



3300U50-1

TUESDAY, 24 MAY 2022 – MORNING

MATHEMATICS

UNIT 1: NON – CALCULATOR

HIGHER TIER

1 hour 35 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.	6	
2.	5	
3.	6	
4.	6	
5.	4	
6.	4	
7.	2	
8.	2	
9.	2	
10.	3	
11.	4	
12.	2	
13.	6	
14.	2	
15.	5	
16.	2	
17.	5	
18.	4	
Total	70	

(Turn over)

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.

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 the booklet.

Question numbers must be given for the work written on the additional page(s).

Take π as 3.14

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

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

The diagram below shows the straight line, *ABC*. The diagram is NOT drawn to scale.



ABC is a straight road, where the ratio

$$AB : BC = 3 : 4$$

$$AC = 56 \text{ km.}$$

Calculate the length of *BC*.

Give your answer in MILES.

You must show all your working.

Length of ***BC*** = _____ MILES

[4 marks + 2 marks OCW]

(Turn over)

2. The table below shows some of the values of $y = x^2 + x - 4$ for values of x from -3 to 3

x	$y = x^2 + x - 4$
-3	2
-2	-2
-1	
0	-4
1	
2	2
3	8

- (a) Complete the table above by finding the values of y for $x = -1$ and for $x = 1$

[2 marks]

continued on the next page . . .

(Turn over)

Question 2 continued

2. (b) On the graph paper provided for Question 2 (b) in the separate Diagram Booklet, draw the graph of $y = x^2 + x - 4$ for values of x from -3 to 3

[2 marks]

continued on the next page . . .

(Turn over)

Question 2 continued

2. (c) Use your graph to solve the equation

$$x^2 + x - 4 = 0$$

Give your answers correct to **1** decimal place.

x = _____ or **x** = _____

[1 mark]

(Turn over)

3. Look at Diagram 1 and Diagram 2 for Question 3 in the separate Diagram Booklet. Diagram 1 is a pie chart and Diagram 2 is a bar chart.

The children in year 5 and year 6 in a primary school took part in a survey.

The children were asked,
“How many pets do you have?”

The results for year 5 are shown in the pie chart. The results for year 6 are shown in the bar chart.

No child in either year had more than 5 pets.

There are 36 children in year 5

One child is chosen at random from all the children in year 5 and year 6

What is the probability that this child has no more than 1 pet?

(Turn over)

4. Look at the diagram for Question 4 in the separate Diagram Booklet.
The diagram is an incomplete tree diagram.

A and **B** are independent events.

The probability of event **A** occurring is **0.6**

The probability of event **A** AND event **B** occurring is **0.48**

- (a) Complete the tree diagram.

[4 marks]

continued on the next page . . .

(Turn over)

Question 4 continued

4. (b) Calculate the probability of neither event **A** nor event **B** occurring.

[2 marks]

(Turn over)

5. Look at the diagram for Question 5 in the separate Diagram Booklet. The diagram is NOT drawn to scale.

In the diagram:

- AB and ED are parallel
- triangles ABC and DEC are similar
- $BC = 8$ cm
- $CA = 10$ cm
- $CD = 15$ cm
- $DE = 10.5$ cm

- (a) Calculate the length of CE .

[2 marks]

5. (b) Calculate the length of AB .

[2 marks]

(Turn over)

- 6. Solve the following simultaneous equations using an algebraic (not graphical) method. You must show all your working.**

$$2x + 3y = 29$$

$$5x - 4y = -8$$

[illegible]

[4 marks]

7. Circle the correct answer for each of the following statements.

(a) 7.2 m^3 is equal to

720 cm^3
72000 cm^3
$7.2 \times 10^5 \text{ cm}^3$
$7.2 \times 10^3 \text{ cm}^3$
$7.2 \times 10^6 \text{ cm}^3$

[1 mark]

continued on the next page . . .

(Turn over)

Question 7 continued

7. (b) $36^{\frac{1}{2}}$ is equal to

18	6	$\frac{1}{18}$	$\frac{1}{6}$	$\frac{1}{36}$
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[1 mark]

(Turn over)

8. Find the value of $\frac{30\,000}{1.5 \times 10^5}$

Write your answer as a decimal.

[2 marks]

(Turn over)

9. (a) Look at the diagram for Question 9 (a) in the separate Diagram Booklet.

The diagram shows a set of axes.

On the axes, sketch the curve

$y = \sin x$, for values of x in the

range $x = 0^\circ$ to $x = 360^\circ$

[1 mark]

- (b) Look at the diagram for Question 9 (b) in the separate Diagram Booklet.

The diagram shows a set of axes.

On the axes, sketch the curve

$y = \tan x$, for values of x in the

range $x = 0^\circ$ to $x = 360^\circ$

[1 mark]

- 10. Rearrange the following formula to make X the subject.**

$$5x + 4 = t - yx$$

You must show all your working.

[illegible]

[3 marks]

11. The wavelength of a sound wave, W metres, is INVERSELY PROPORTIONAL to its frequency, f hertz (Hz).

Richard is measuring the wavelengths of different sound waves.

The wavelength is 0.5 m when the frequency is 1200 Hz.

What is the frequency when the wavelength is 10 m?

(Turn over)

- 12. Look at the diagram for Question 12 in the separate Diagram Booklet.**

The diagram shows a triangle on a coordinate grid.

Enlarge the triangle by a scale factor of -2

Use the origin as the centre of enlargement.

[2 marks]

13. Marian is competing in a race.

The race is $(6X + 5)$ miles long.

She completes the race in X hours.

Her average speed during the race is $(2X + 3)$ miles per hour.

Calculate how long Marian takes to complete the race.

You must use an algebraic method (not trial and improvement).

(Turn over)

14. Find the value of $125^{-\frac{1}{3}}$

Simplify your answer.

[2 marks]

15. Simplify the following.

$$\frac{\sqrt{800}}{(\sqrt{2})^3} + (3 - \sqrt{7})^2$$

State whether the answer is rational or irrational.

The answer is rational

☐

The answer is irrational

☐

(Turn over)

16. (a) Look at Diagram 1 and Diagram 2 for Question 16 (a) in the separate Diagram Booklet.

Diagram 1 shows a sketch of the curve $y = f(x)$

The curve is transformed, as shown in Diagram 2.

Using function notation, complete the equation of the transformed curve (Diagram 2).

$y =$ _____

[1 mark]

continued on the next page . . .

Question 16 continued

- 16. (b) Look at Diagram 1 and Diagram 3 for Question 16 (b) in the separate Diagram Booklet.**

Diagram 1 shows a sketch of the curve $y = f(x)$

The curve is transformed, as shown in Diagram 3.

Using function notation, complete the equation of the transformed curve (Diagram 3).

$y =$ _____

[1 mark]

17. A bag contains 10 balls.

**5 of the balls are blue, 4 of the balls are red
and 1 ball is green.**

**Three balls are chosen at random, one at
a time, without replacement.**

**(a) Calculate the probability that the
first ball is blue, the second ball is red
and the third ball is green.**

You must show all your working.

[2 marks]

- 17. (b) Calculate the probability that at least one blue ball is chosen.**

You must show all your working.

(Turn over)

[3 marks]

18. Simplify $\frac{6x - 15}{4x^2 - 25}$

[illegible]

[4 marks]

END OF PAPER

TOTAL 70 MARKS

(Turn over)

