



**GCSE**

**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**

<b>Question</b>	<b>Maximum Mark</b>	<b>Mark Awarded</b>
<b>1.</b>	<b>6</b>	
<b>2.</b>	<b>5</b>	
<b>3.</b>	<b>6</b>	
<b>4.</b>	<b>6</b>	
<b>5.</b>	<b>4</b>	
<b>6.</b>	<b>4</b>	
<b>7.</b>	<b>2</b>	
<b>8.</b>	<b>2</b>	
<b>9.</b>	<b>2</b>	
<b>10.</b>	<b>3</b>	
<b>11.</b>	<b>4</b>	
<b>12.</b>	<b>2</b>	
<b>13.</b>	<b>6</b>	
<b>14.</b>	<b>2</b>	
<b>15.</b>	<b>5</b>	
<b>16.</b>	<b>2</b>	
<b>17.</b>	<b>5</b>	
<b>18.</b>	<b>4</b>	
<b>Total</b>	<b>70</b>	

**(Turn over)**

**ADDITIONAL MATERIALS**

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

**ITEMS INCLUDED WITH QUESTION PAPER**

**A separate Formula Booklet.**

**A separate Diagram Booklet.**

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

**(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 additional page(s) at the back of the booklet. Question numbers must be given for the work written on the additional page(s).**

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

**(Turn over)**

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

The diagram below shows a straight line,  $ABC$ .

The diagram is NOT drawn to scale.



$ABC$  is a straight road, where

the ratio  $AB : BC = 3 : 4$

$AC = 56$  km.

continued on the next page . . .

(Turn over)





**2. Look at the table for Question 2 in the separate Diagram Booklet. The table shows some of the values of  $y = x^2 + x - 4$  for values of  $x$  from  $-3$  to  $3$**

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

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**[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  $3$**

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**[2 marks]****(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.**

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**$x =$  \_\_\_\_\_ **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.**

**continued on the next page . . .**

**(Turn over)**

**Question 3 continued**

**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?**

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**(Turn over)**



**14**

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**[6 marks]**

**(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.**

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**[4 marks]**

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

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**(Turn over)**

**17**

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**[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  $CE$ .

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(Turn over)

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**[2 marks]**

**continued on the next page . . .**

**(Turn over)**











**25**

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**[4 marks]**

**(Turn over)**

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

(a)  $7.2 \text{ m}^3$  is equal to

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

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[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)**



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**[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]

continued on the next page . . .

(Turn over)

**Question 9 continued**

- 9. (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]**

**(Turn over)**





**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?**

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**(Turn over)**





**37**

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**[4 marks]**

**(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]**

**(Turn over)**

**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).**

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**(Turn over)**





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**[6 marks]**

**(Turn over)**

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

**Simplify your answer.**

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**[2 marks]**

**(Turn over)**

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

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(Turn over)





