

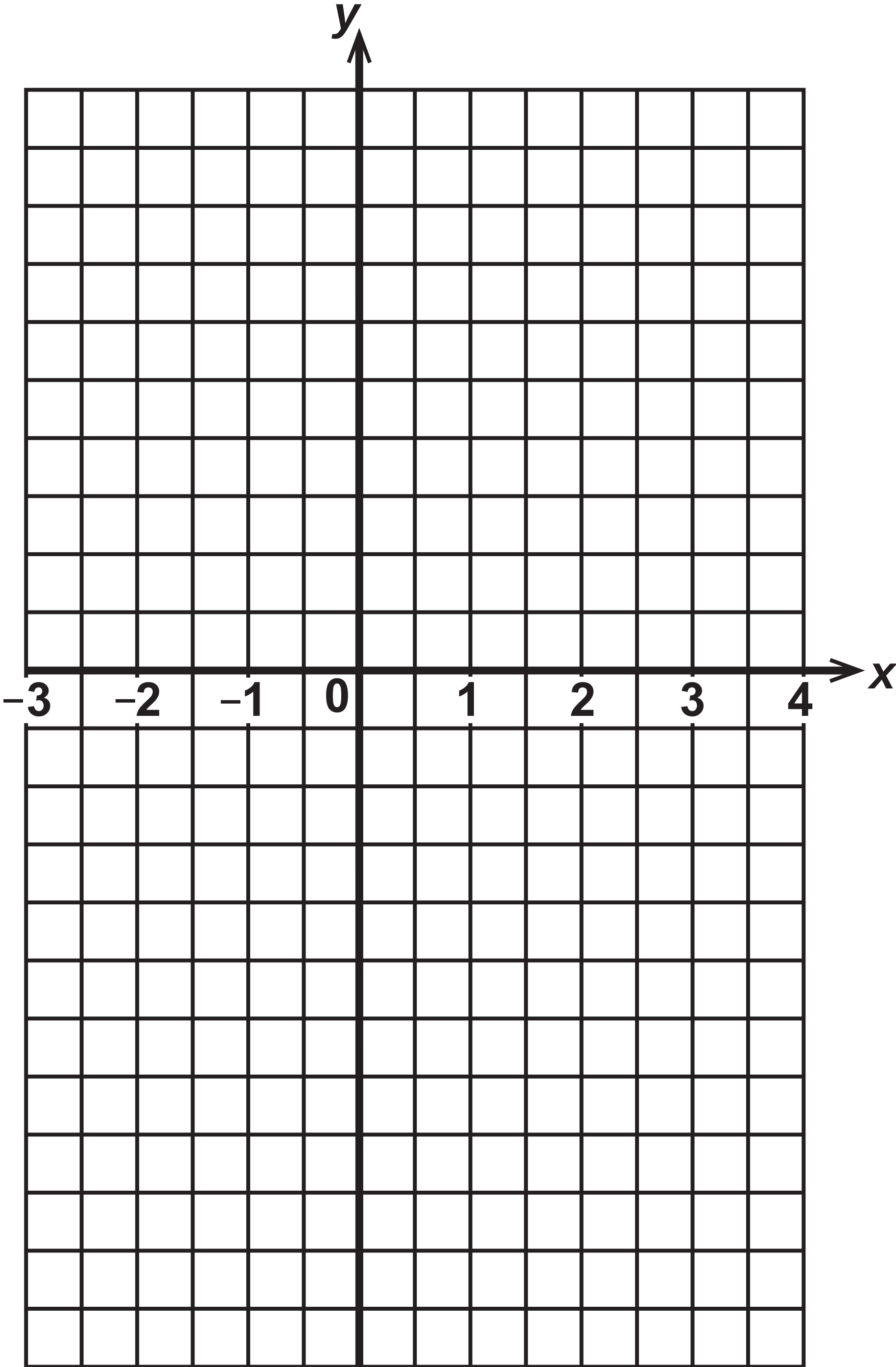
HIGHER TIER

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Spare Diagram Booklet

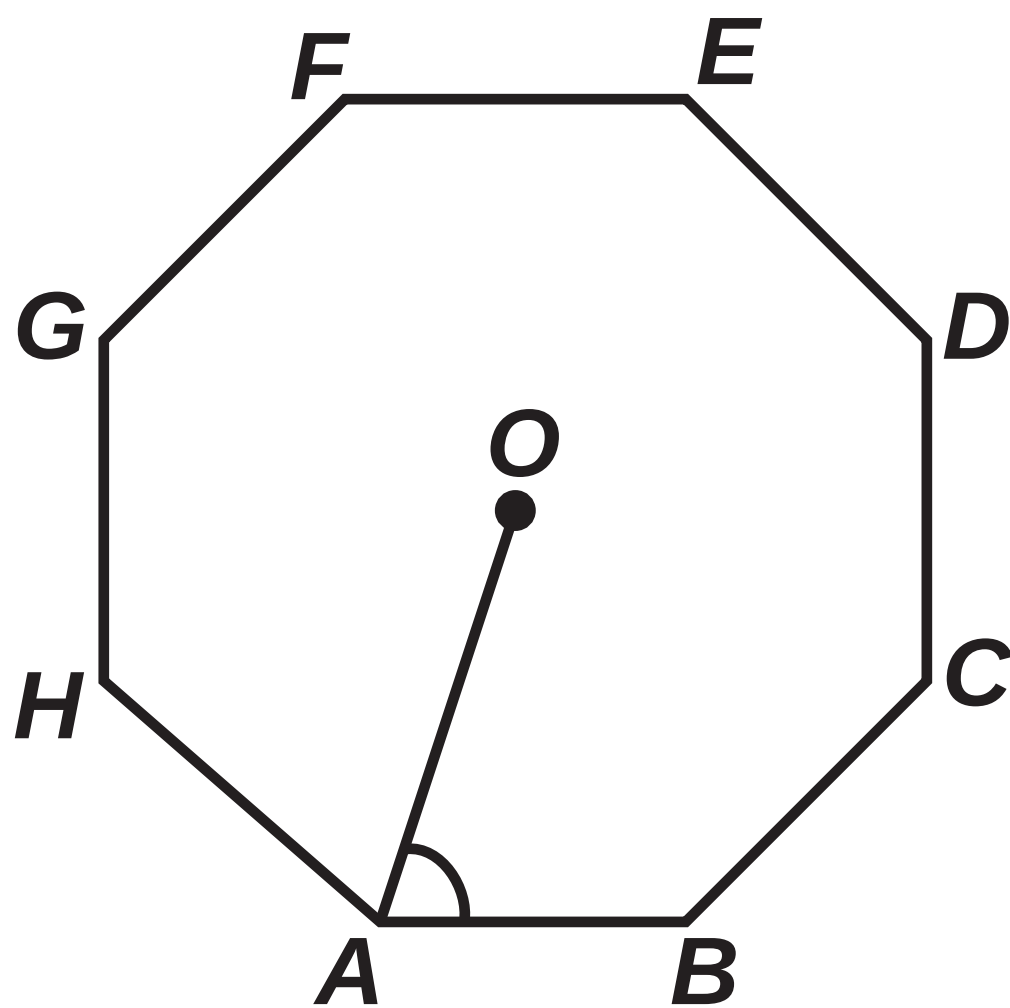
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Other Names:	
Centre Number:	
Candidate Number:	0