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

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MATHEMATICS

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HIGHER TIER

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

Diagram Booklet

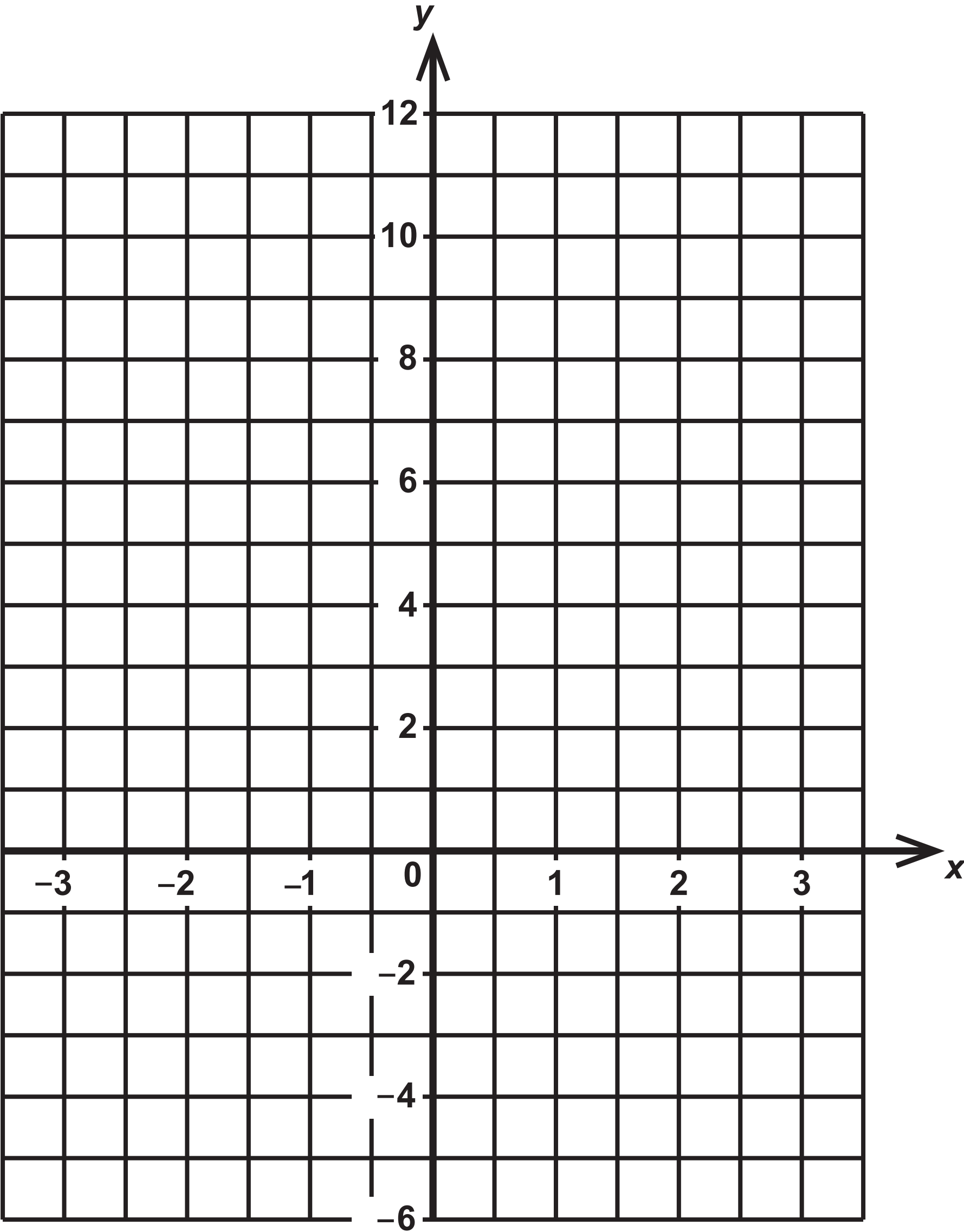
Surname: _____

First name(s): _____

Centre Number: _____

Candidate Number: 0 _____

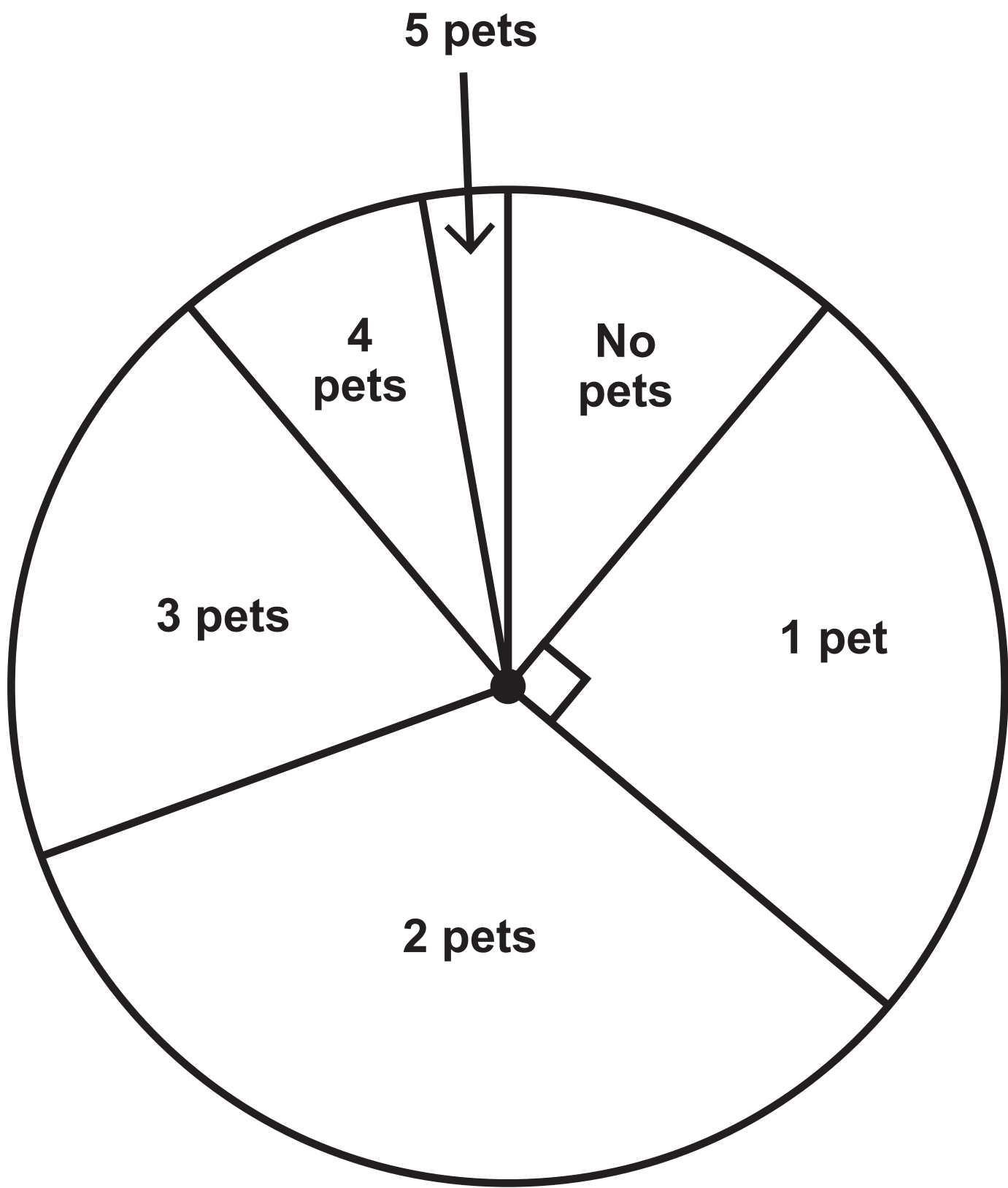
Question 2 (b)