**47**

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**[5 marks]**

**(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 . . .**

**(Turn over)**

**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]**

**(Turn over)**

**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.**

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**(Turn over)**







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**[3 marks]**

**(Turn over)**



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**[4 marks]**

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**END OF PAPER**

**TOTAL 70 MARKS**

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**(Turn over)**









**GCSE**

**3300U50-1**

**TUESDAY, 24 MAY 2022 – MORNING**

**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:** \_\_\_\_\_

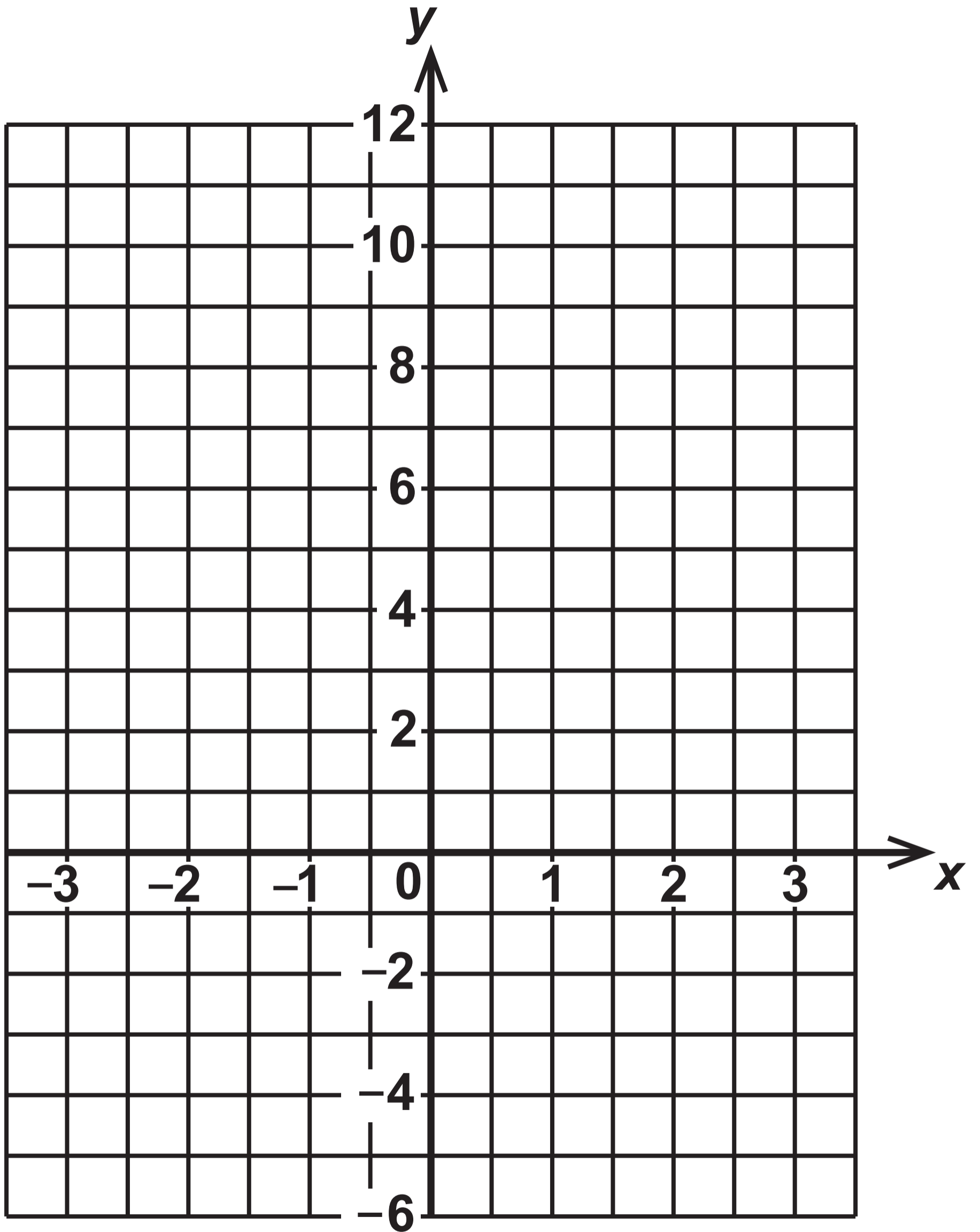
**Candidate Number:** 0 \_\_\_\_\_

## Question 2

### Table

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

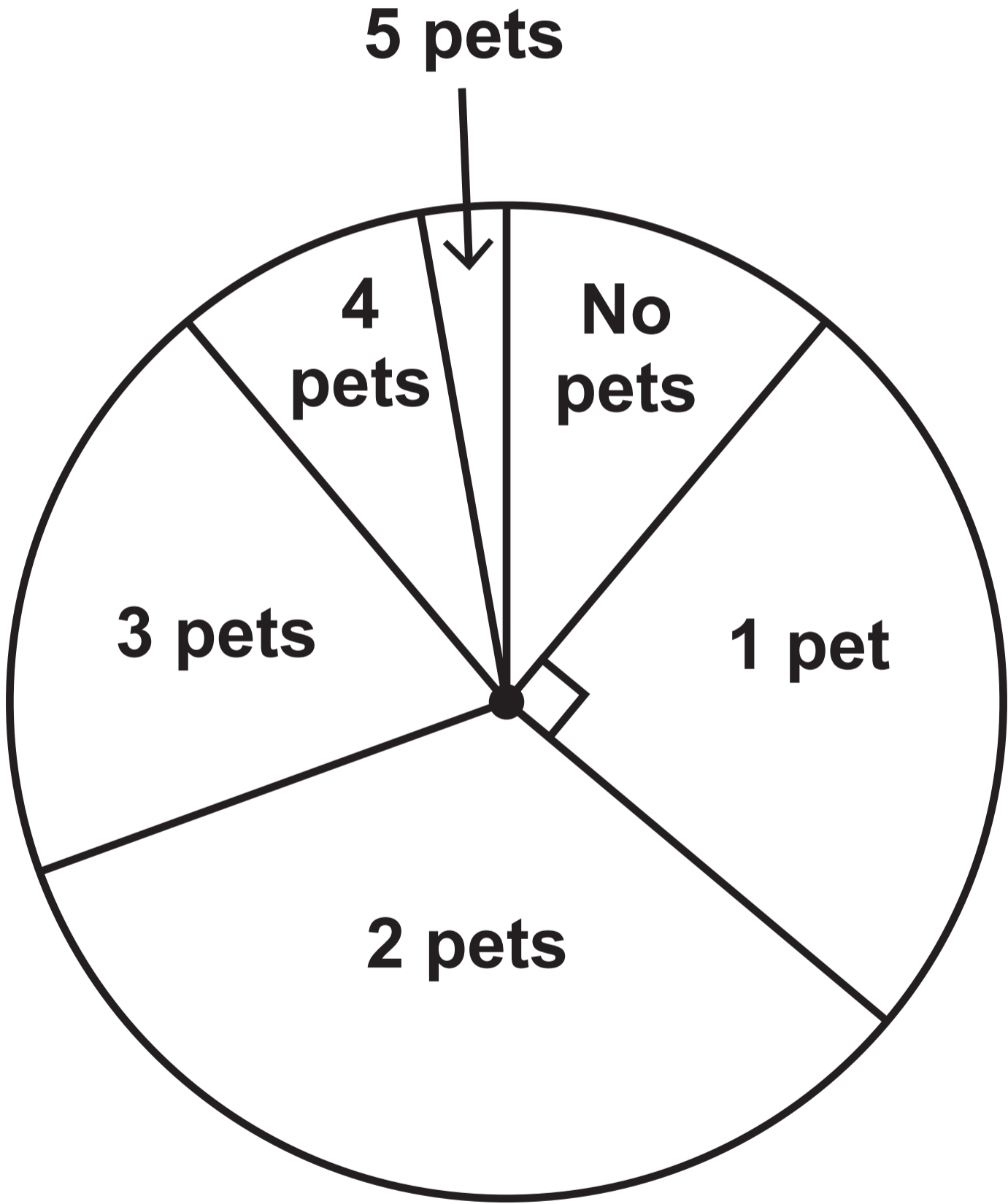
## Question 2 (b)