Question 2



Question 3

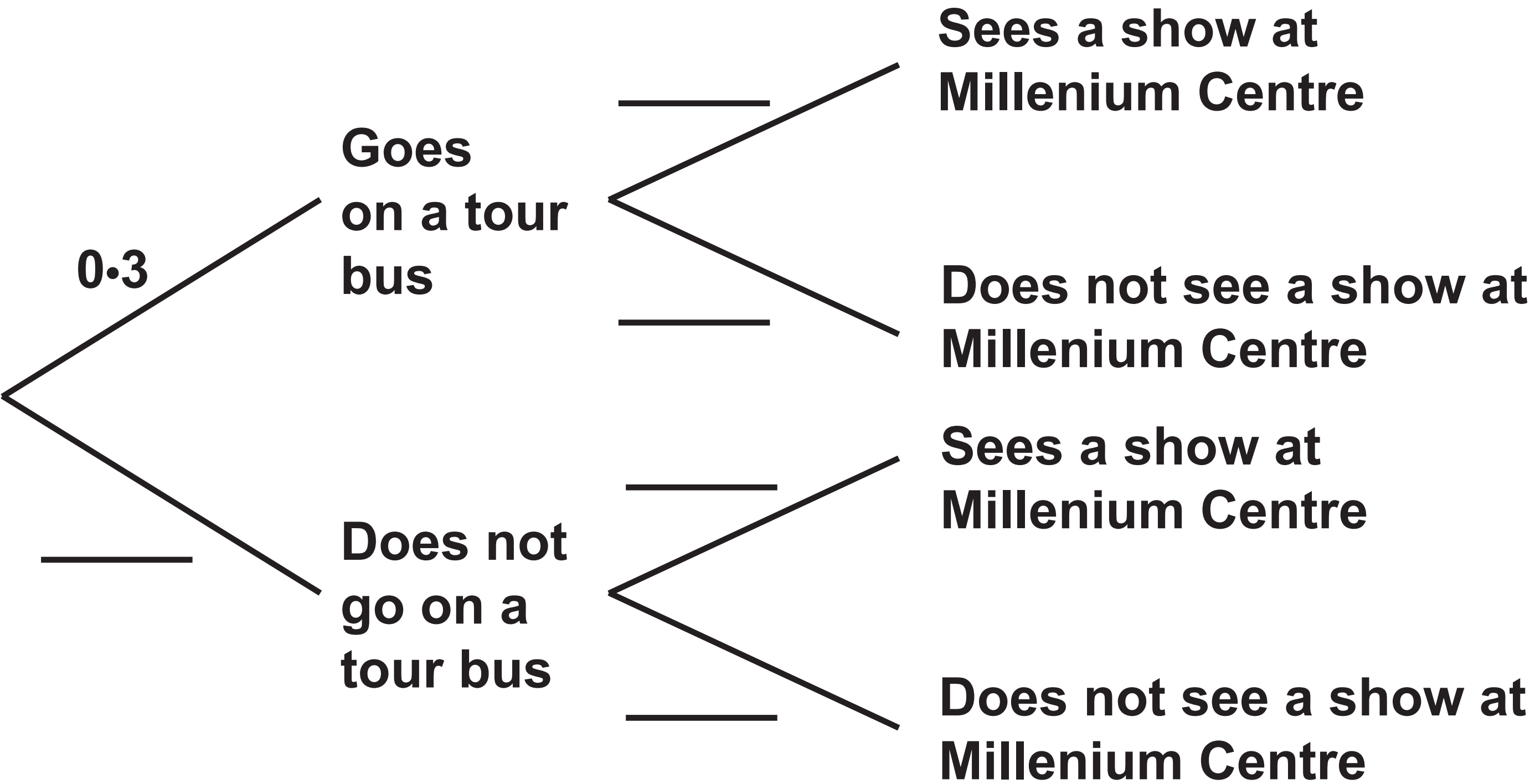
Diagram NOT drawn to scale



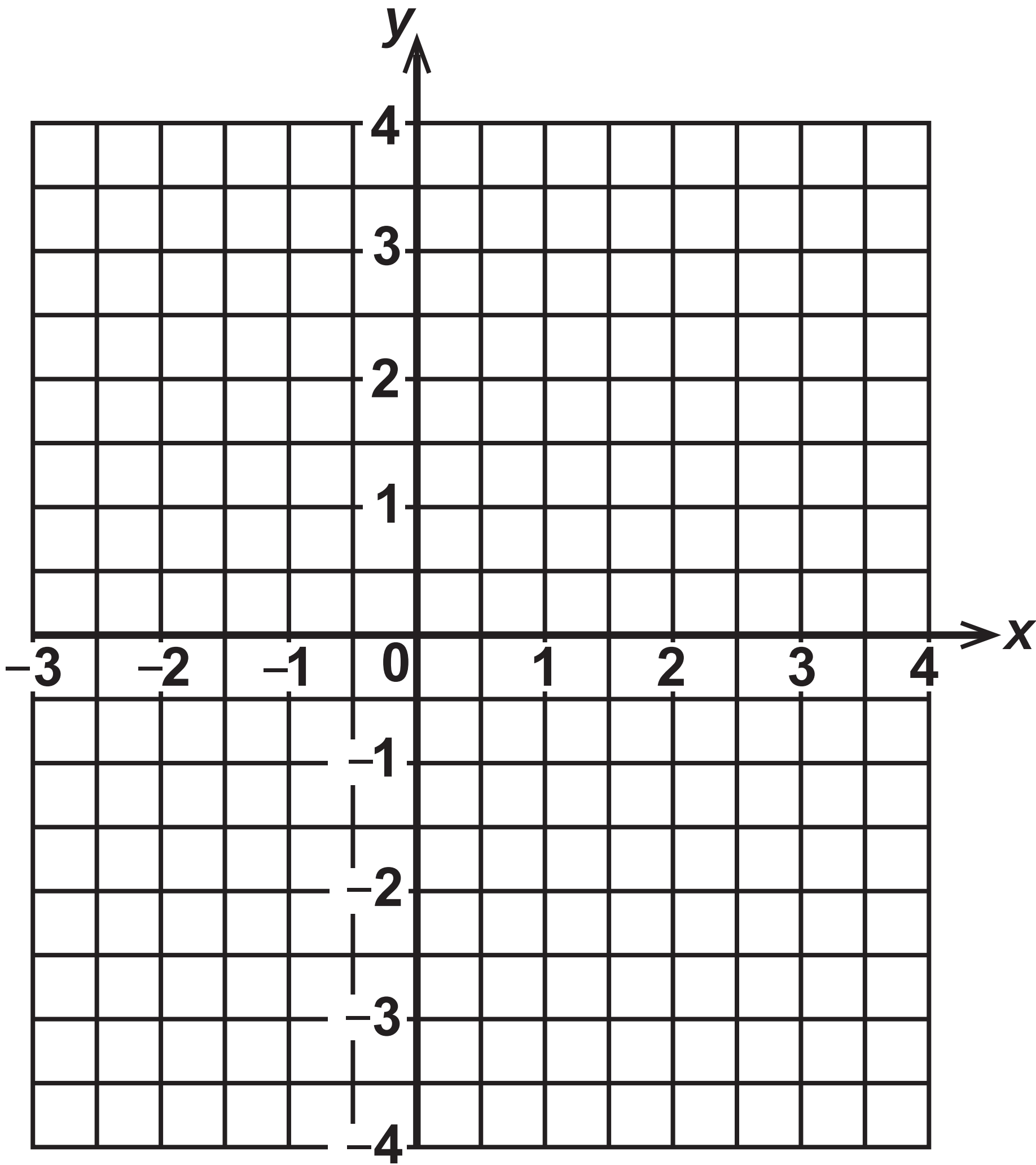
Question 4

A |—————| ***B***

Question 8 (a)