Question 3

Diagram 1

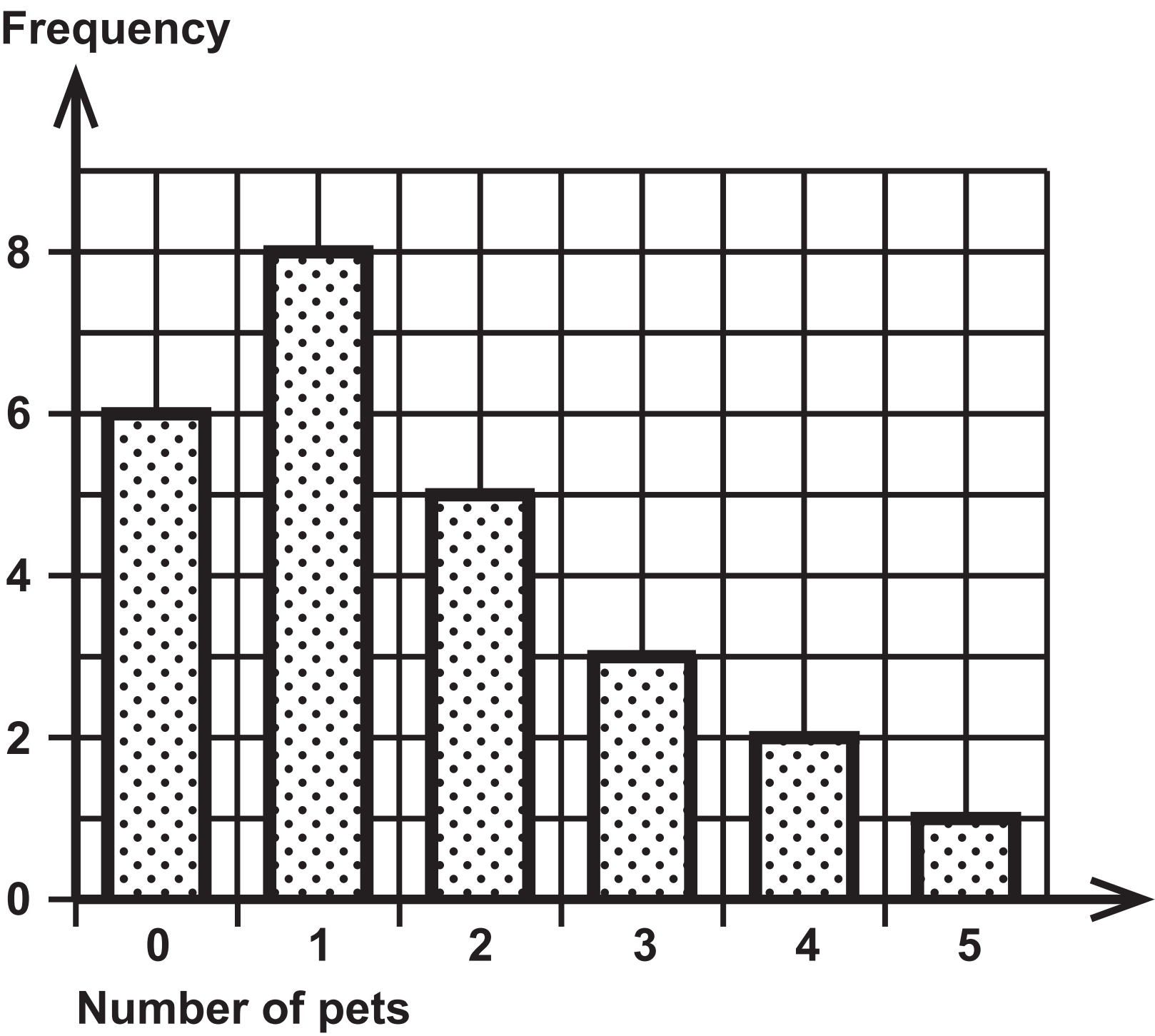
YEAR 5



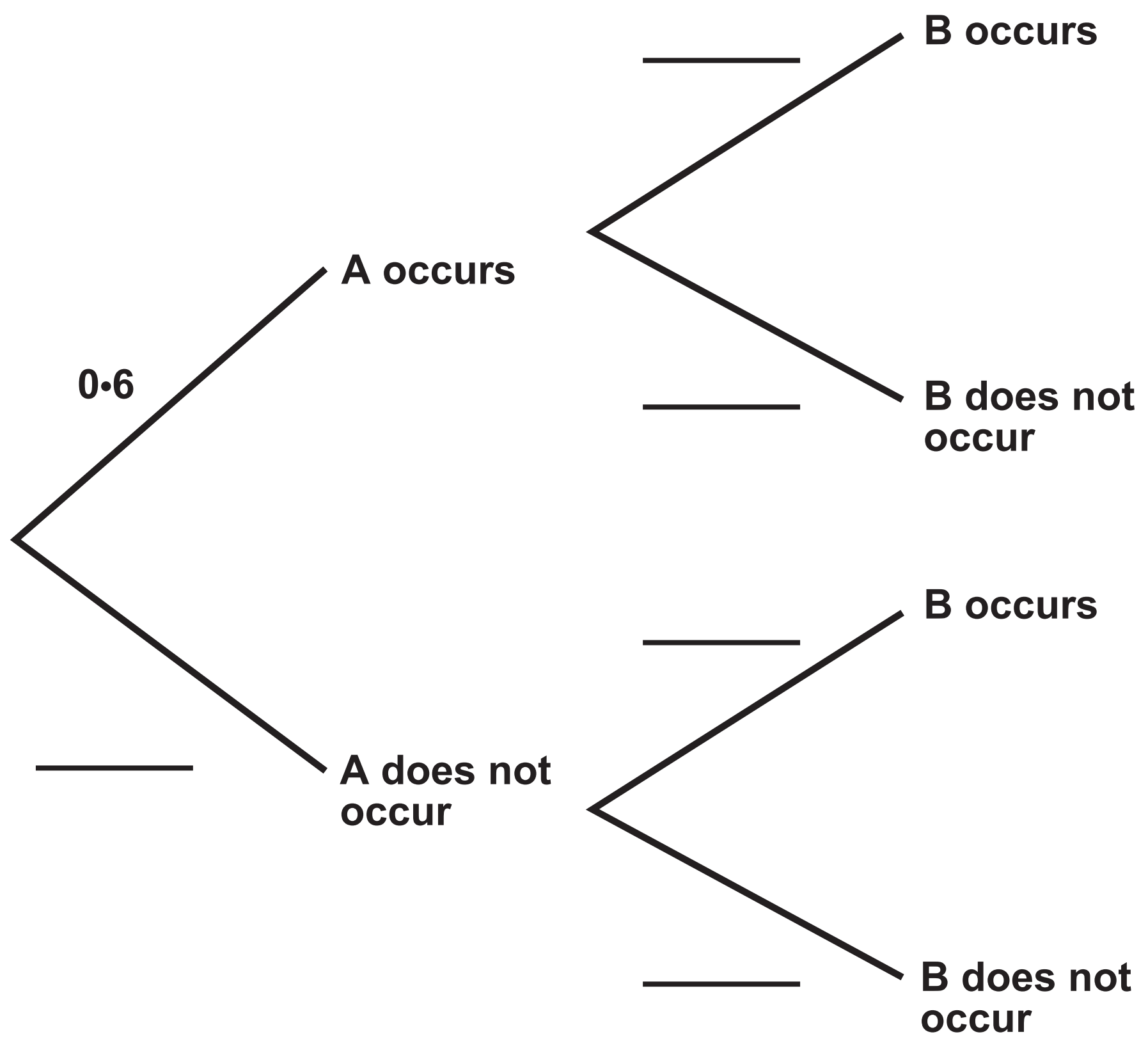
Question 3

Diagram 2

YEAR 6

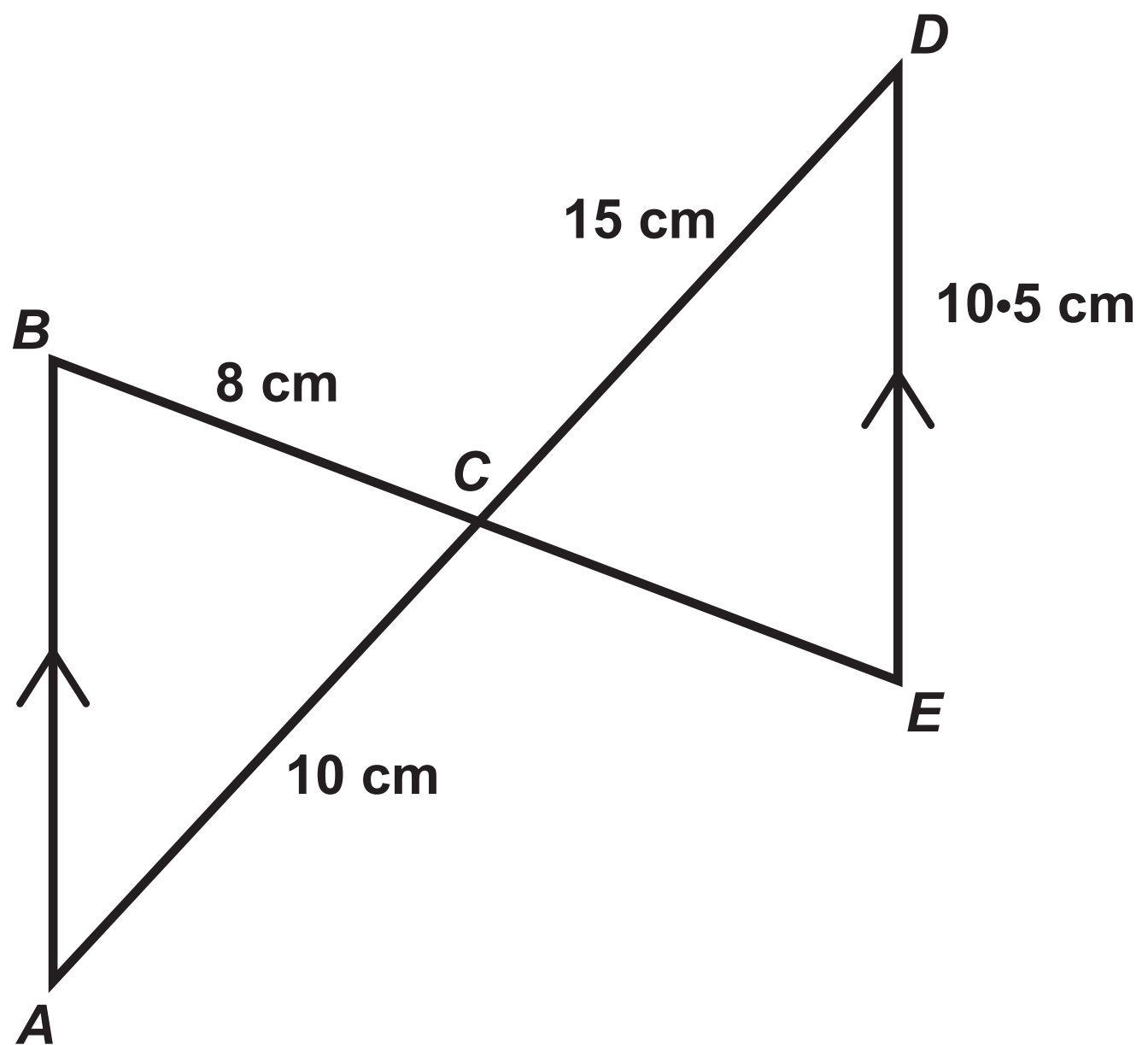