# Question 3

## Diagram 1

**YEAR 5**

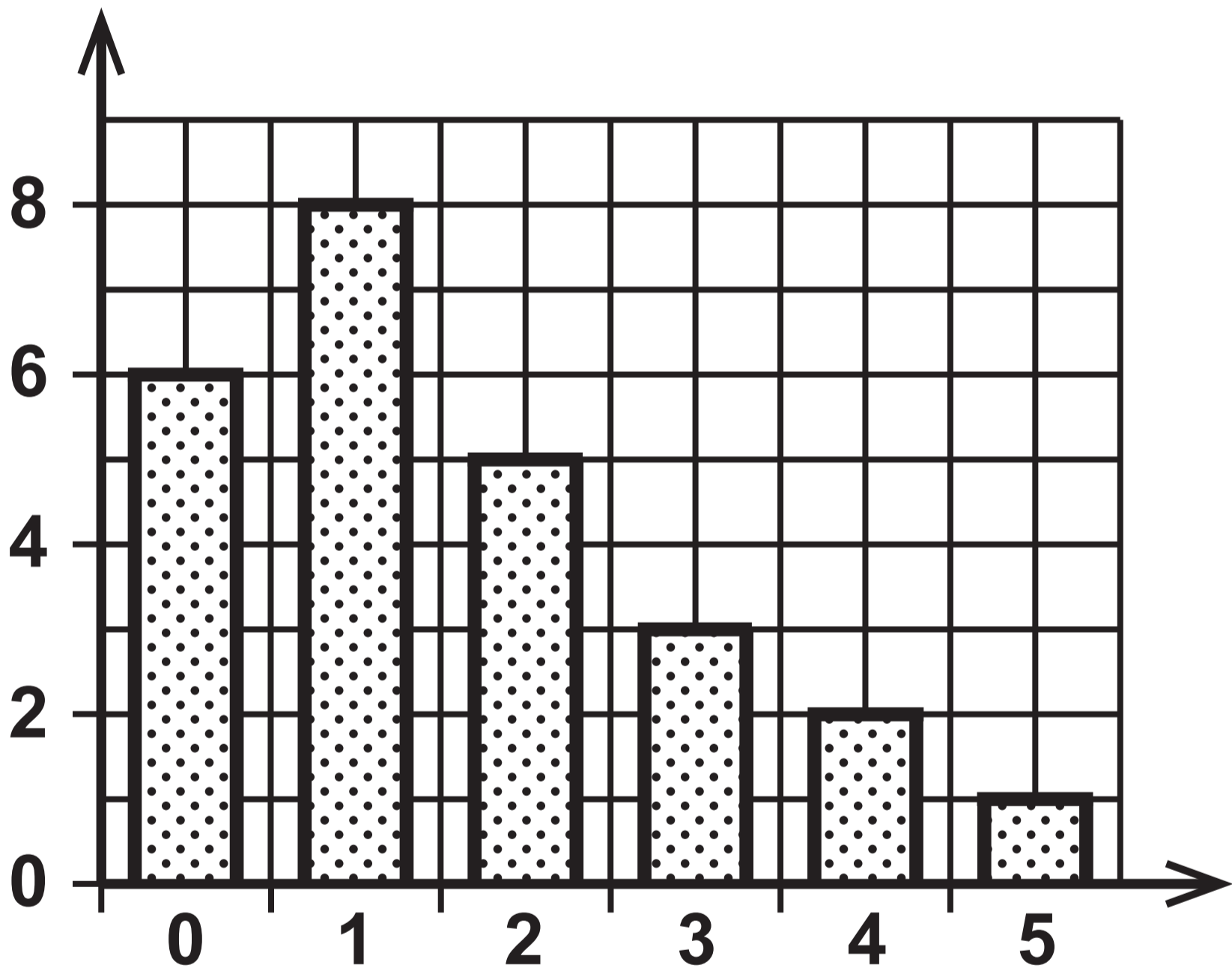


# Question 3

## Diagram 2

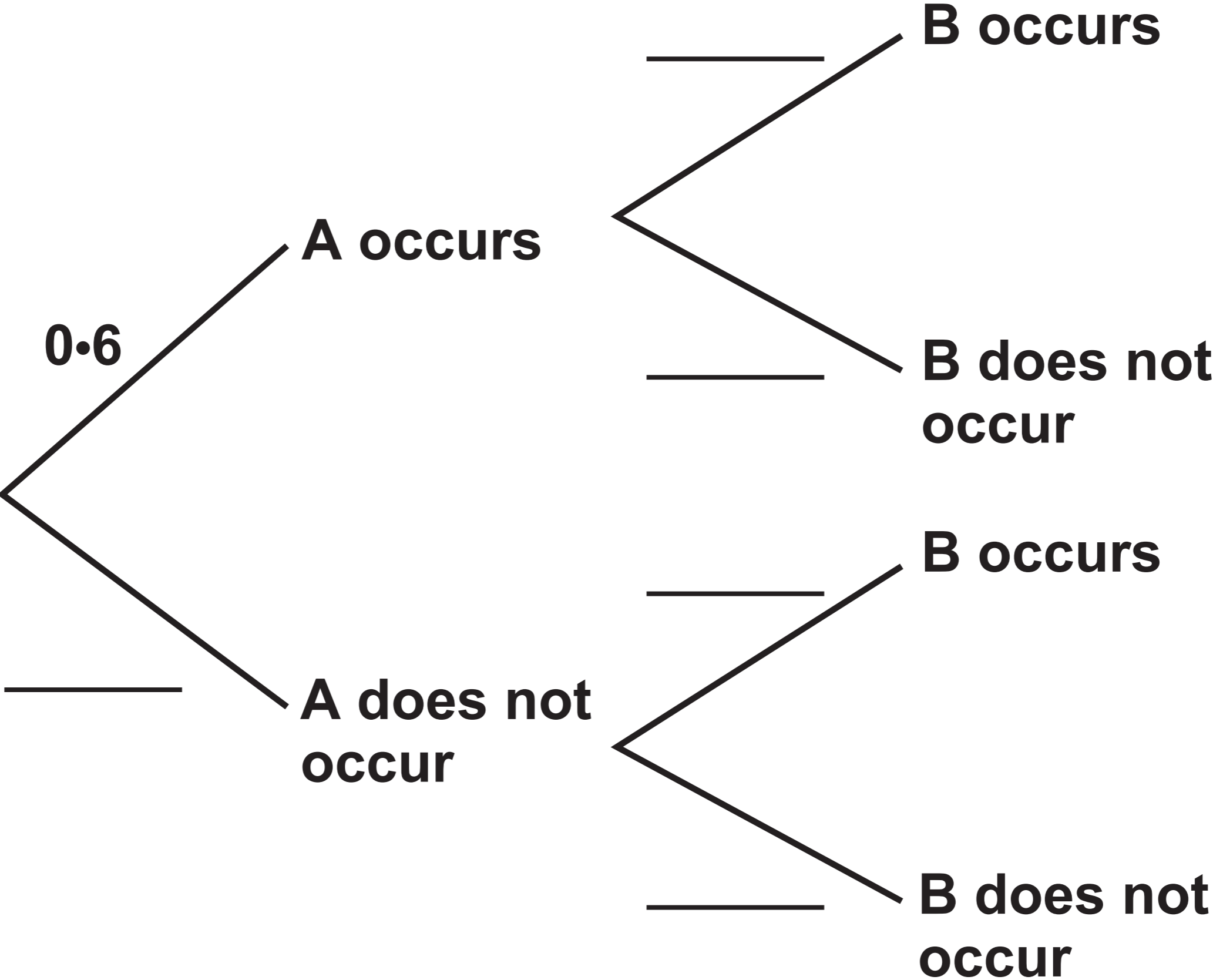