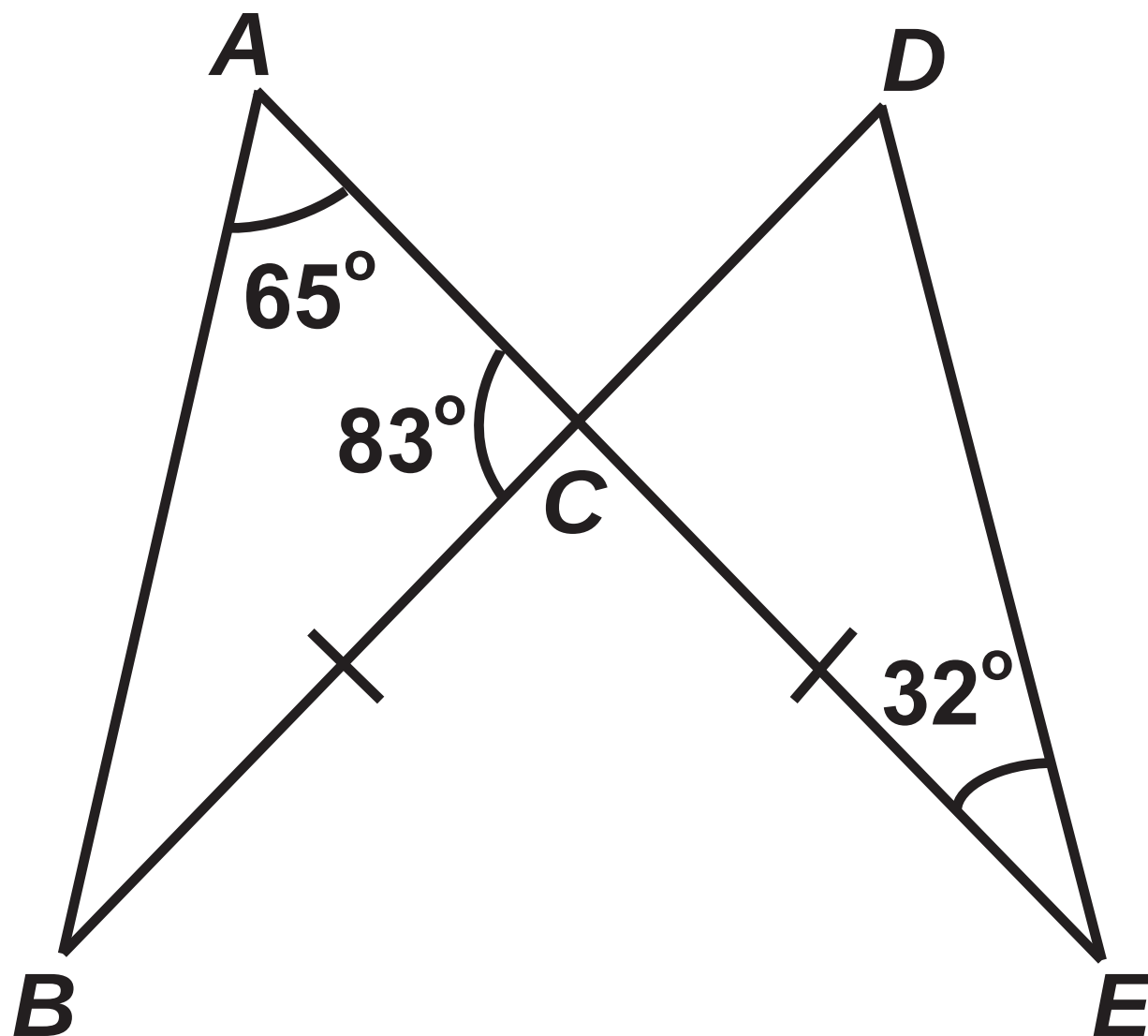


Question 10



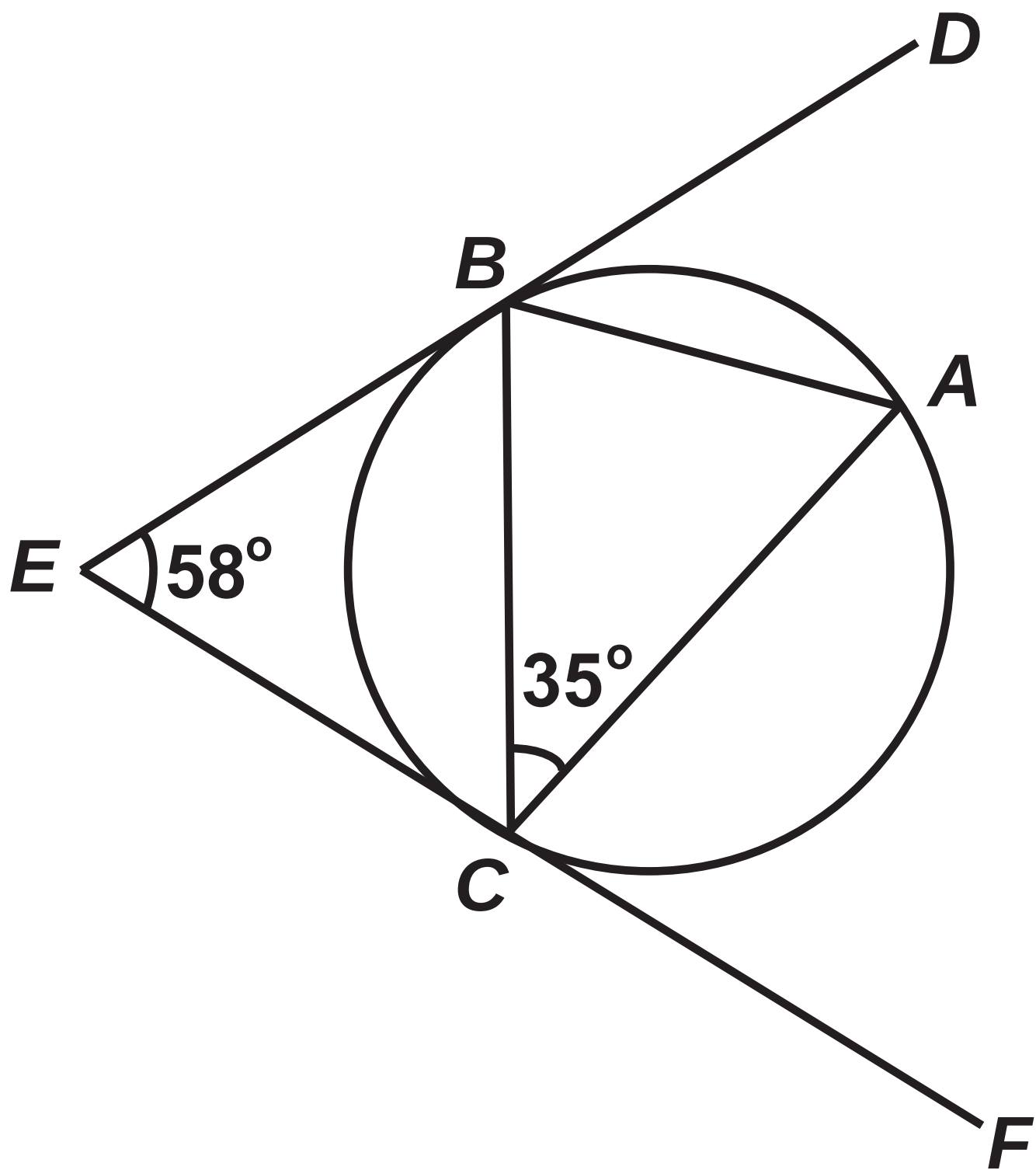
Question 12

Diagram NOT drawn to scale



Question 14

Diagram NOT drawn to scale



Question 17 (a)

Diagram (i)

