



GCSE

3300U50 –1

THURSDAY, 15 MAY 2025 – 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.	6	
2.	6	
3.	6	
4.	4	
5.	3	
6.	4	
7.	6	
8.	2	
9.	2	
10.	3	
11.	4	
12.	2	
13.	3	
14.	3	
15.	5	
16.	3	
17.	2	
18.	4	
19.	5	
20.	7	
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.

A model for Question 14.

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 the questions in the spaces provided.

If you run out of space, use the additional page(s) at the back of this booklet.

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

Take π as $3 \cdot 14$

(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. Look at the diagram for Question 1 in the separate Diagram Booklet. The diagram shows a Venn diagram.

A group of 100 pupils attended their school sports day.

13 pupils did not compete in either Track or Field events.

The expressions in the Venn diagram represent the number of pupils in each category.

The universal set, $\mathcal{E}$, contains all the pupils.

(a) Find the value of y .

(Turn over)

6

[illegible]

[4 marks]

continued on the next page . . .

(Turn over)

Question 1 continued

- 1. (b) One pupil is chosen at random from the group.**

What is the probability that this pupil competed only in Track events?

(Turn over)

8

[2 marks]

(Turn over)

- 2. Look at the table for Question 2 in the separate Diagram Booklet. The table shows some of the values of $y = 2x^2 - 6$ for values of x from -3 to 2**

- (a) Complete the table in the separate Diagram Booklet.**

[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 $y = 2x^2 - 6$ for values of x from -3 to 2**

[2 marks]

continued on the next page . . .

(Turn over)

Question 2 continued

- 2. (c) Draw the line $y = 1$ on the same graph.**

**Write down the values of x where
the line $y = 1$ cuts the curve
 $y = 2x^2 - 6$**

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

$x =$ _____ and $x =$ _____

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

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

A mass is shared in the ratio 3 : 5

The larger share is 44 lb (pounds).

Calculate the total mass.

Give your answer in kilograms (kg).

You must show all your working.

(Turn over)

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(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)

15

[4 marks + 2 marks OCW]

(Turn over)

4. The mean of five whole numbers is 20

**The mean of three of these numbers
is 22**

**The other two numbers have a
difference of 6**

Find THE OTHER TWO numbers.

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)

18

[4 marks]

(Turn over)

5. Look at the diagram for Question 5 in the separate Diagram Booklet.

The diagram shows the graph of a straight line for values of x from -2 to 2

(a) Write down the gradient of the straight line in the diagram.

Gradient is _____

[1 mark]

continued on the next page . . .

(Turn over)

Question 5 continued

- 5. (b) Write down the equation of the straight line in the form $y = mx + c$, where m and c are whole numbers.**

[1 mark]

continued on the next page . . .

(Turn over)

Question 5 continued

- 5. (c) Write down the equation of a different straight line that is parallel to the straight line in the diagram.**

[1 mark]

(Turn over)

6. Look at the diagram for Question 6 in the separate Diagram Booklet.

**The diagram shows four patterns:
Pattern 1, Pattern 2, Pattern 3 and
Pattern 4**

**Shaded tiles are used to make the
patterns as shown in the diagram.**

**(a) How many shaded tiles would you
need to make Pattern n ?**

(Turn over)

[2 marks]

continued on the next page . . .

(Turn over)

Question 6 continued

- 6. (b) What is the number of the pattern you would make when you use exactly 147 shaded tiles?**

(Turn over)

25

[2 marks]

(Turn over)

**7. 5 kg of cherries and 7 kg of grapes
cost £88**

**2 kg of cherries and 3 kg of grapes
cost £36**

The cost of 1 kg of cherries is £ x .

The cost of 1 kg of grapes is £ y .

**Use an algebraic method, not trial and
improvement, to find the total cost of**

$\frac{1}{2}$ kg of cherries and 6 kg of grapes.

You must show all your working.