Question 4

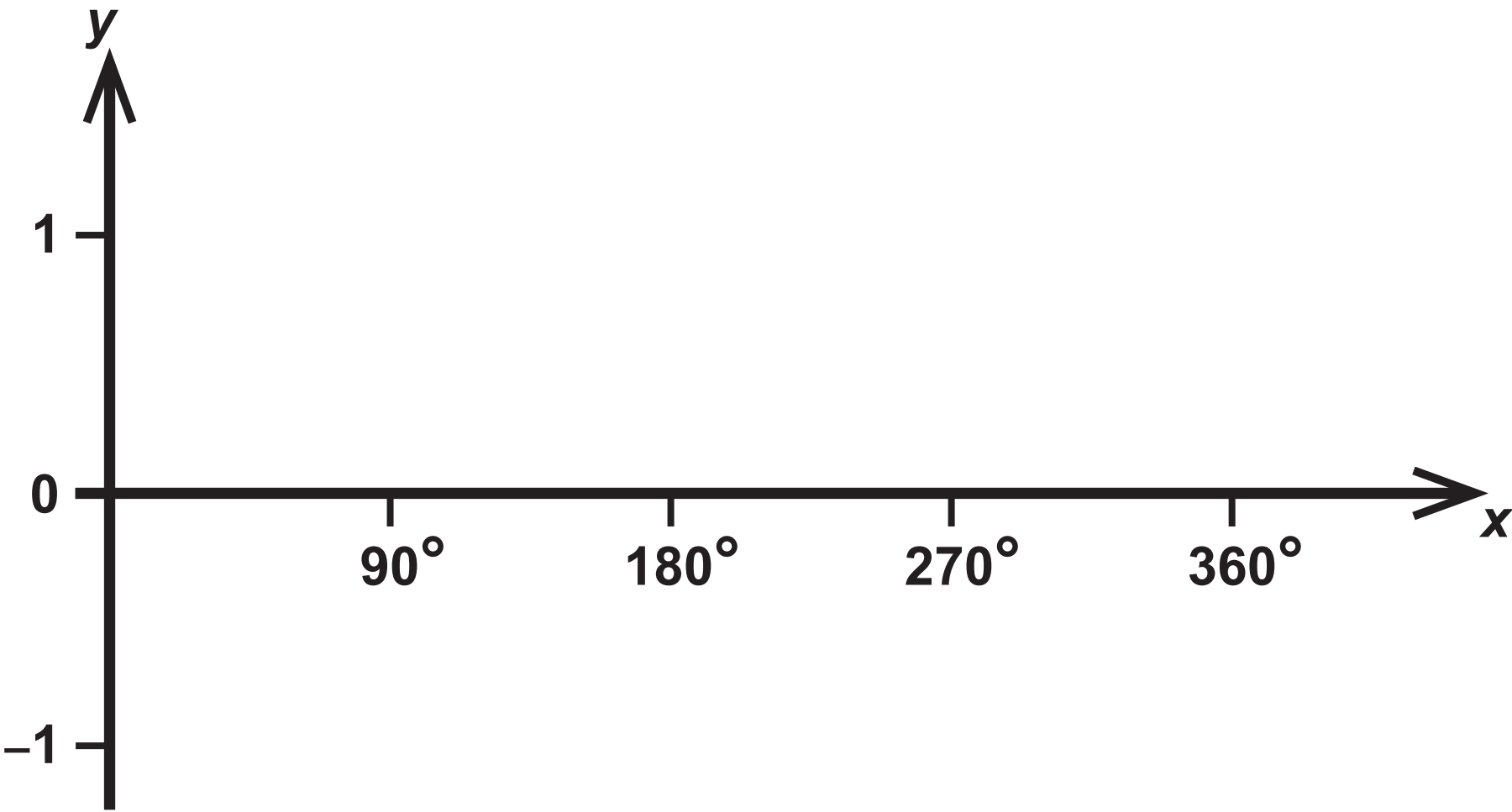


Question 5

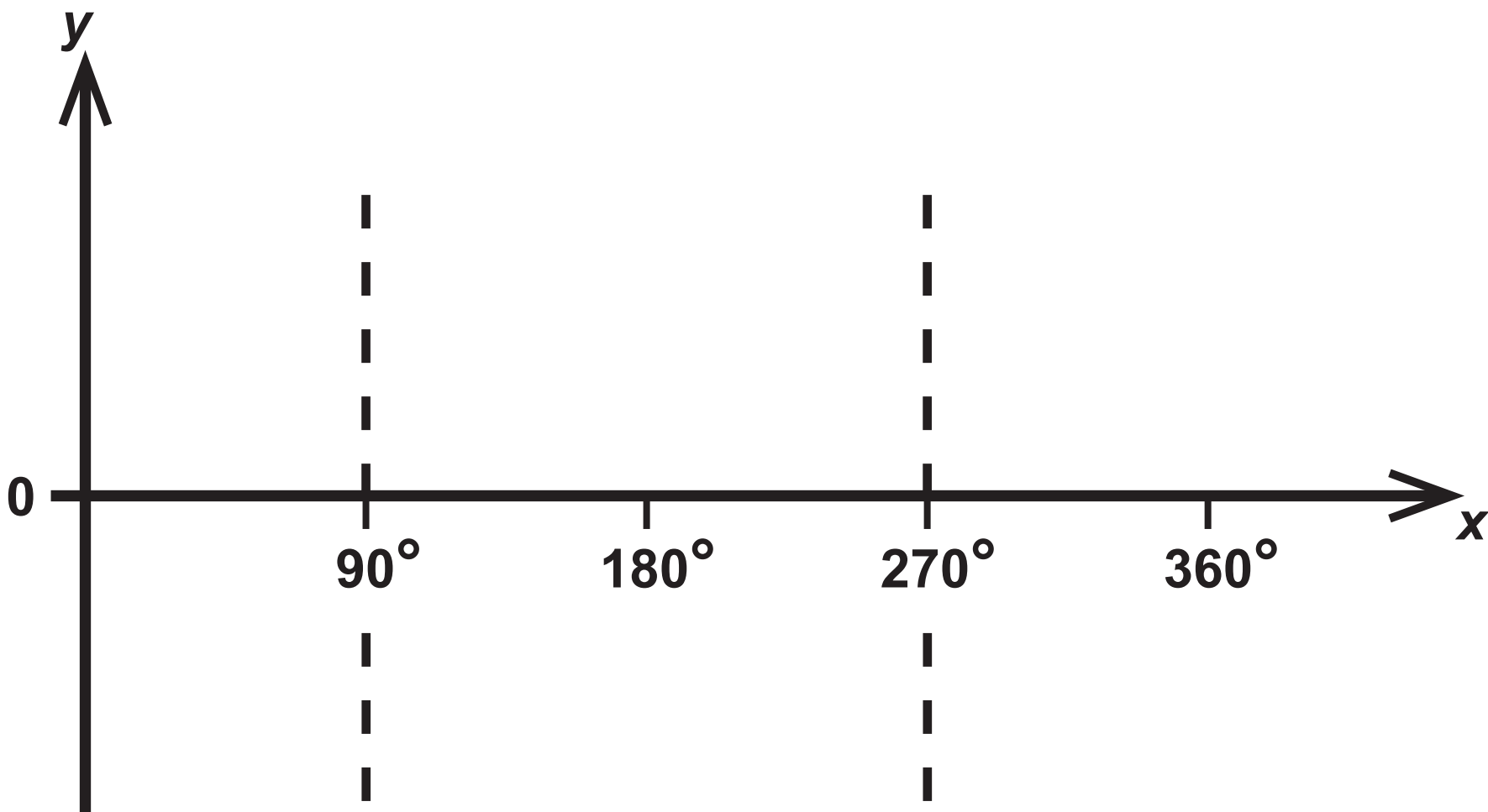
Diagram NOT drawn to scale



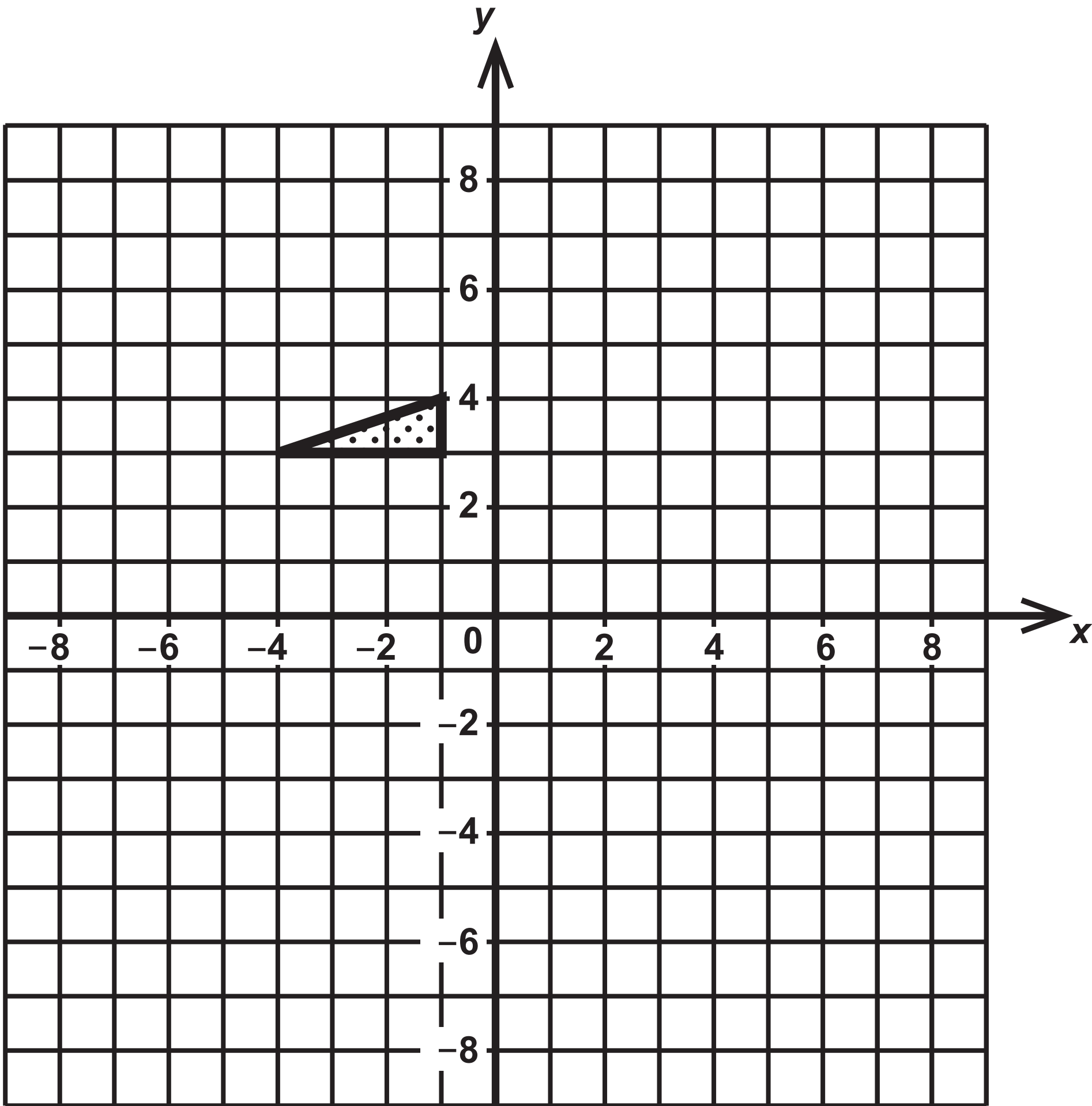