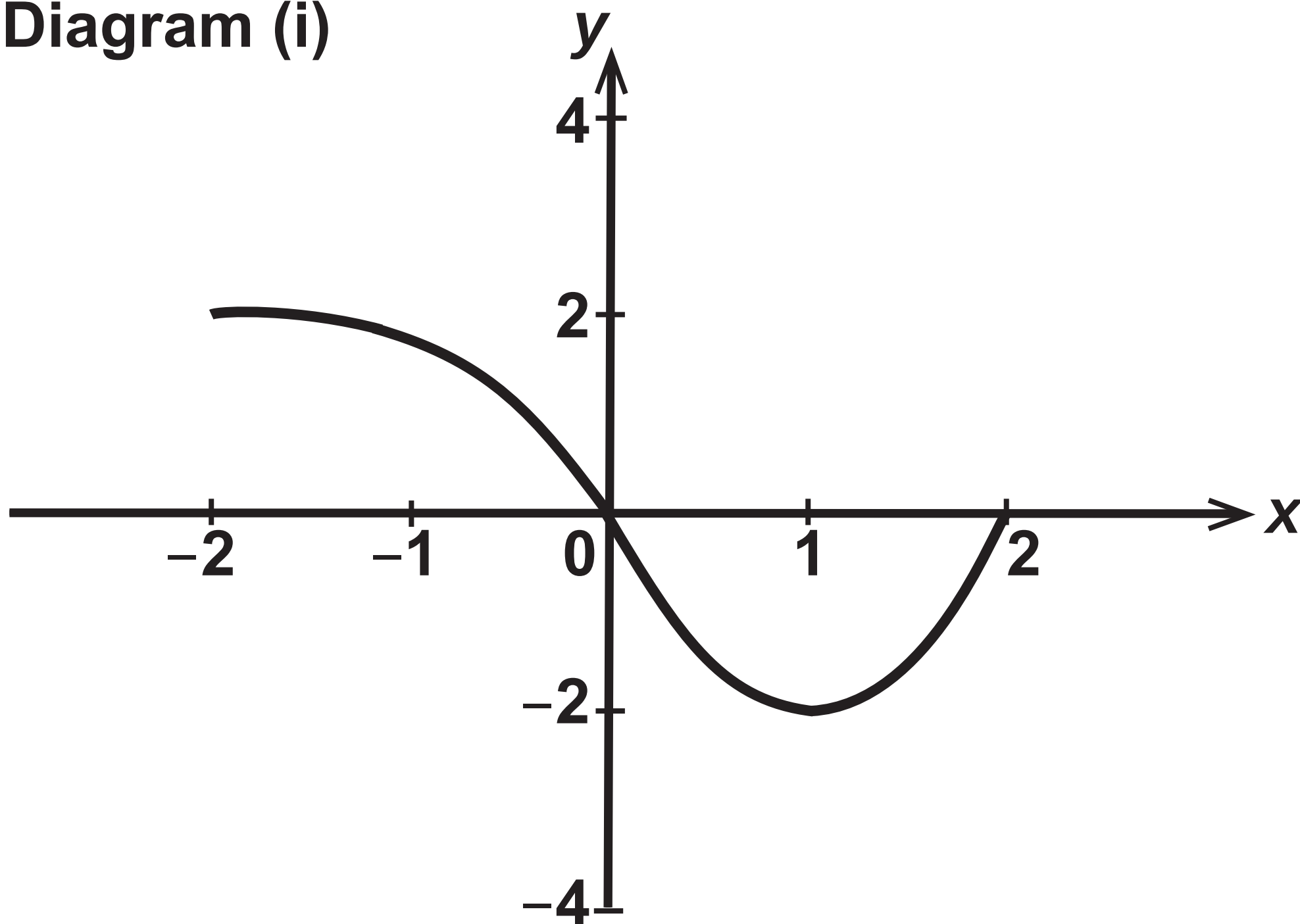
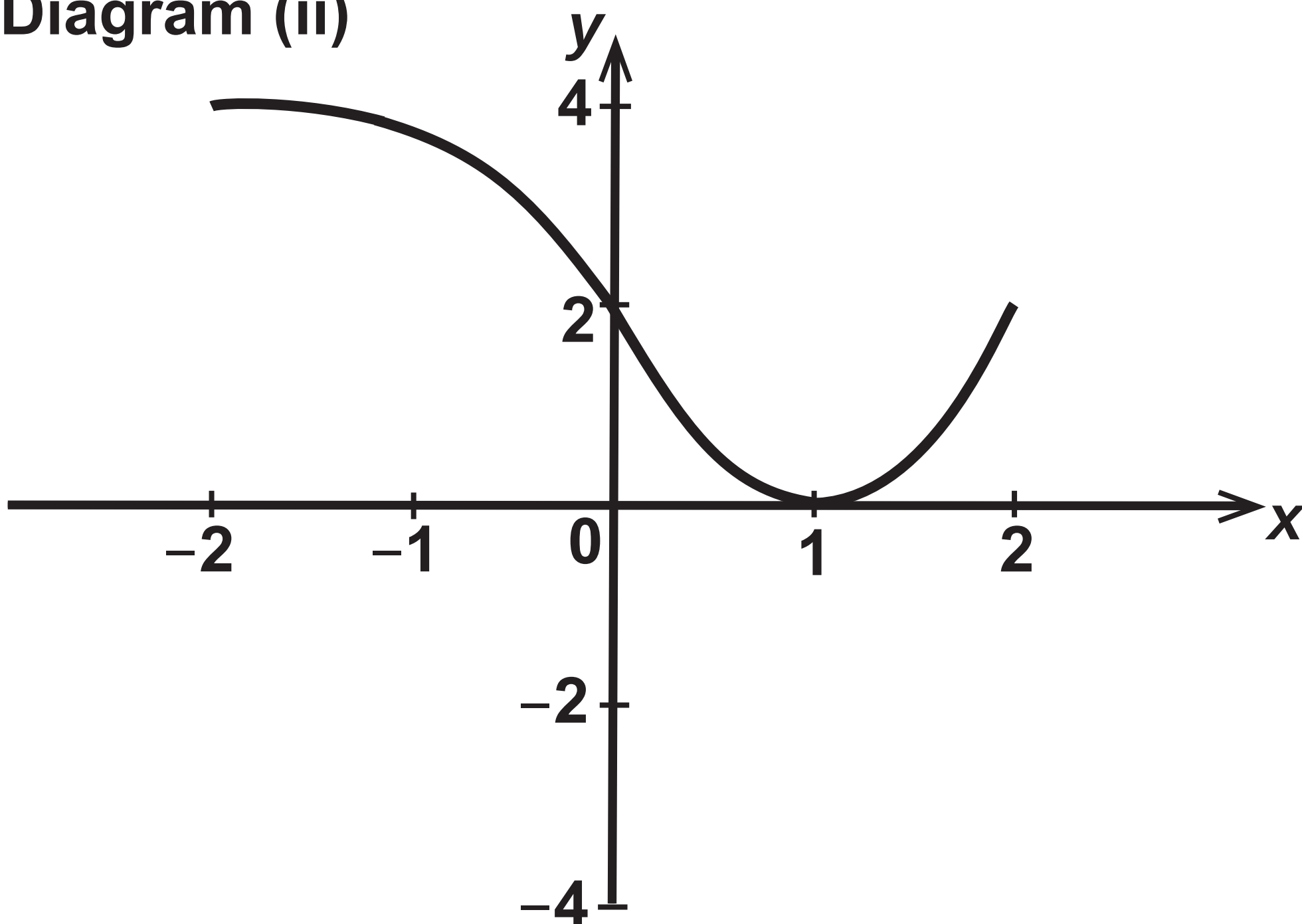


Diagram (ii)



Question 17 (b)

Diagram (i)