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)

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)

The total cost of $\frac{1}{2}$ kg of cherries and
6 kg of grapes is £ _____

[6 marks]

(Turn over)

- 8. The length of each side of a square is 15 cm, correct to the nearest 1 cm. Calculate the greatest possible perimeter of this square.**

[2 marks]

(Turn over)

9. Factorise $x^2 - 11x + 24$

[2 marks]

(Turn over)

10. Look at the diagram for Question 10 in the separate Diagram Booklet.
The diagram is NOT drawn to scale.
In the diagram, $ABCD$ and $ABCE$ are cyclic quadrilaterals.

$$\text{Angle } ABC = y$$

$$\text{Angle } AEC = x$$

$$\text{Angle } ADC = 79^\circ$$

- (a) Find the size of angle x .

$$x = \underline{\hspace{2cm}}^\circ$$

[1 mark]

continued on the next page . . .

(Turn over)

Question 10 continued

10. (b) Calculate the size of angle y .

**State the CIRCLE THEOREM that
you have used to find your answer.**

$y =$ _____ °

Circle Theorem:

(Turn over)

34

[2 marks]

(Turn over)

11. Express $\frac{3x}{4x-5} - \frac{2x}{6x+1}$ as a single fraction in its simplest form.

(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)

[4 marks]

(Turn over)

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

The diagram is NOT drawn to scale.

The diagram shows Triangle X and Triangle Y.

In Triangle X:

Angle $CAB = 75^\circ$

Angle $ACB = 63^\circ$

In Triangle Y:

Angle $DEF = 75^\circ$

Angle $DFE = 42^\circ$

continued on the next page . . .

(Turn over)

Question 12 continued

Which ONE of the following statements is correct?

Circle the correct answer.

The triangles must be congruent
The triangles could be congruent
The triangles cannot be congruent

You must show your working and JUSTIFY your answer.

(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.

[2 marks]

(Turn over)

- 13. Look at the diagram for Question 13 in the separate Diagram Booklet. Using the axes shown in the diagram, find the region that satisfies the following inequalities.**

$$y \leq x + 3$$

$$x + y \leq 4$$

$$y \geq 1$$

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

(Turn over)

[3 marks]

14. Ask for the model for Question 14.

The model is NOT made to scale.

The model is a SOLID cone.

**Look at the diagram for Question 14
in the separate Diagram Booklet.**

The diagram is NOT drawn to scale.

**The diagram is a simplified 2D
diagram of the SOLID cone.**

The cone has:

- **base radius = r cm**
- **slant height = $\frac{5}{4} r$ cm**
- **TOTAL surface area = 144π cm²**

continued on the next page . . .

(Turn over)

Question 14 continued

Calculate the value of r .

In your working, express any areas in terms of π .

(Turn over)

(Turn over)

[3 marks]

(Turn over)

15. (a) (i) Find the value of $8^{-\frac{1}{3}}$

Circle your answer.

-2	$-\frac{1}{2}$	$\frac{3}{8}$	$-2\frac{2}{3}$	$\frac{1}{2}$
------	----------------	---------------	-----------------	---------------

[1 mark]

continued on the next page . . .

(Turn over)

Question 15 (a) continued**15. (a) (ii) Find the value of $4^{\frac{5}{2}}$** **Circle your answer.**

$\frac{20}{8}$	10	32	512	1024
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[1 mark]**continued on the next page . . .****(Turn over)**

Question 15 continued**15. (b) Evaluate the following.**

$$0.\overset{\bullet}{2}\overset{\bullet}{1}\overset{\bullet}{5} \times 330$$

(Turn over)

[3 marks]

(Turn over)

16. Factorise $2x^2 + 3x - 20$

Hence solve the equation

$$2x^2 + 3x - 20 = 0$$

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)

[3 marks]

(Turn over)

17. Look at the diagram for Question 17 in the separate Diagram Booklet.

The diagram shows a sketch of $y = \tan x$ for values of x from 0° to 360°

Given that $\tan 23^\circ = 0.4245$, correct to 4 decimal places, write down ALL the solutions of the equation

$$\tan x = -0.4245$$

for values of x from 0° to 360°

(Turn over)

[2 marks]

(Turn over)

18. Two similar solids have surface areas of 3 cm^2 and 75 cm^2

The volume of the smaller solid is 0.4 cm^3

Calculate the volume of the larger solid.