Question 9 (a)



Question 9 (b)



Question 12



Question 16 (a)

Diagram 1

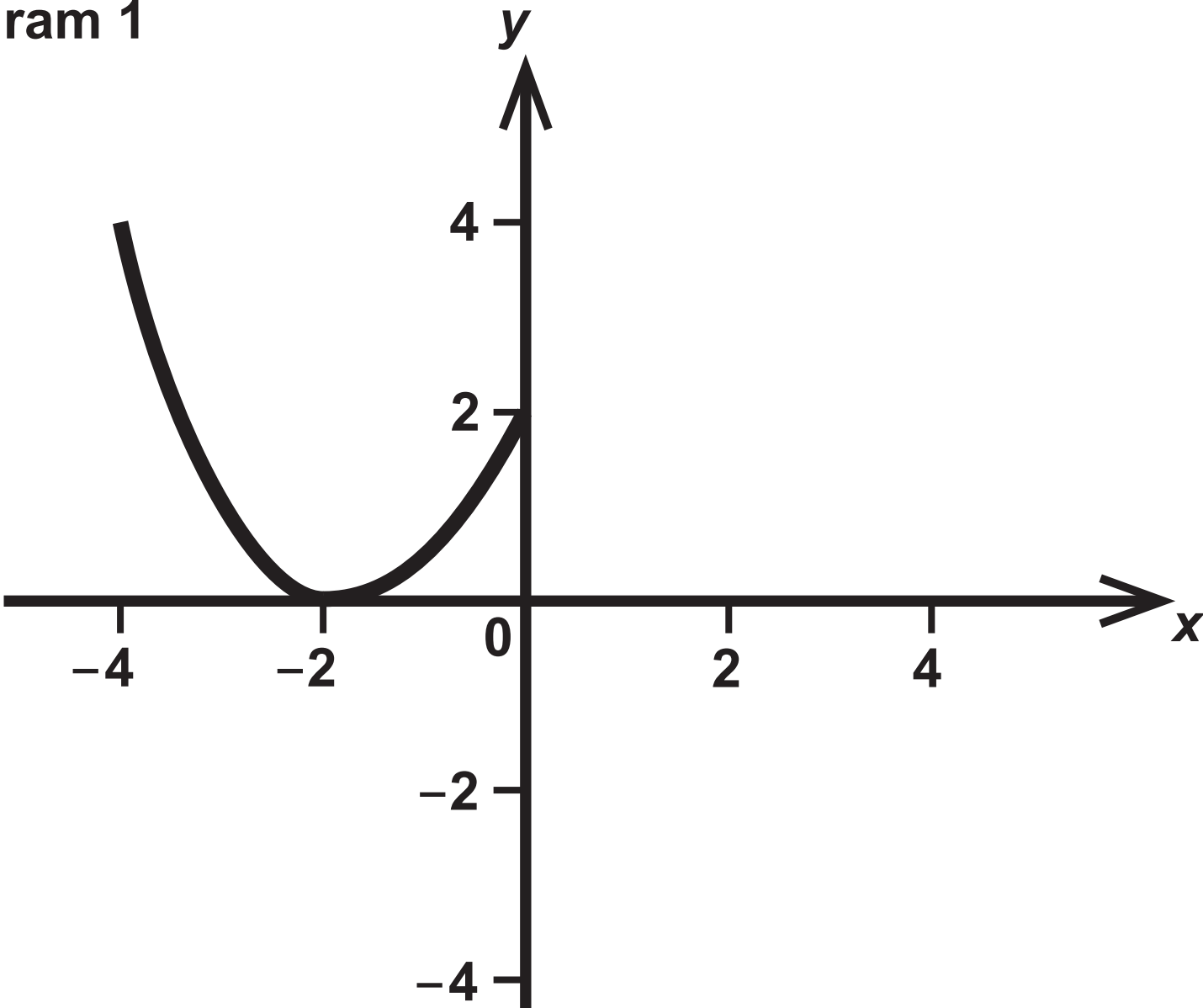
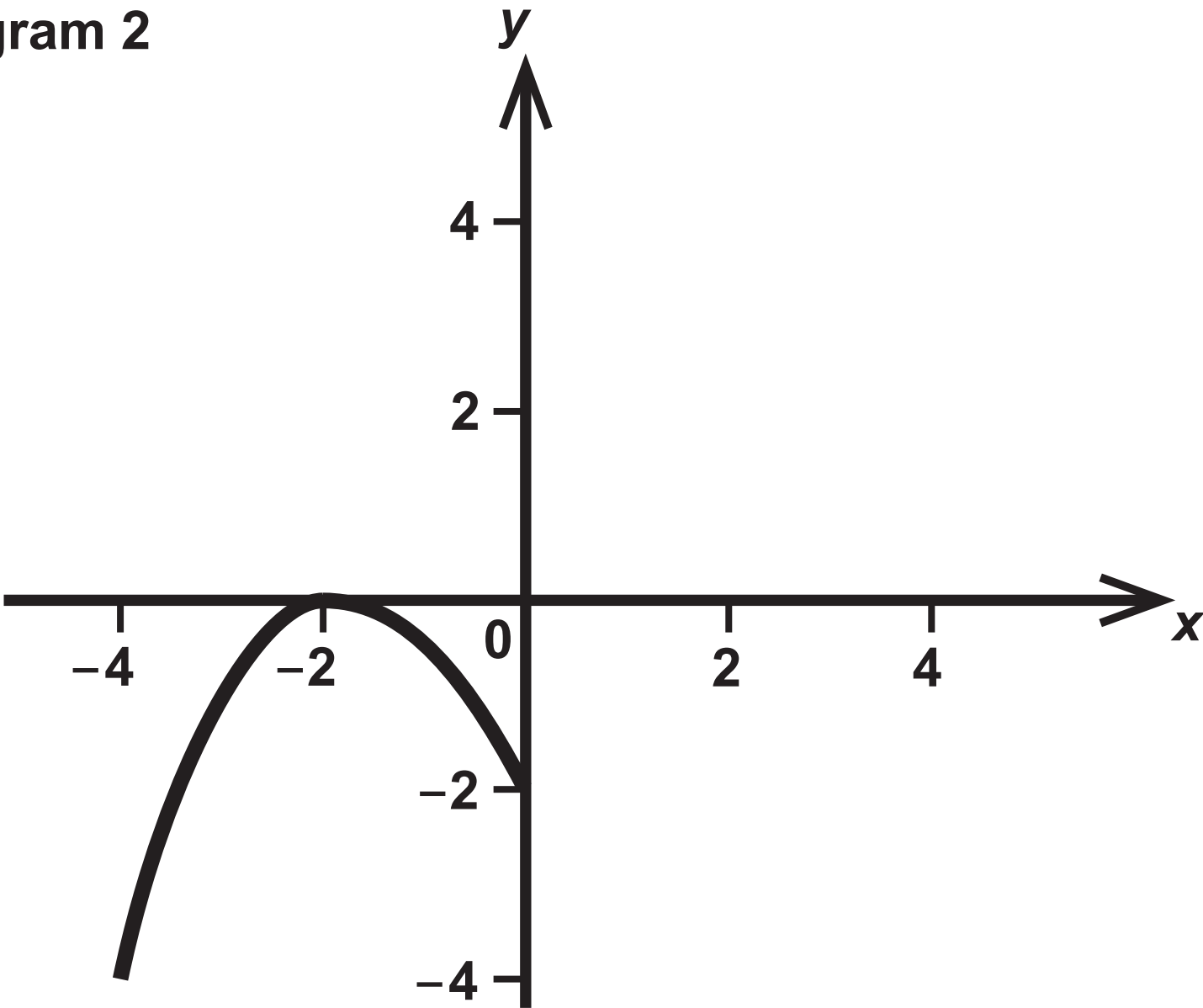