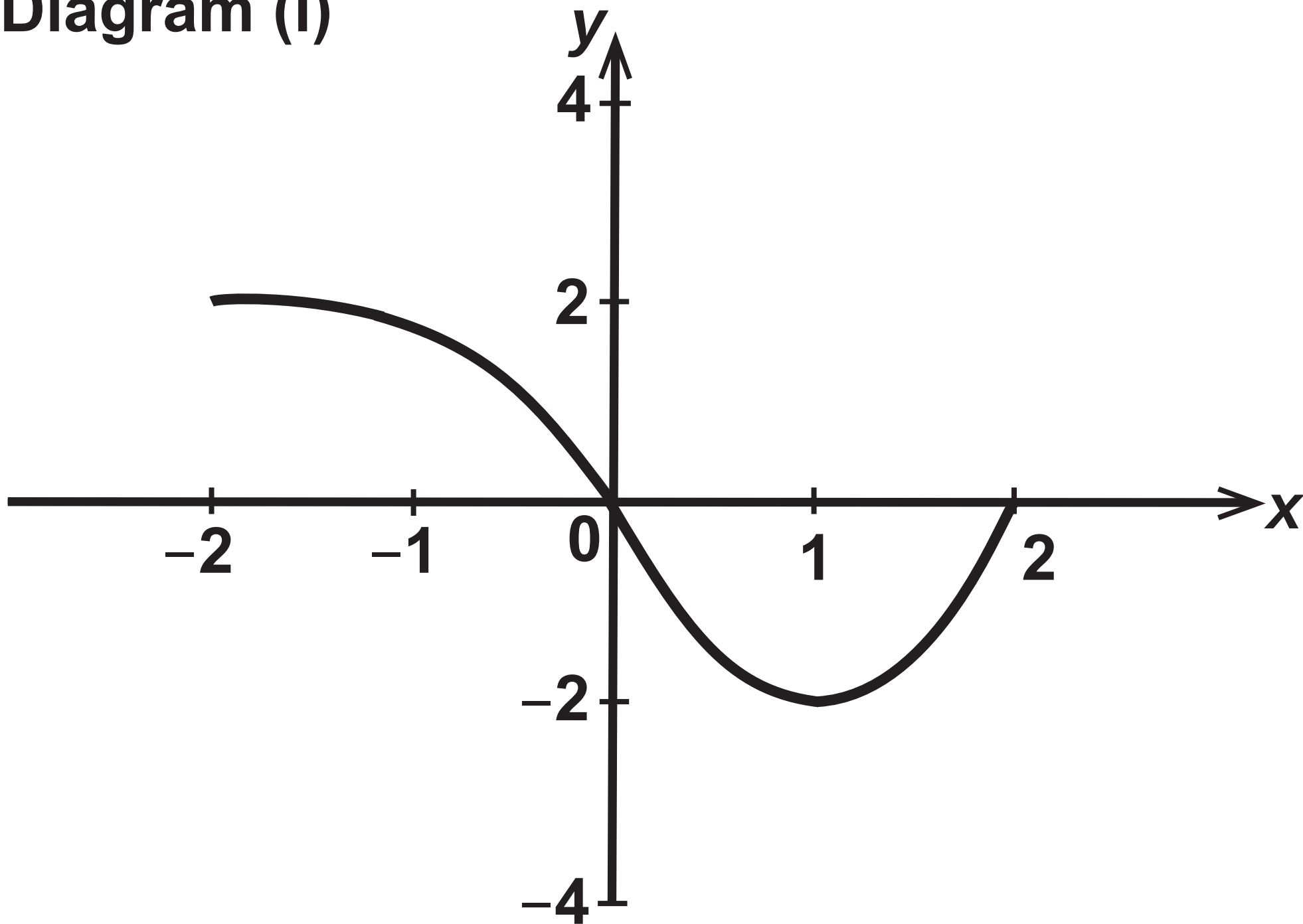
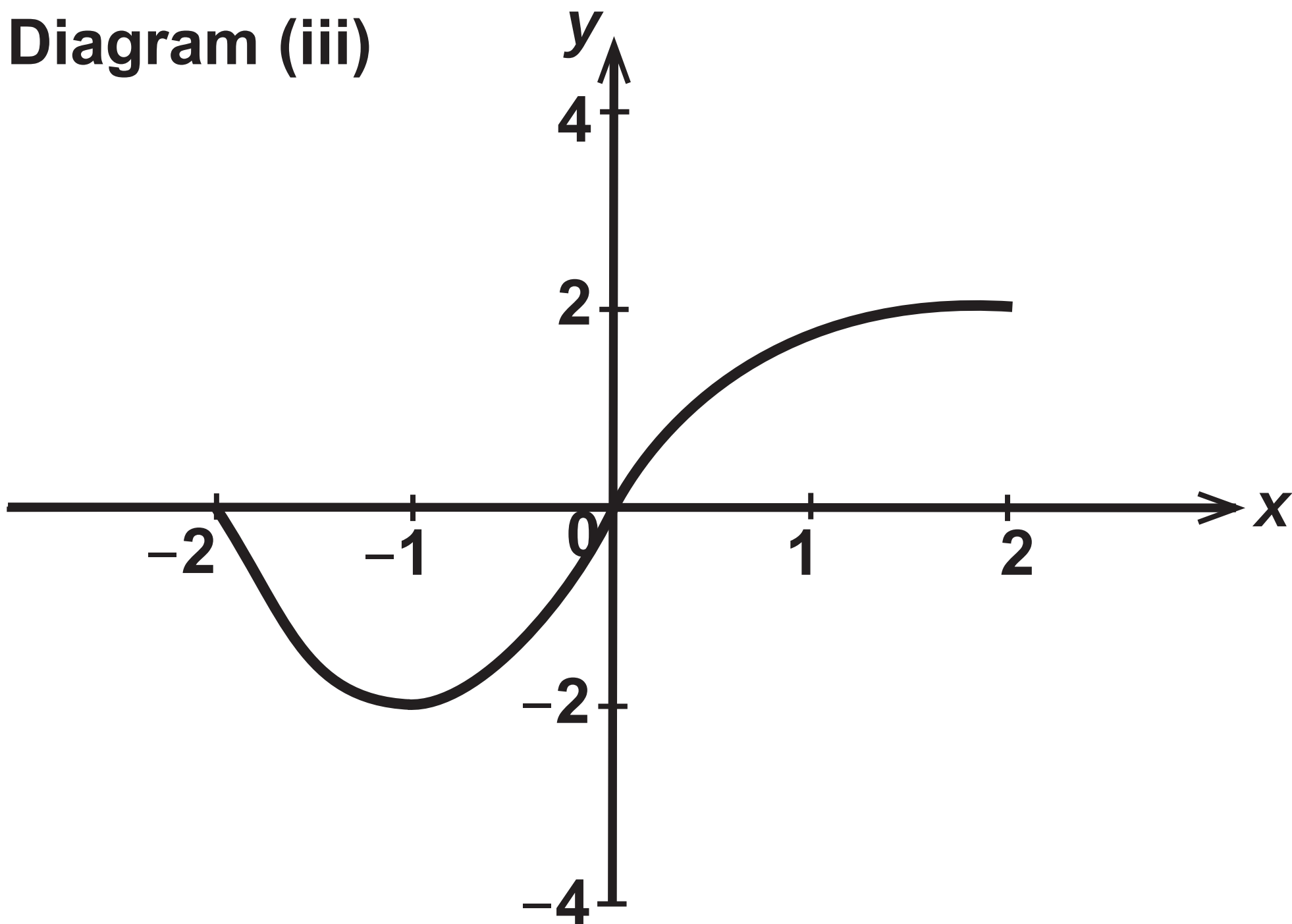


Diagram (iii)