(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)

Volume of larger solid = _____ cm³
[4 marks]

19. Simplify the following expression.

$$\frac{\sqrt{250}}{(\sqrt{5})^3} + (4 + \sqrt{2})(3 - \sqrt{2})$$

State whether your answer is rational or irrational.

(Turn over)

60

**The answer is
rational**

☐

**The answer is
irrational**

☐

[5 marks]
(Turn over)

20. Look at the diagram for Question 20 in the separate Diagram Booklet. The diagram shows six cards with numbers on them.

Mathew has the six cards shown in the diagram.

He chooses three of the cards at random.

He does NOT replace any of the cards.

(a) Calculate the probability that the first card is a 7, the second card is a 5 and the third card is a 6

(Turn over)

[2 marks]

continued on the next page . . .

(Turn over)

Question 20 continued

- 20. (b) Calculate the probability that the
PRODUCT of the numbers on
Mathew's three cards is a
cube number.**

(Turn over)

[2 marks]

continued on the next page . . .

(Turn over)

Question 20 continued

- 20. (c) Calculate the probability that the SUM of the numbers on Mathew's three cards is 17**

(Turn over)

[3 marks]

END OF PAPER

TOTAL 80 MARKS

(Turn over)

[illegible]

(Turn over)

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

(Turn over)