YEAR 6

Frequency



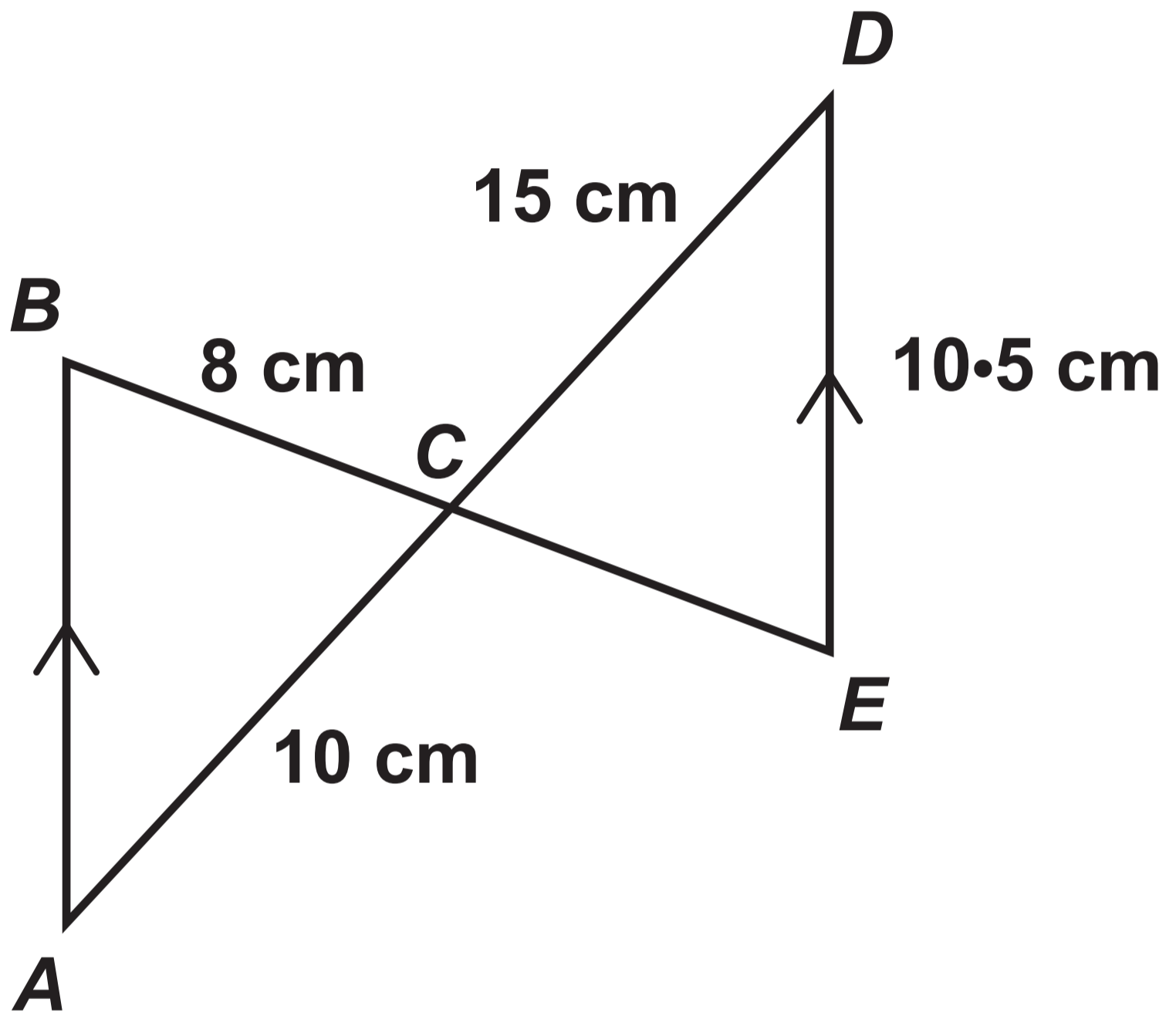
Number of pets

# Question 4

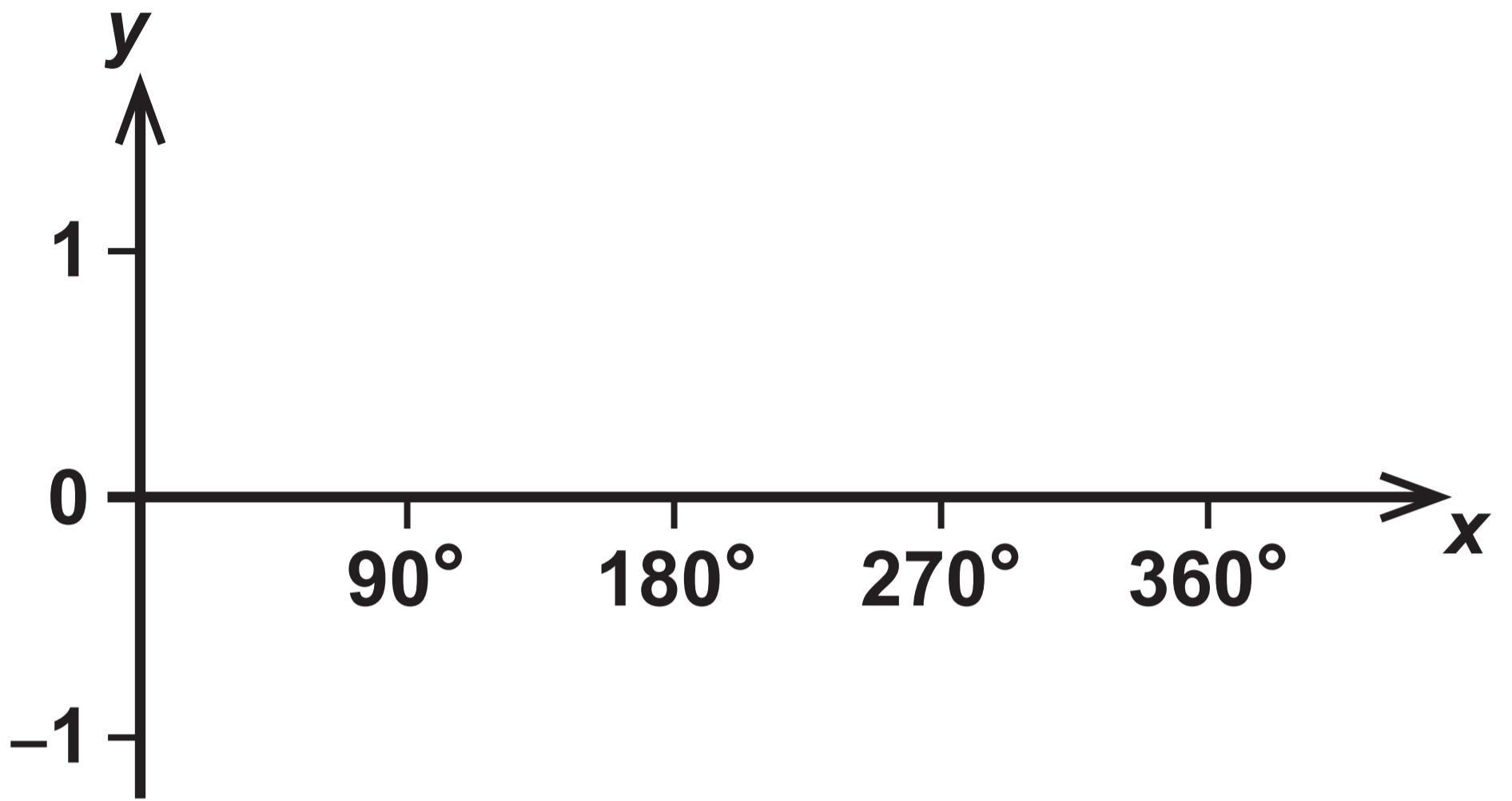