Diagram 2



Question 16 (b)

Diagram 1

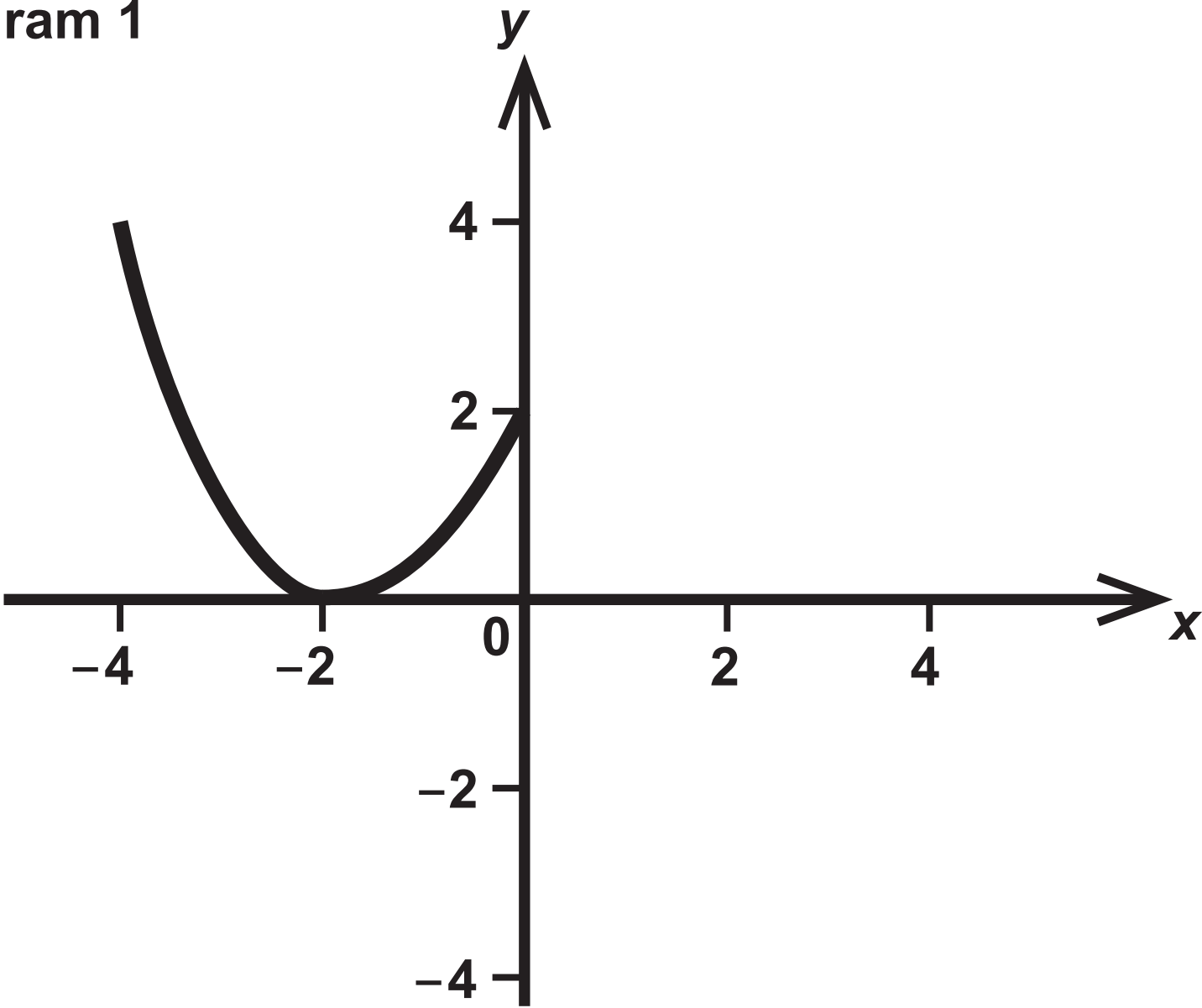
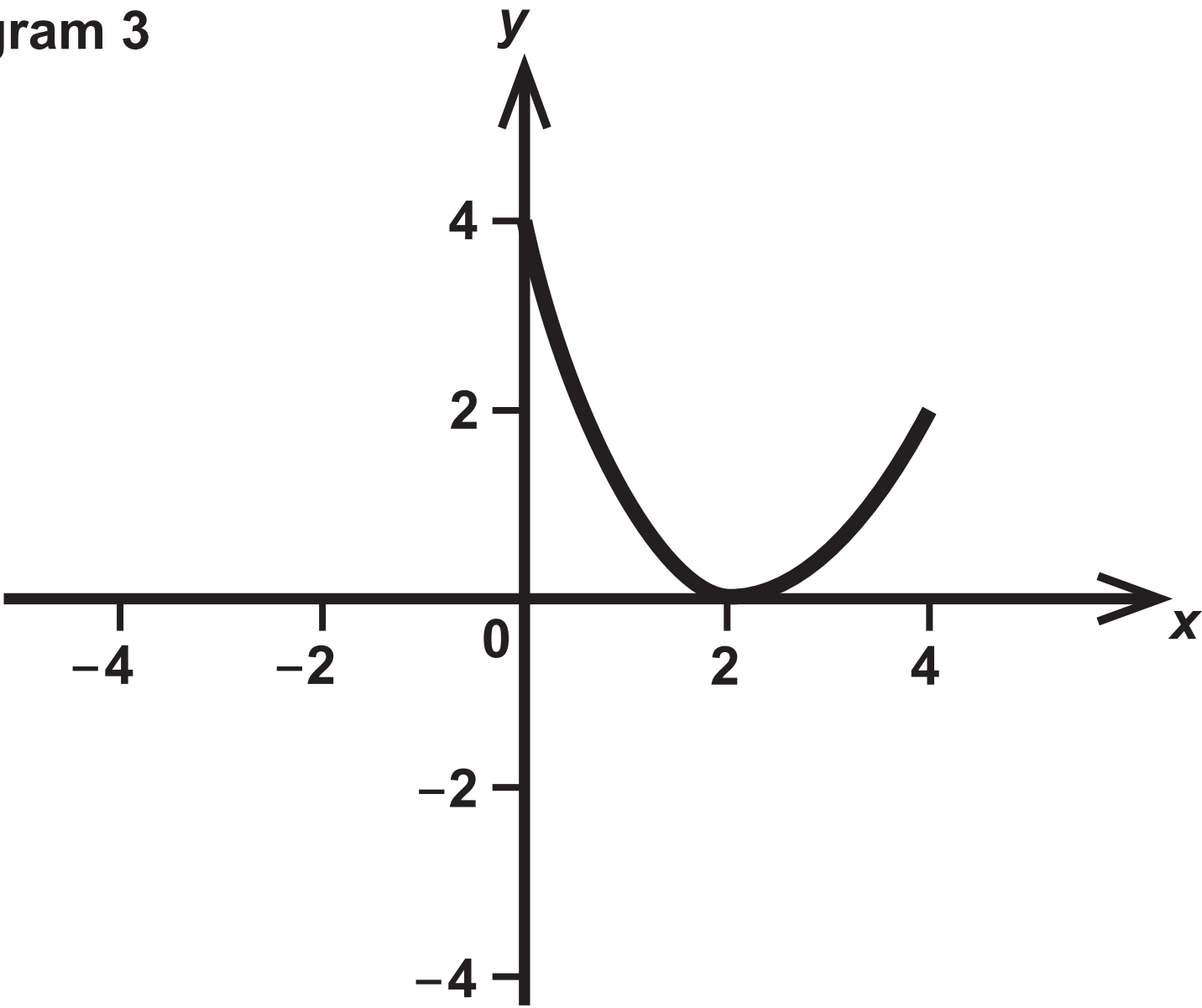