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HIGHER TIER

Diagram Booklet

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

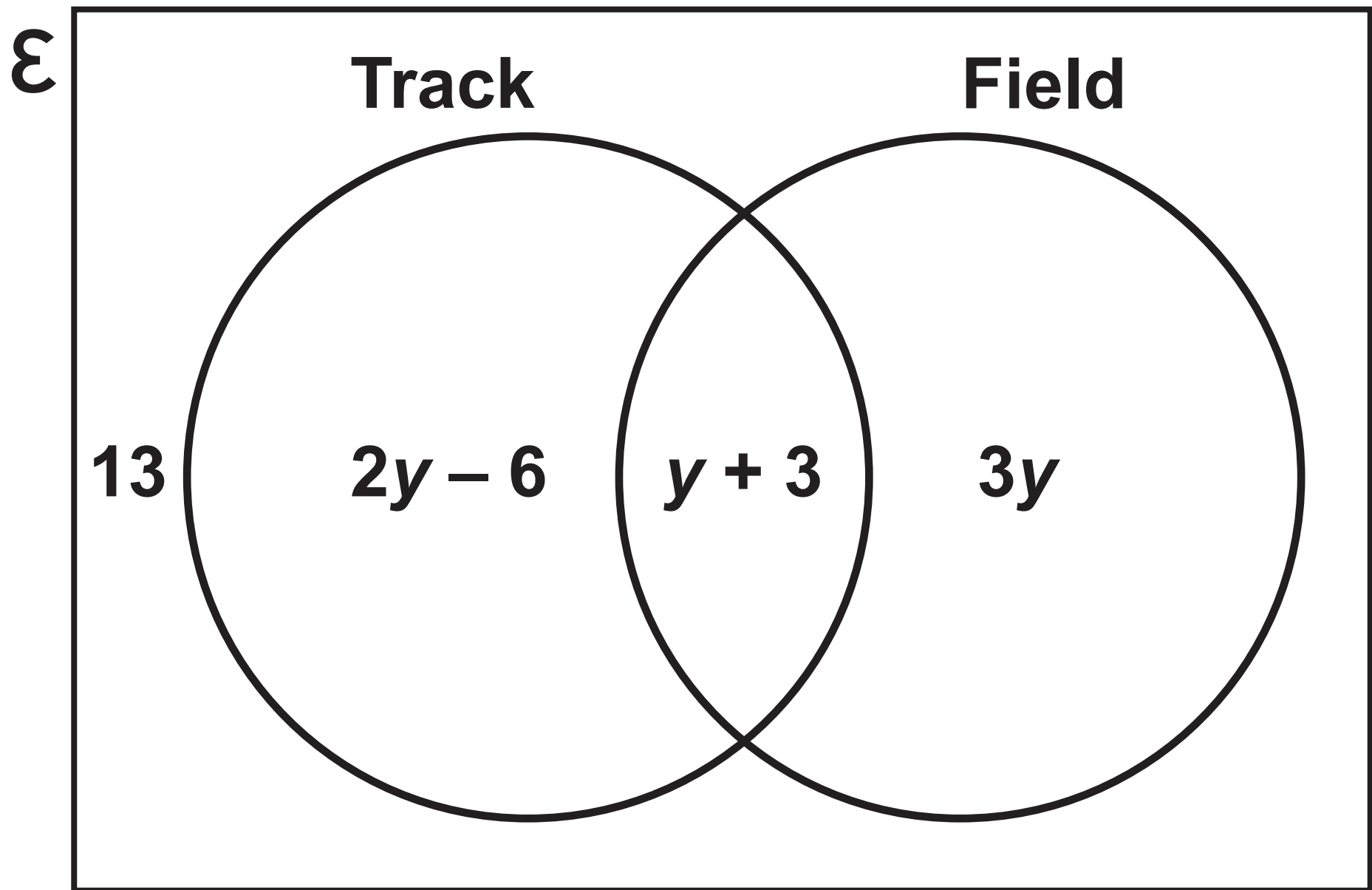
Surname: _____

First name(s): _____

Centre Number: _____

Candidate Number: 0 _____

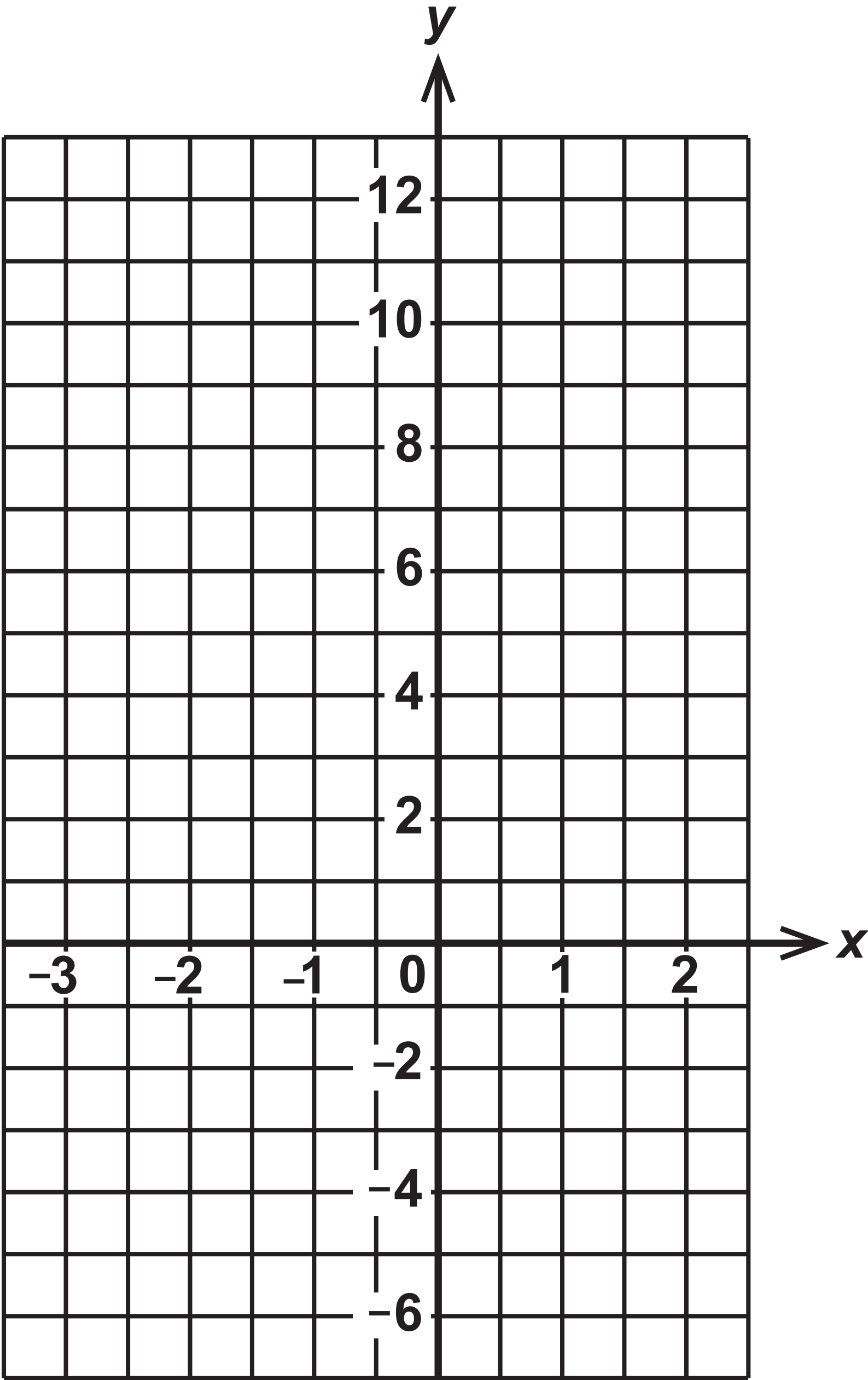