# Question 5

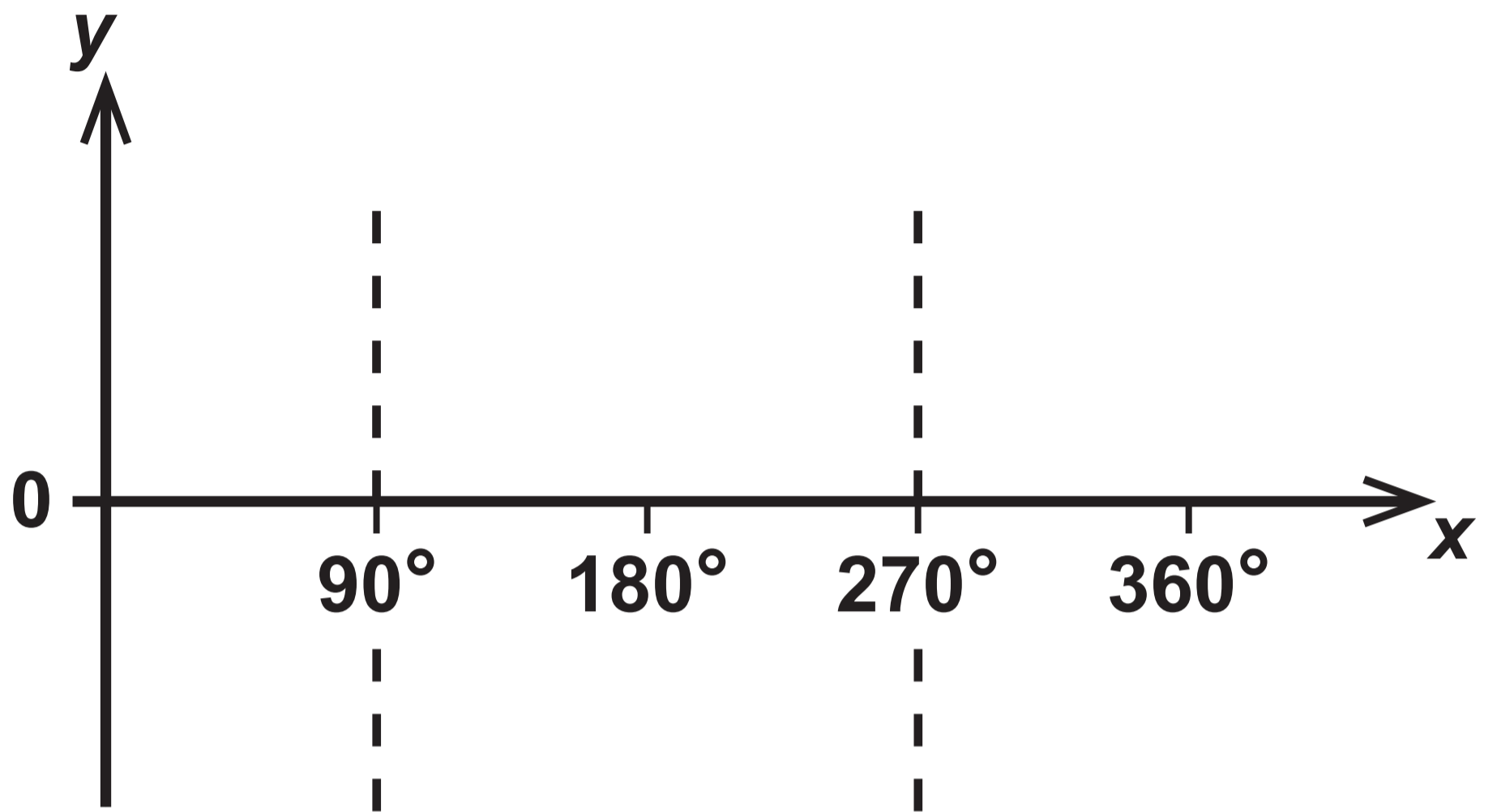
Diagram NOT drawn to scale



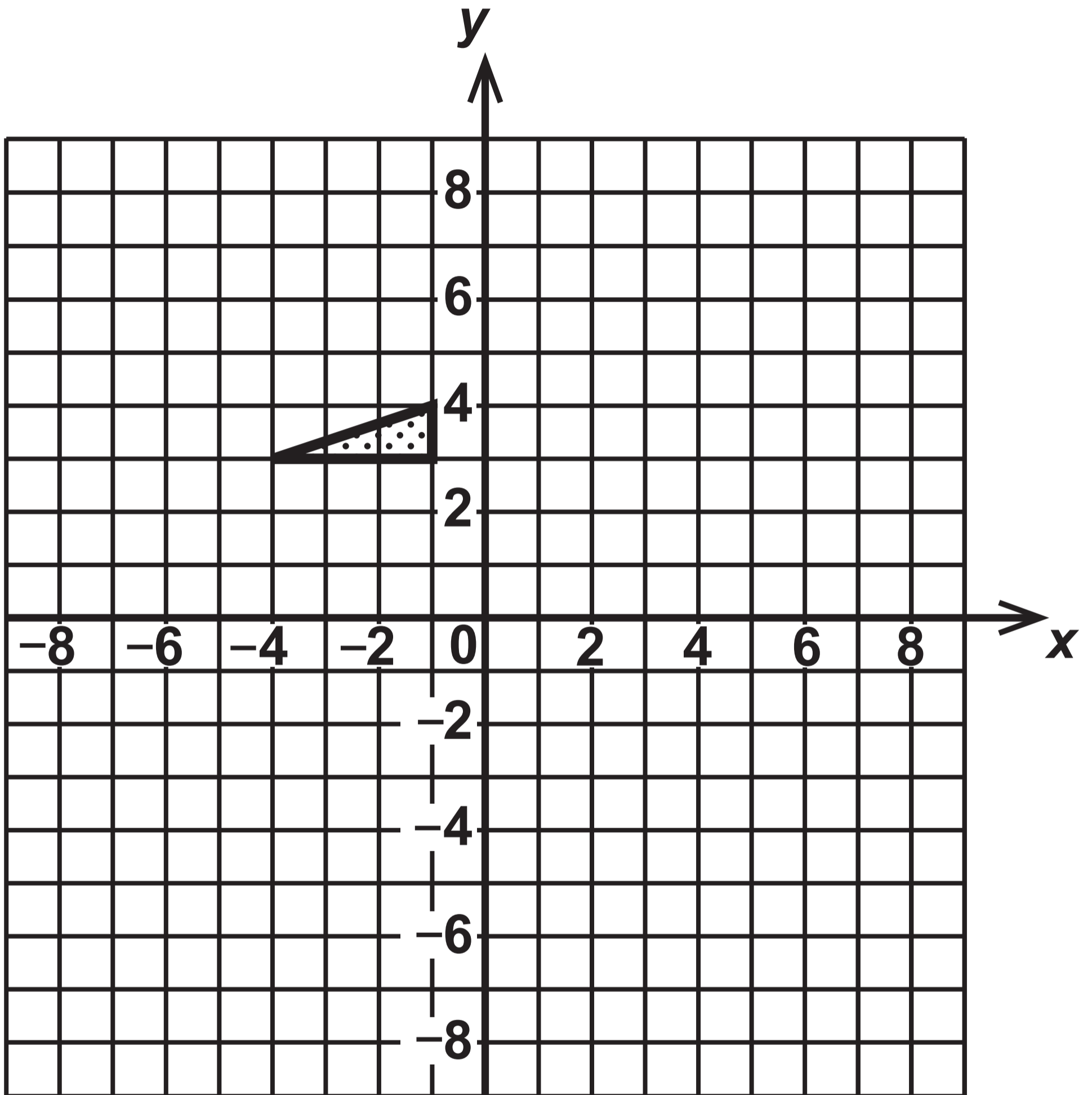
# Question 9 (a)