Diagram 3



**GCSE
MATHEMATICS
and
NUMERACY**



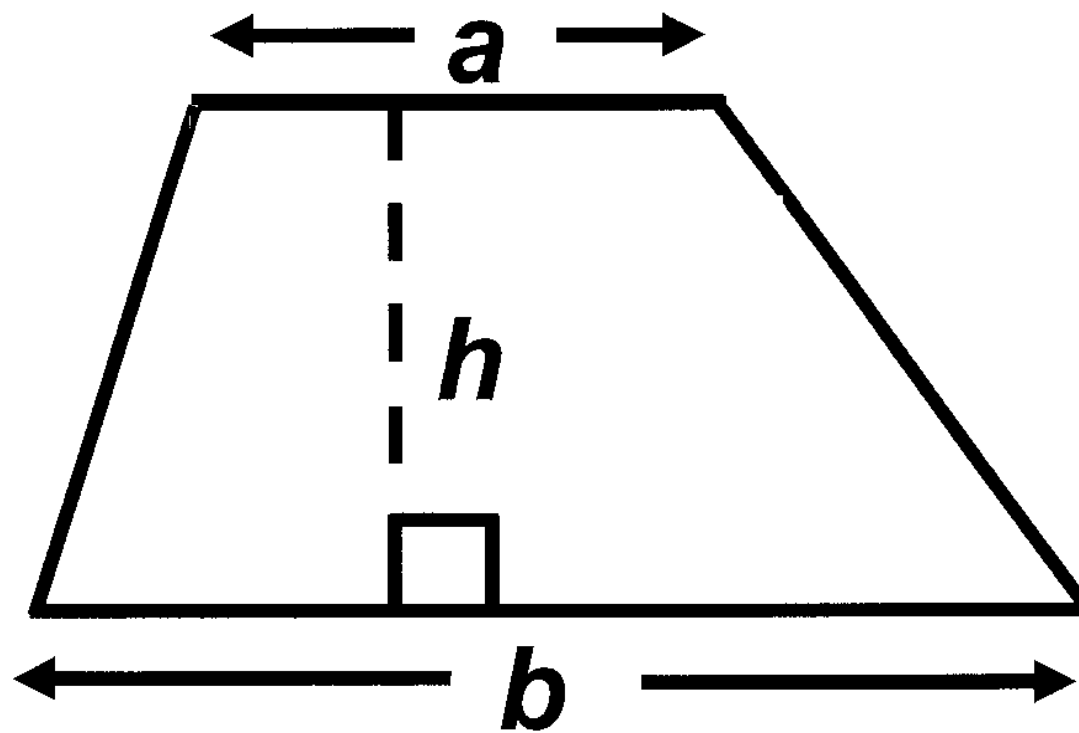
**FORMULA LIST
HIGHER TIER
GCSE**

You must not write on these formula pages.

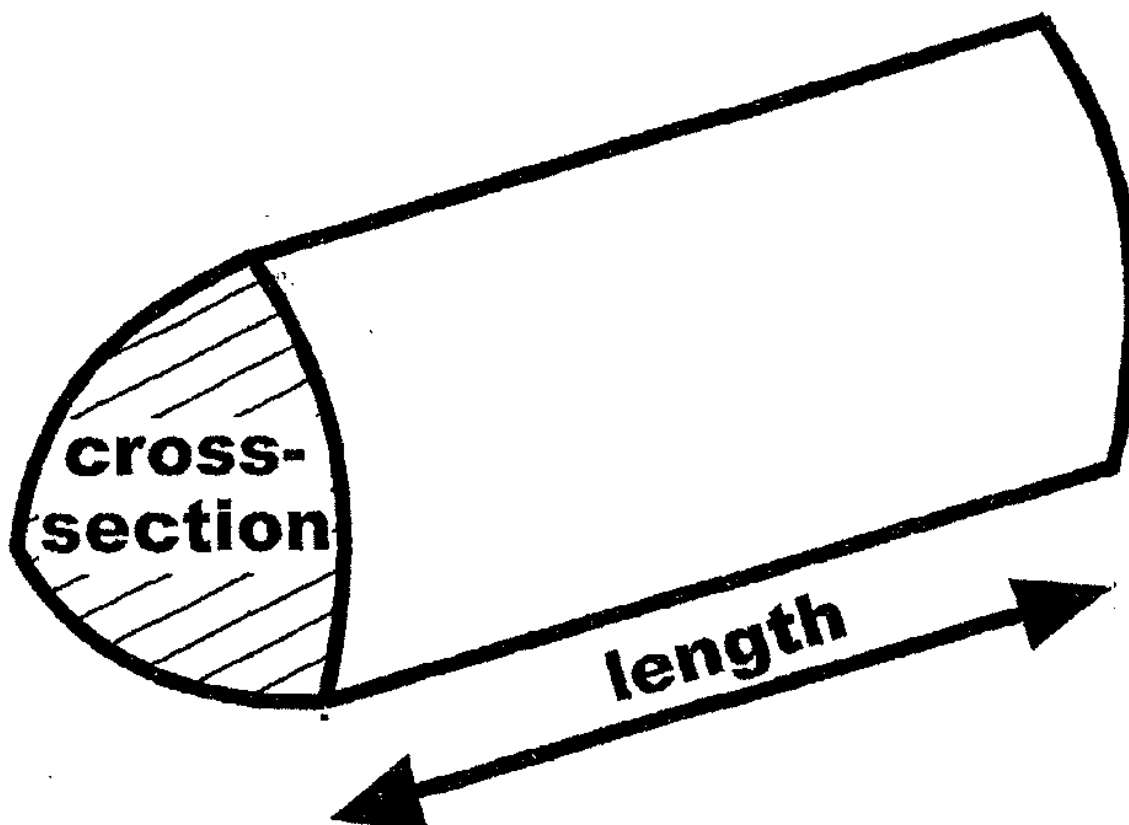
Anything you write on these formula pages will gain NO credit.