Question 1



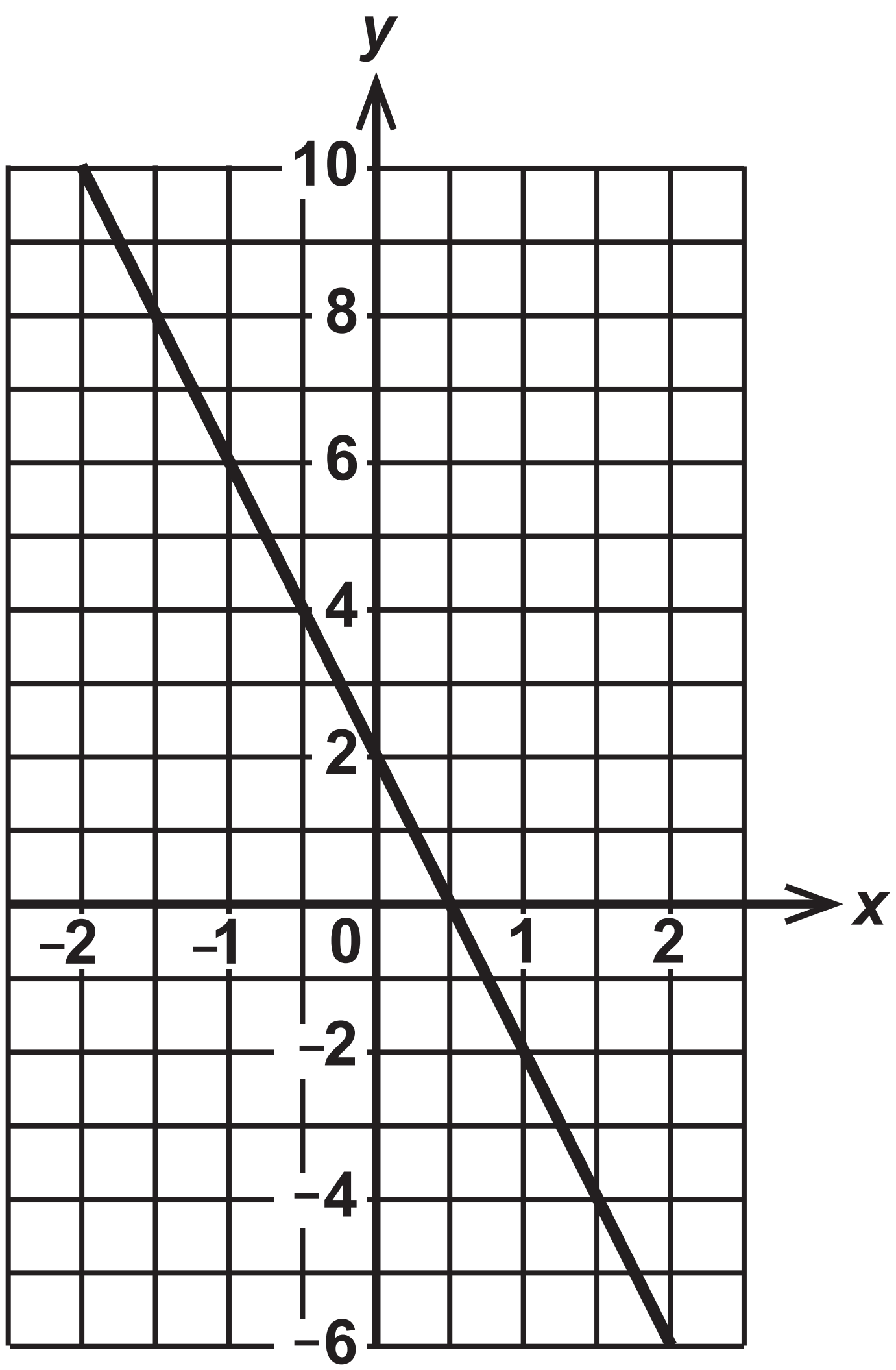
Question 2

x	-3	-2	-1	0	1	2
$y = 2x^2 - 6$		2	-4	-6		2

Question 2 (b)