# Question 9 (b)

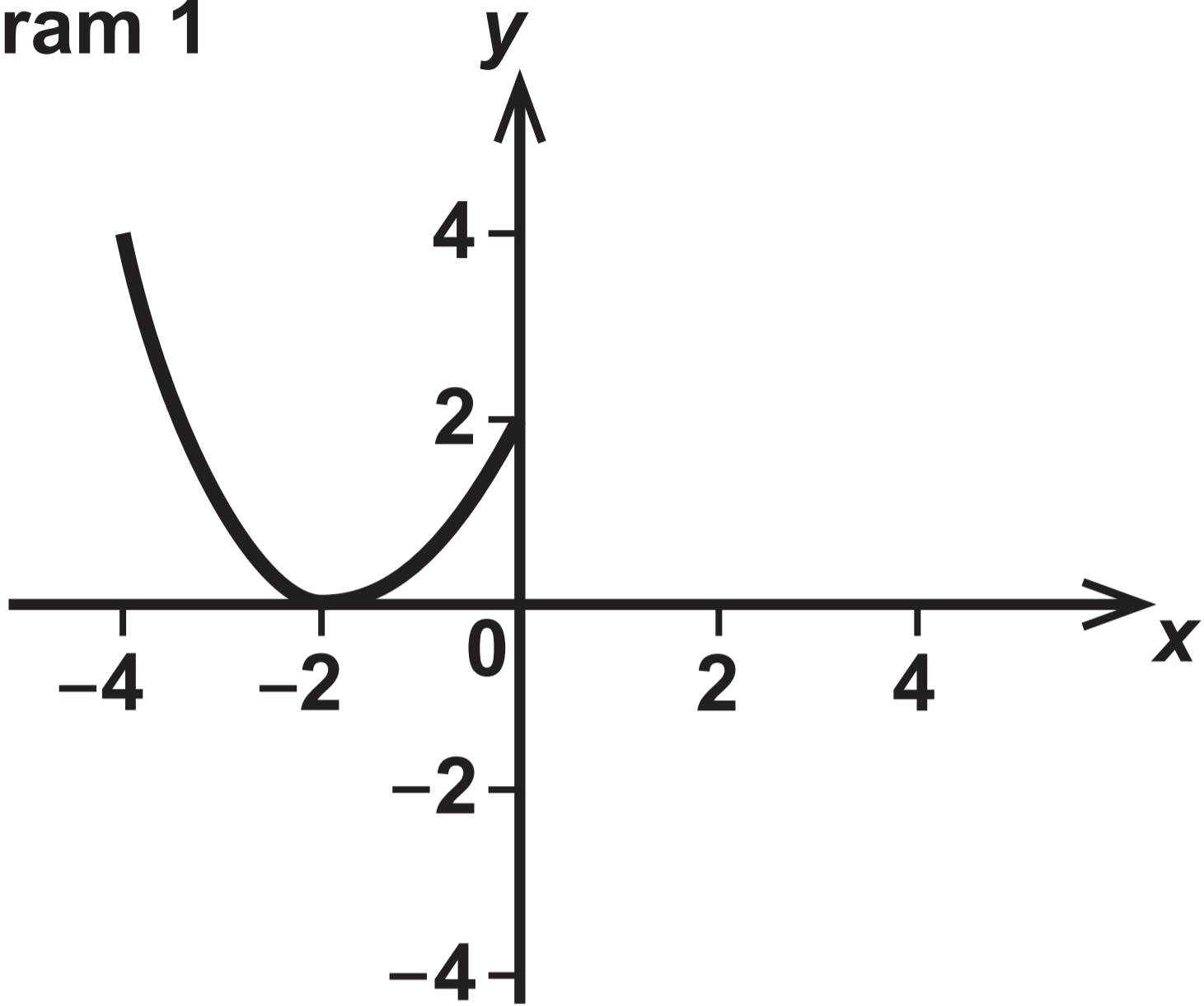


# Question 12

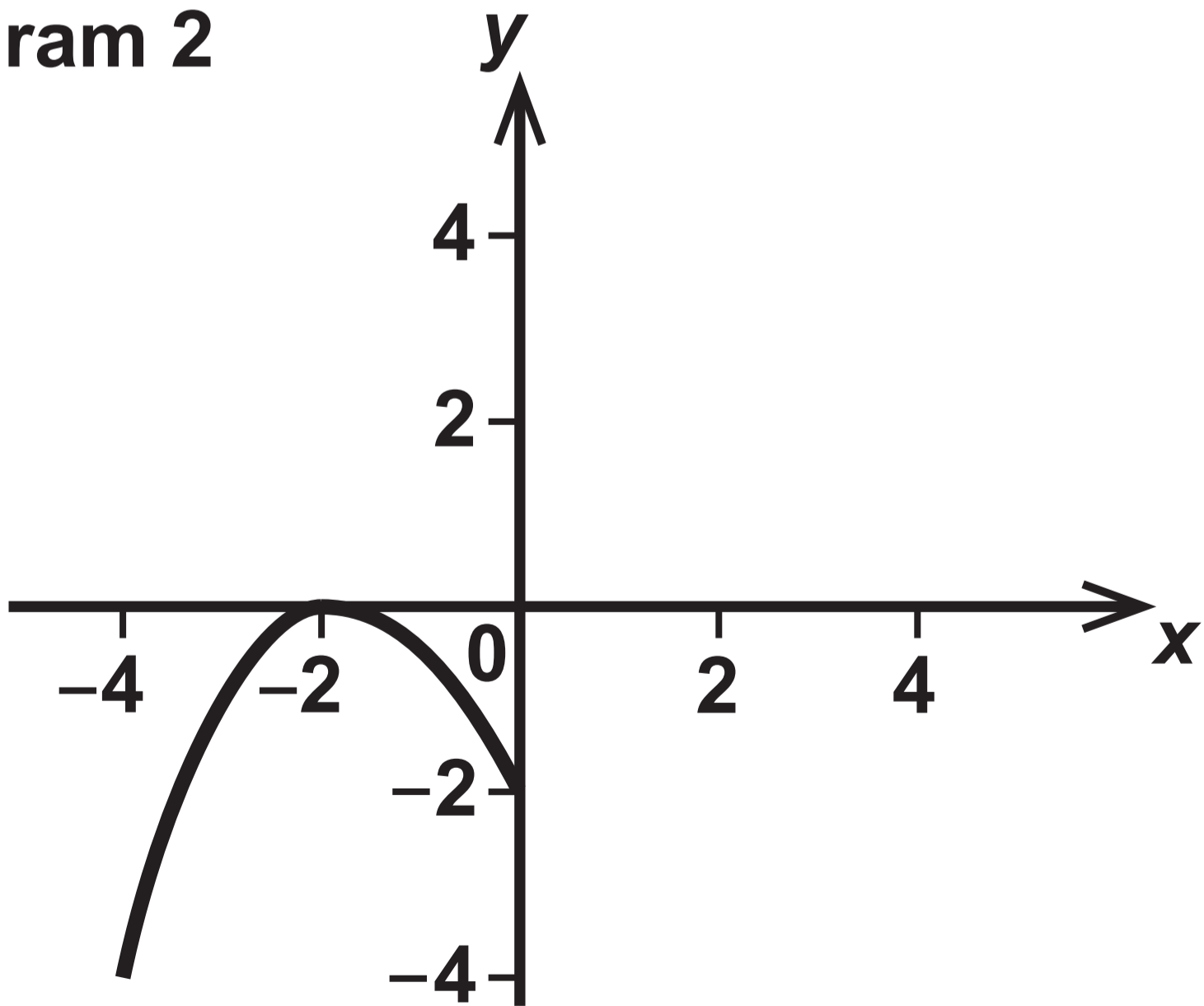


# Question 16 (a)

## Diagram 1

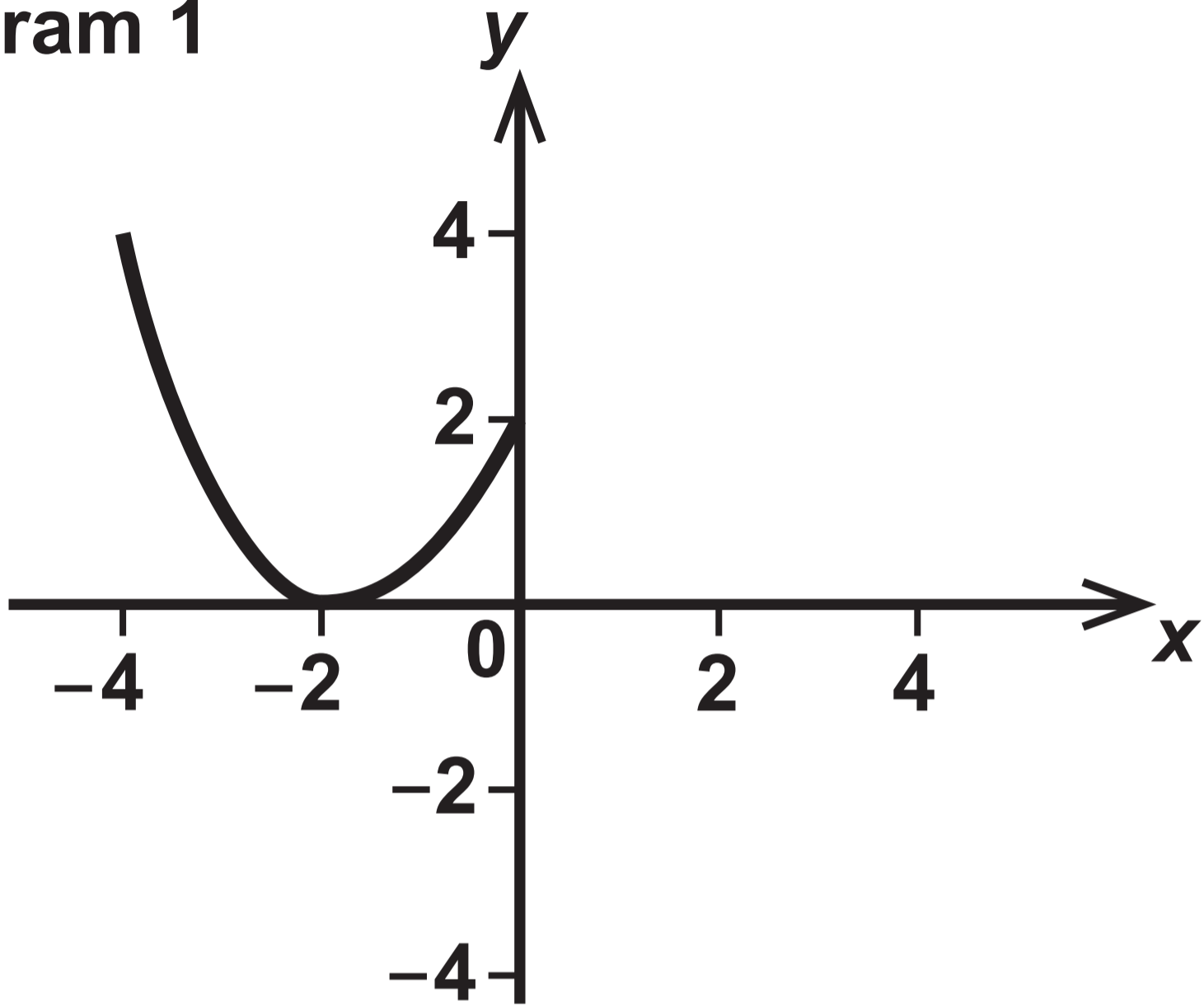


## Diagram 2

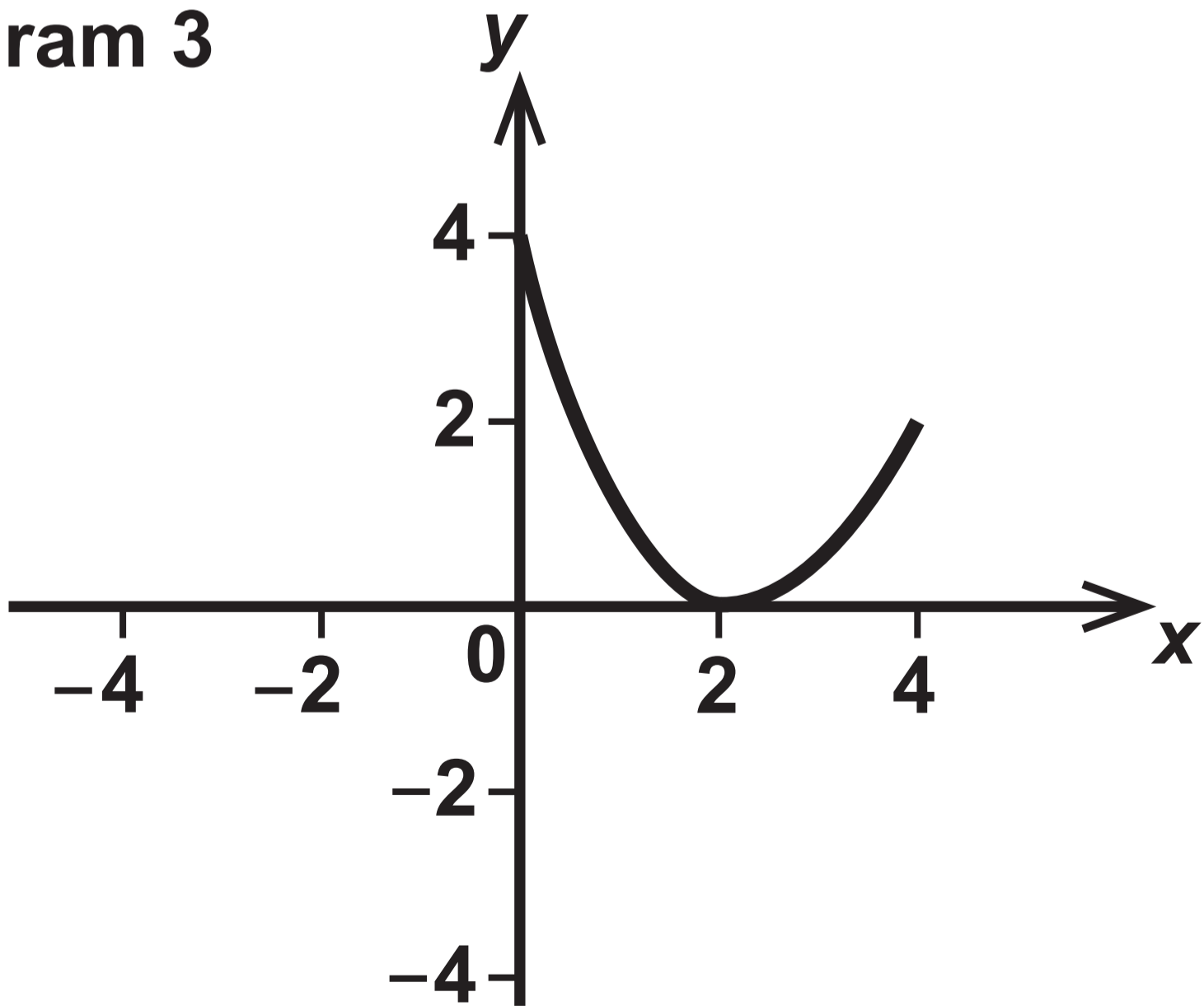


# Question 16 (b)

## Diagram 1



## Diagram 3



**GCSE  
MATHEMATICS  