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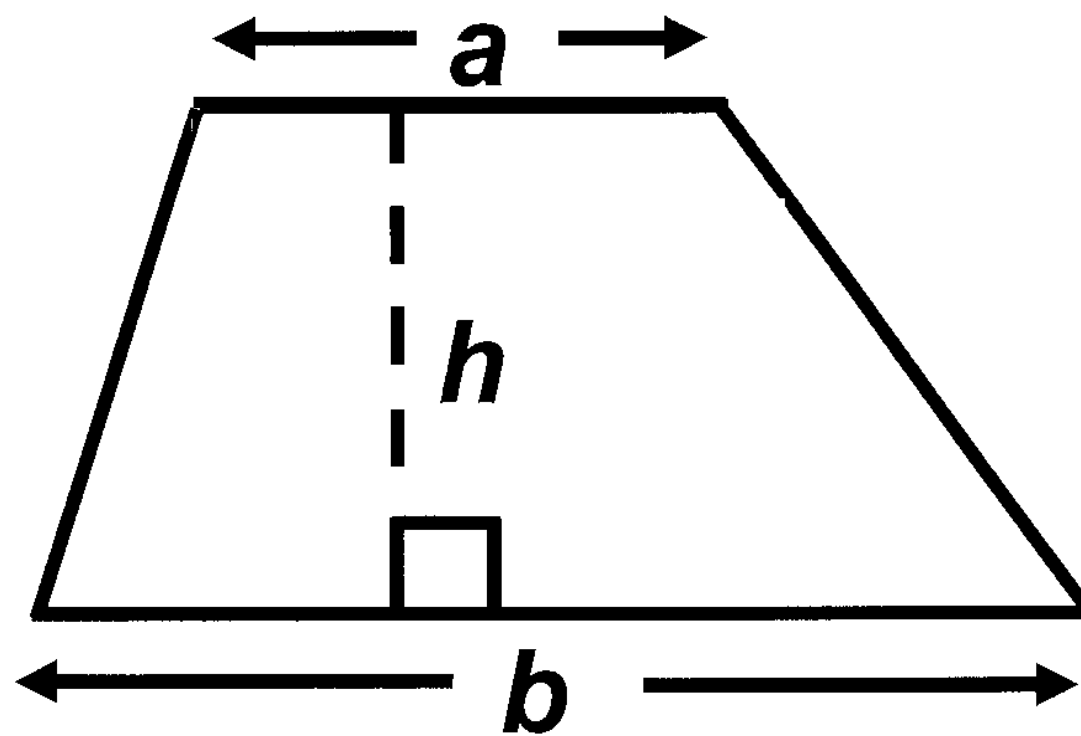
**FORMULA LIST
HIGHER TIER
GCSE**

You must not write on these formula pages.

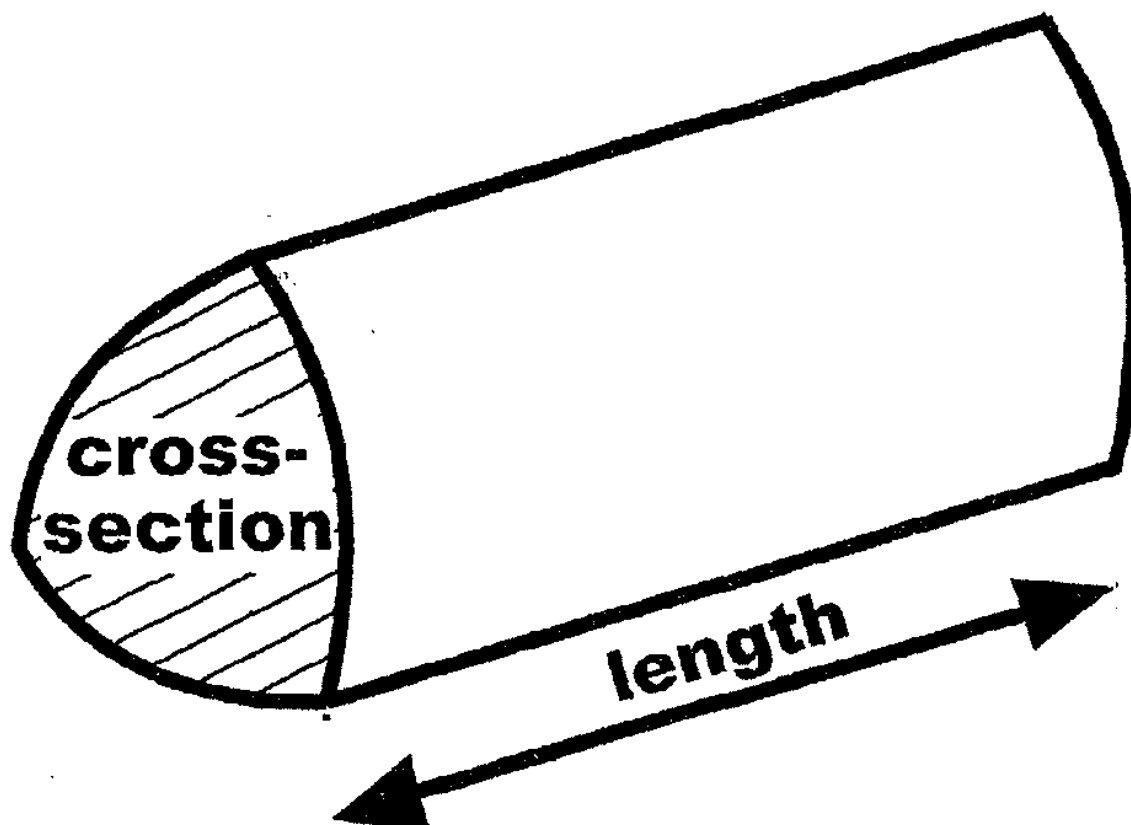
Anything you write on these formula pages will gain NO credit.