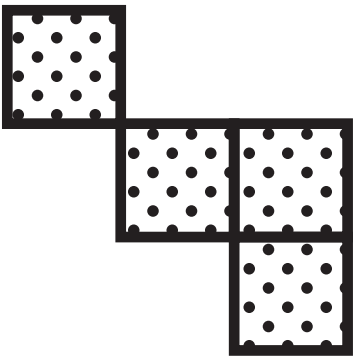


Question 5

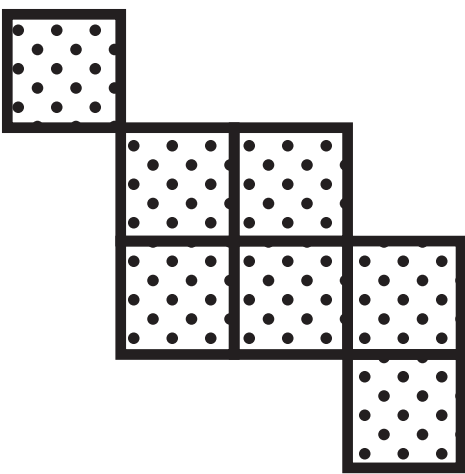


Question 6

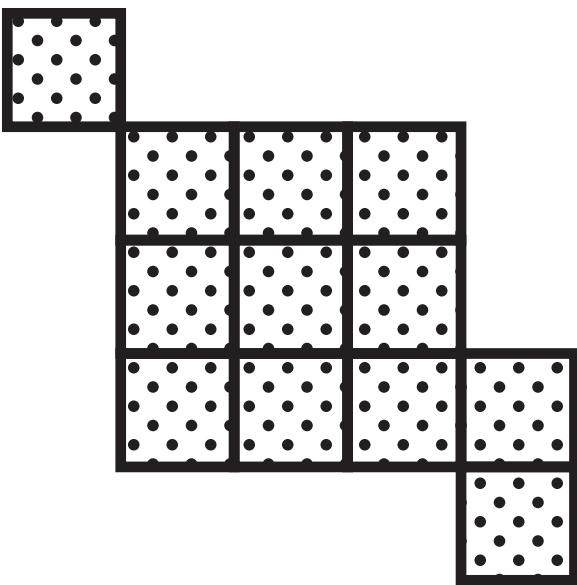
Pattern 1