and  
NUMERACY**

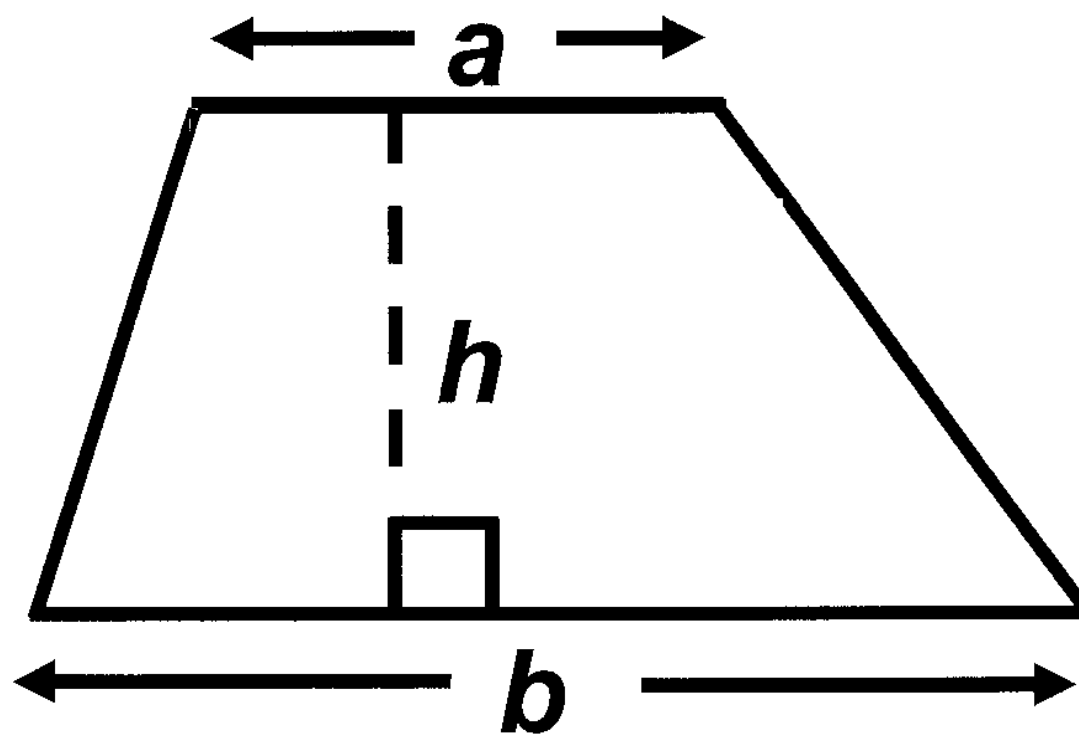
**FORMULA LIST  
HIGHER TIER  
GCSE**

**You must not write on these formula pages.**

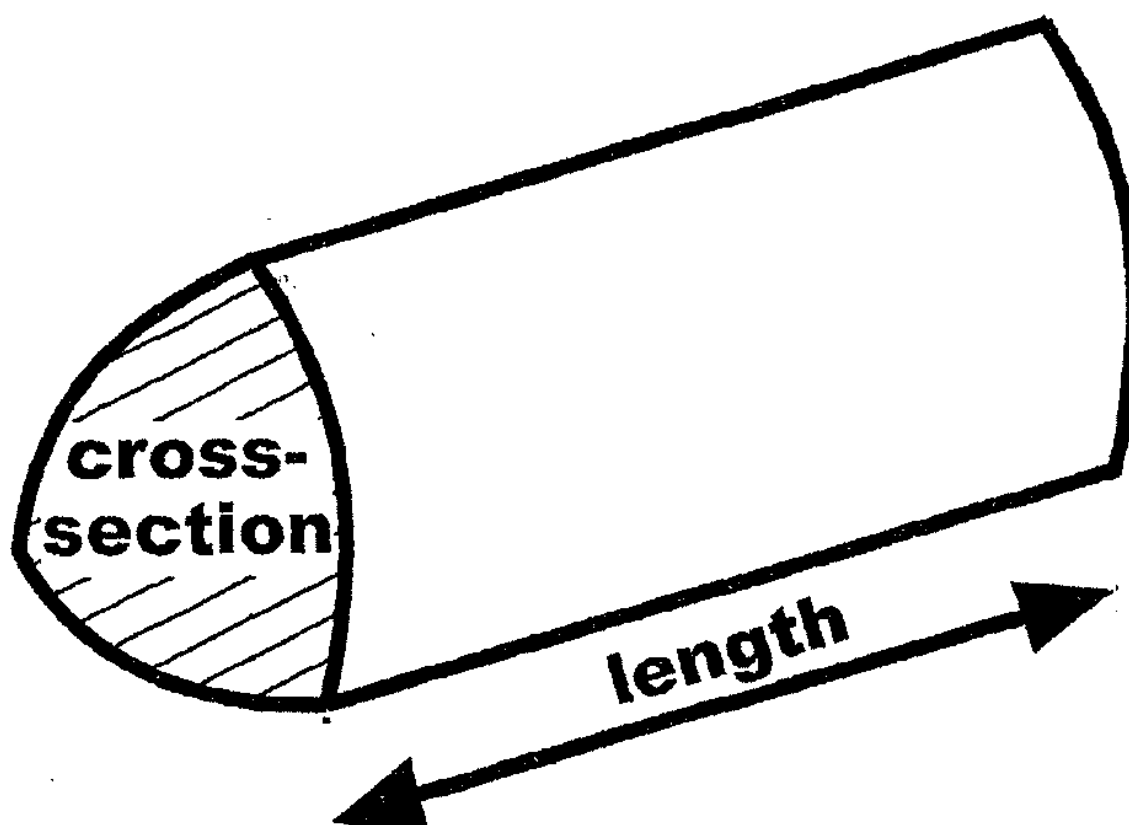
**Anything you write on these formula pages will gain NO credit.**