Formula List – Higher Tier

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

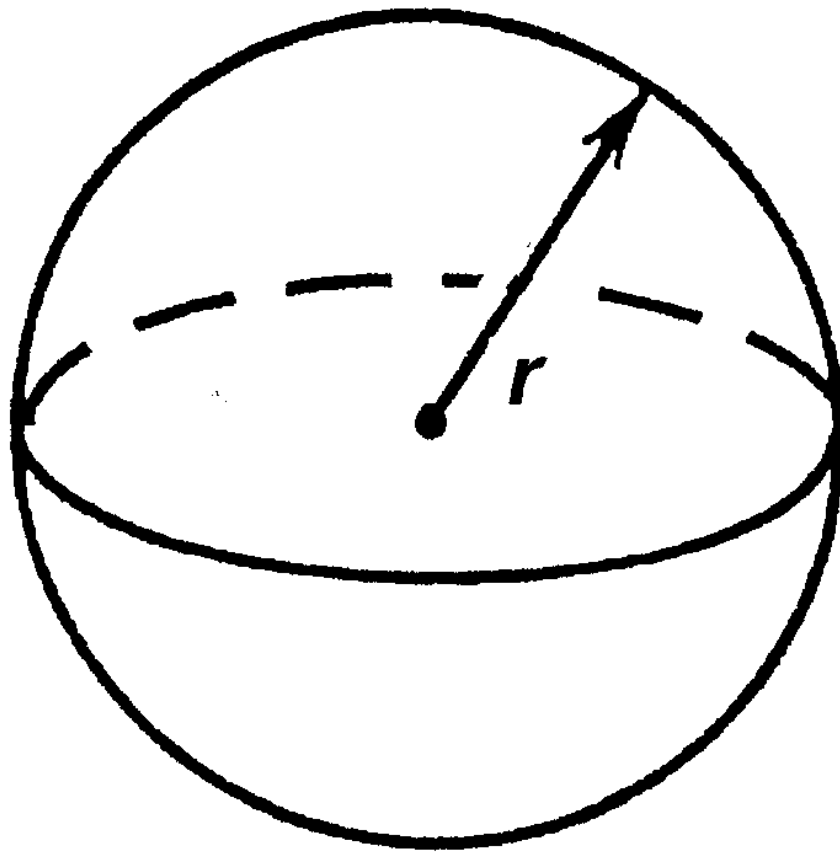


Volume of prism =
area of cross – section $\times$ length



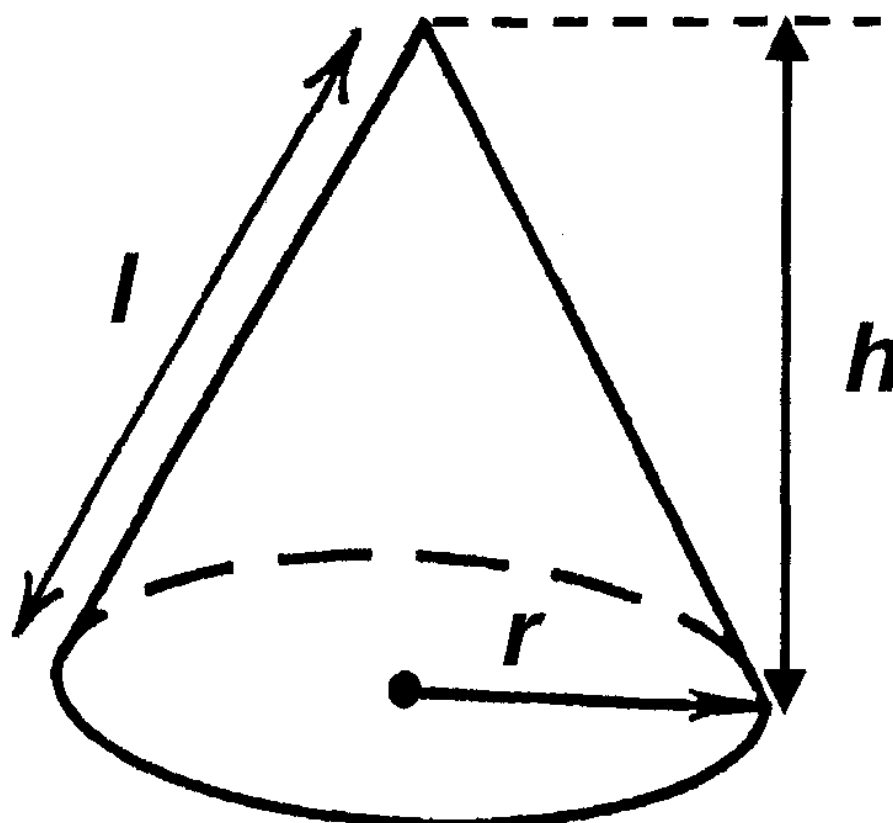
Volume of sphere = $\frac{4}{3}\pi r^3$

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

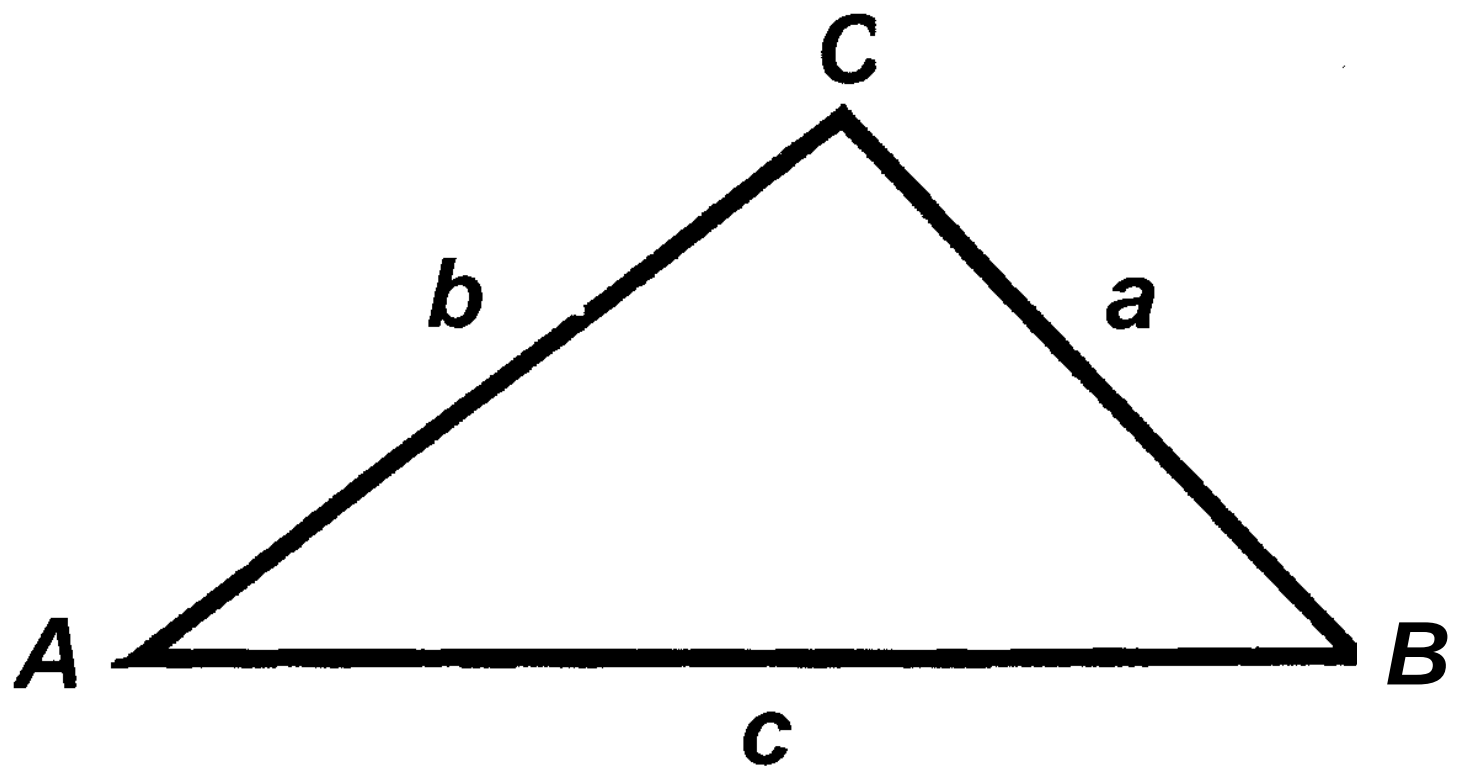


Volume of cone = $\frac{1}{3}\pi r^2 h$

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.