Formula List – Higher Tier

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

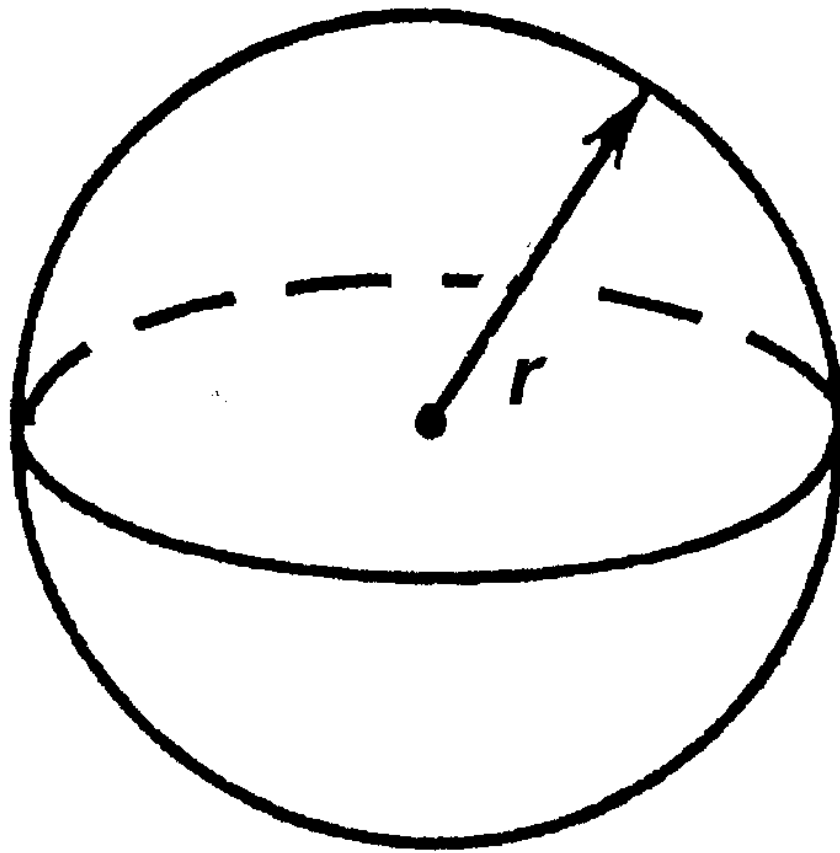


Volume of prism =
area of cross – section $\times$ length



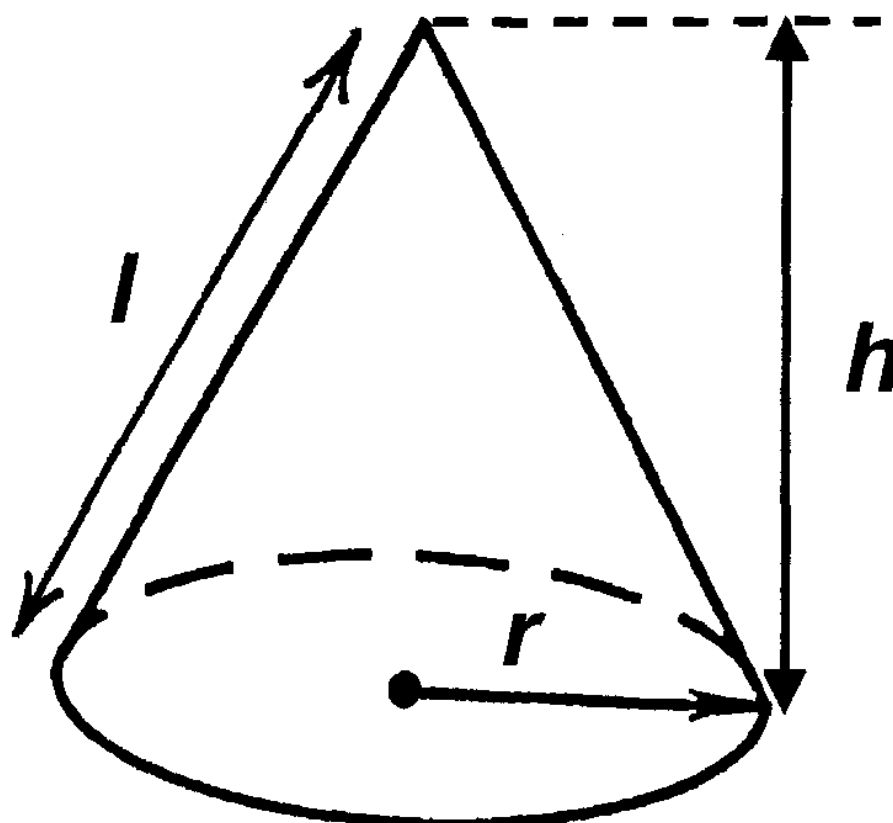
Volume of sphere = $\frac{4}{3}\pi r^3$

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

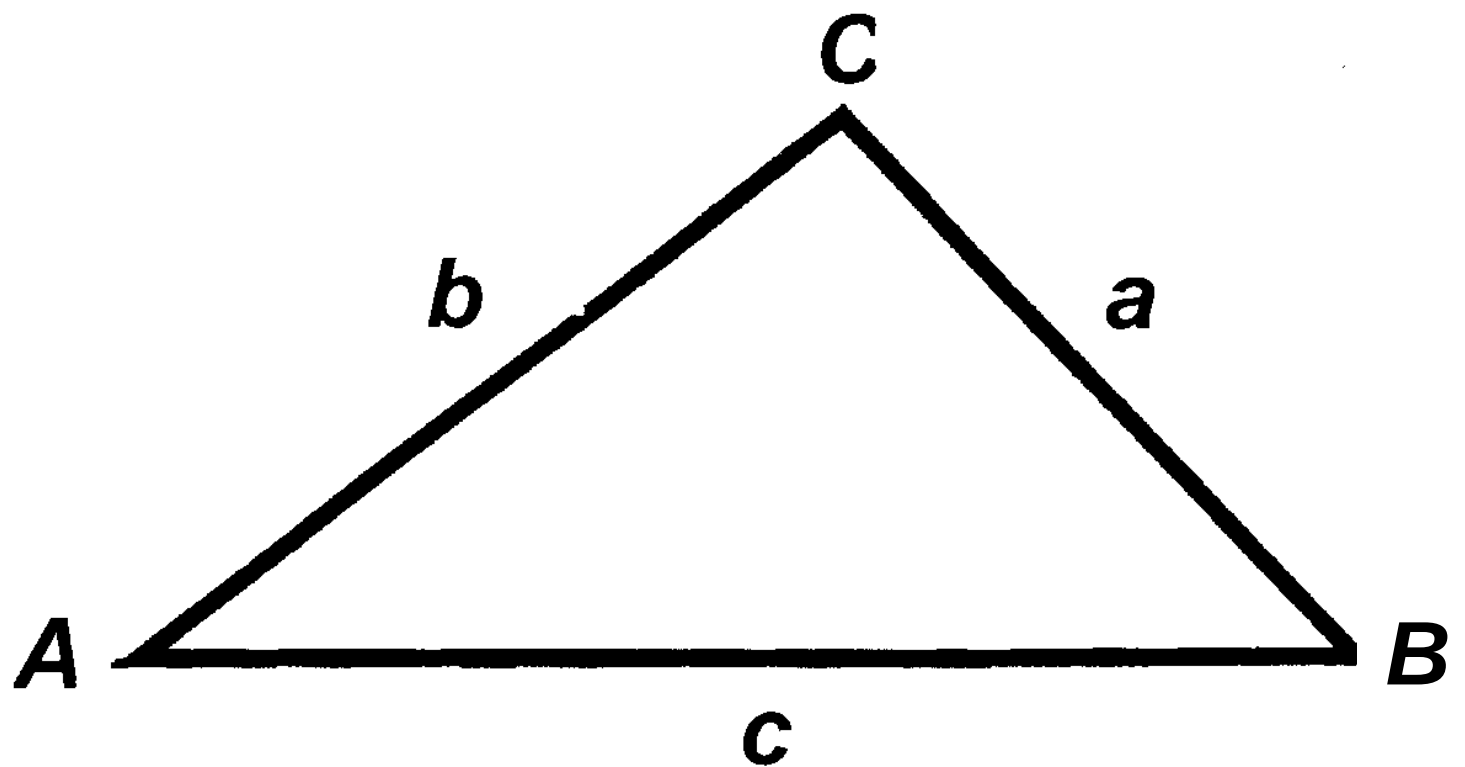


Volume of cone = $\frac{1}{3}\pi r^2 h$

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



In any triangle ABC



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

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

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

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.