## Formula List – Higher Tier

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

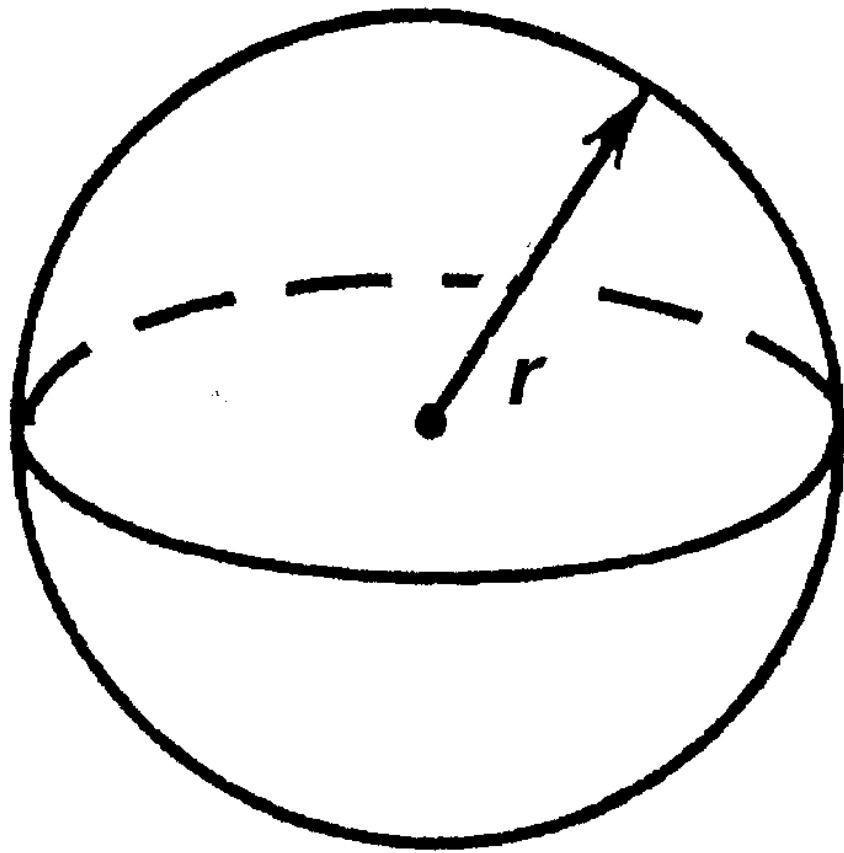


Volume of prism =  
area of cross – section  $\times$  length



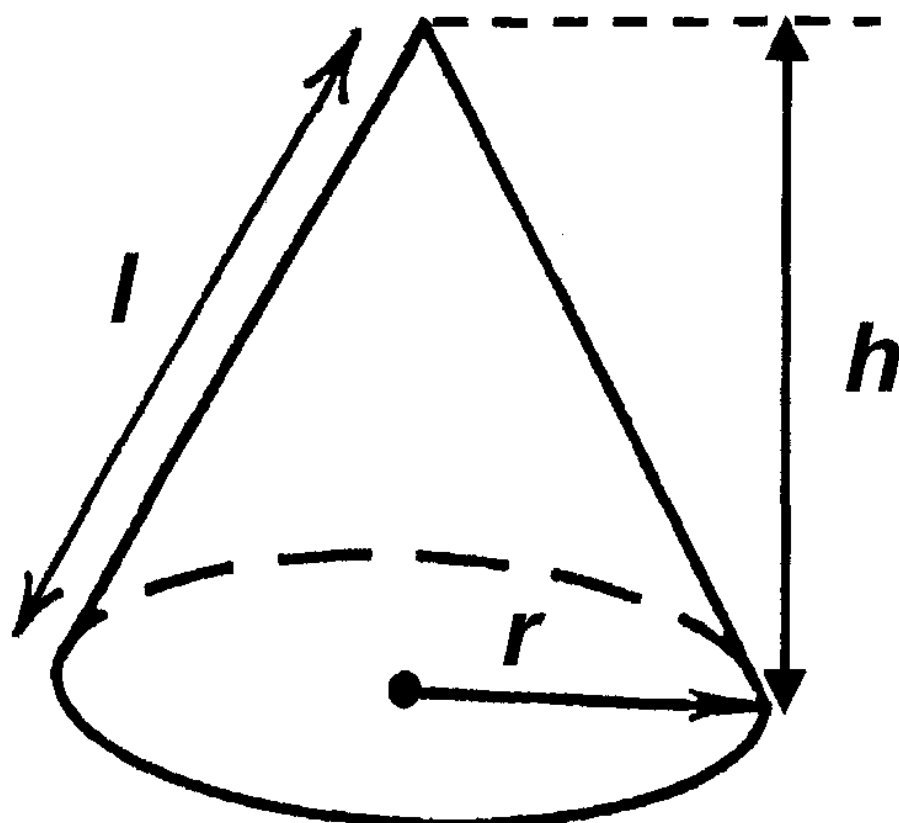
**Volume of sphere =  $\frac{4}{3}\pi r^3$**

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

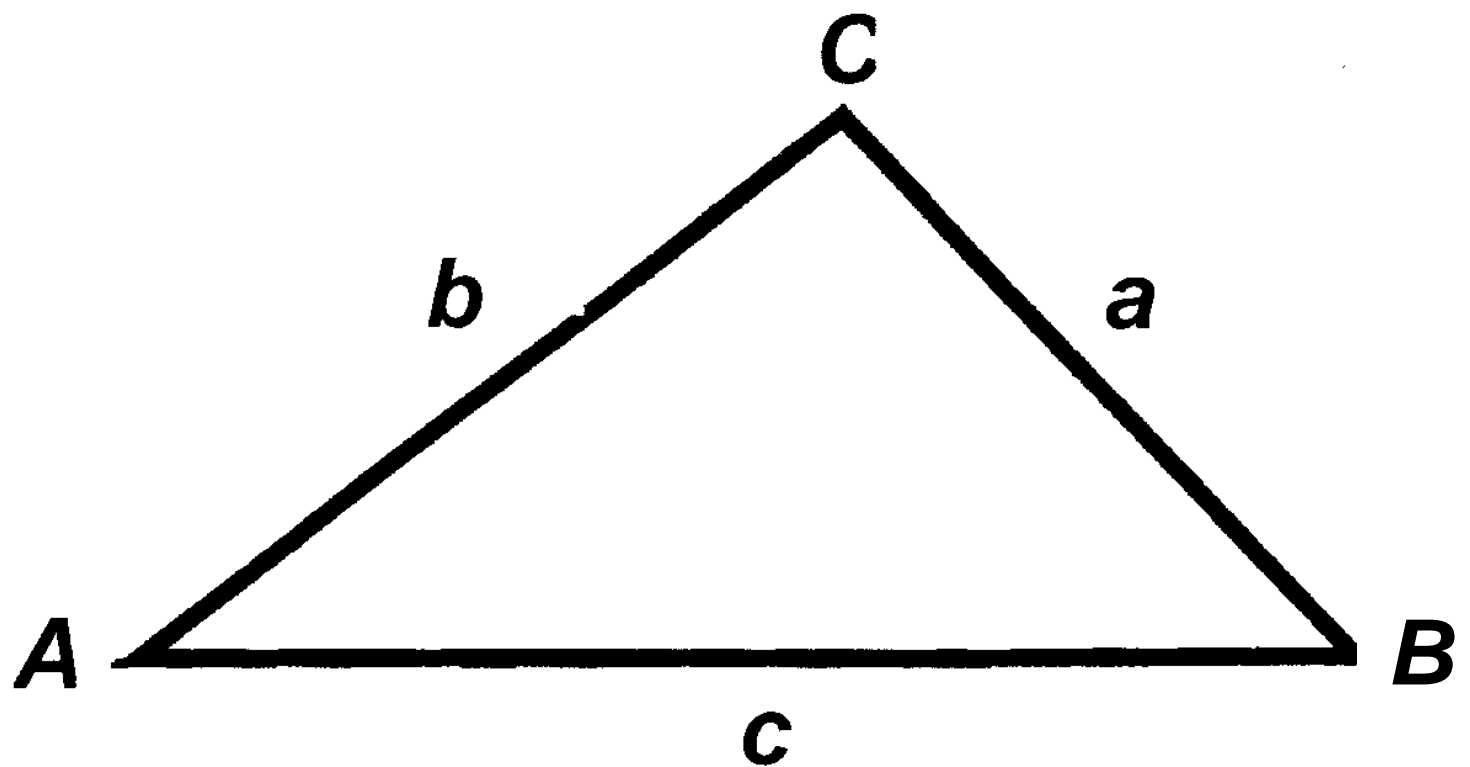


**Volume of cone =  $\frac{1}{3}\pi r^2 h$**

**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.