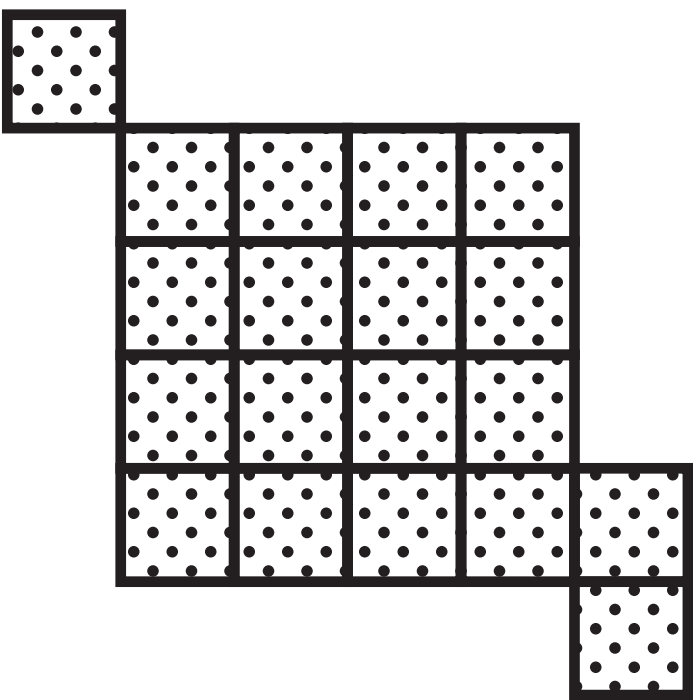
Pattern 2



Pattern 3

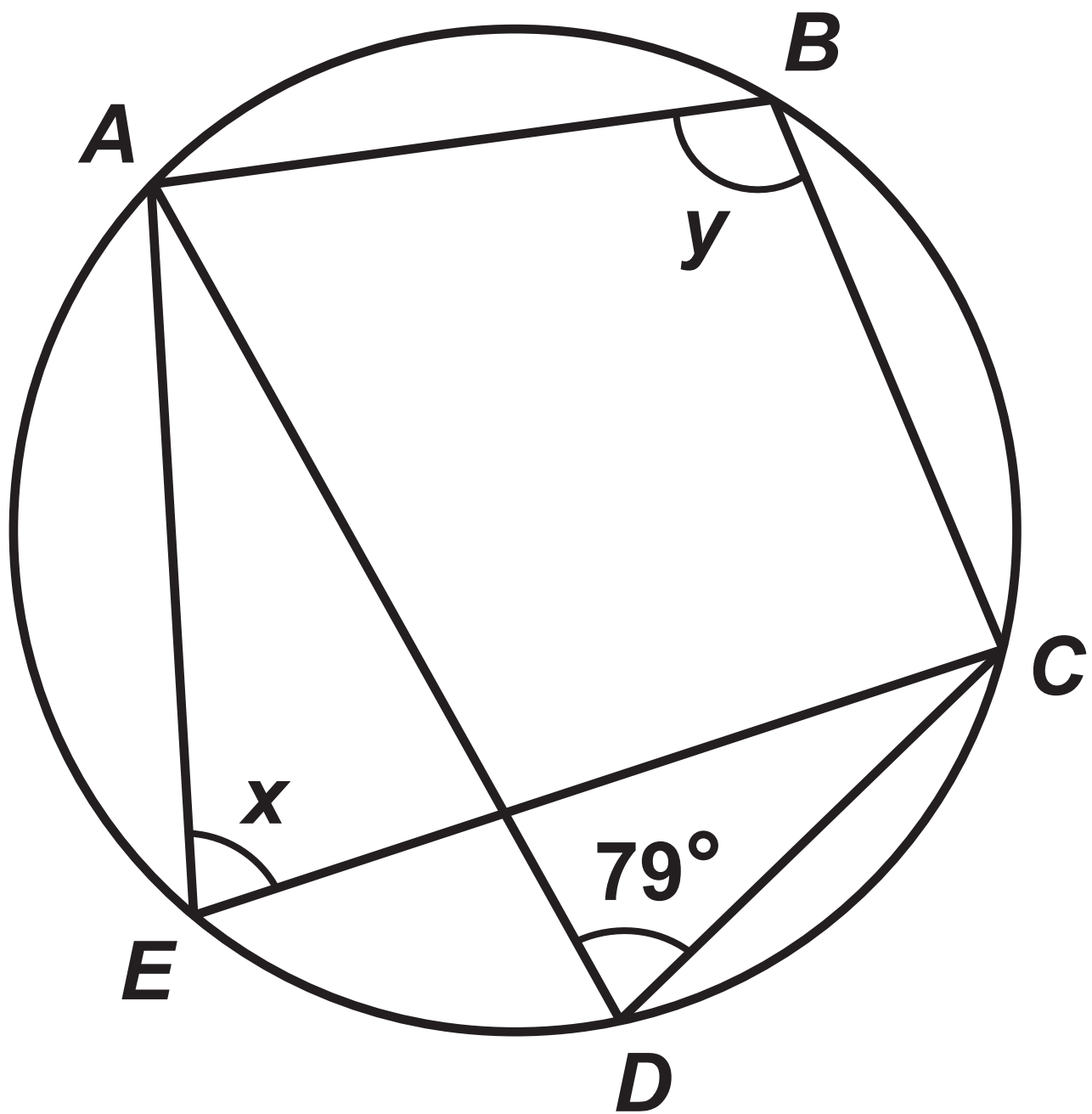


Pattern 4



Question 10

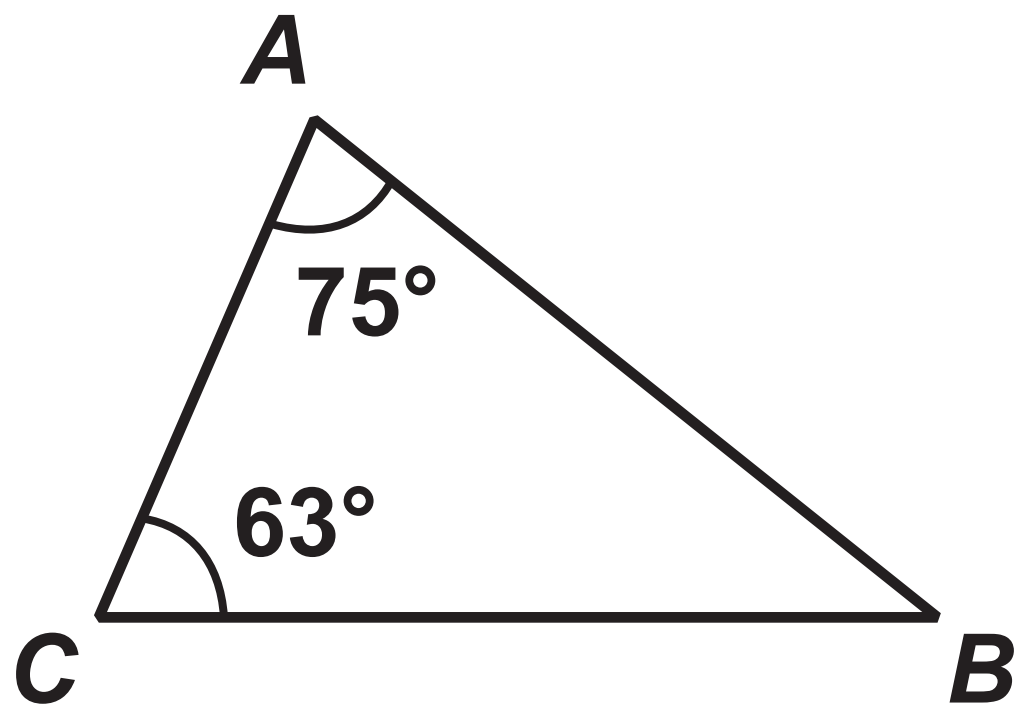
Diagram NOT drawn to scale



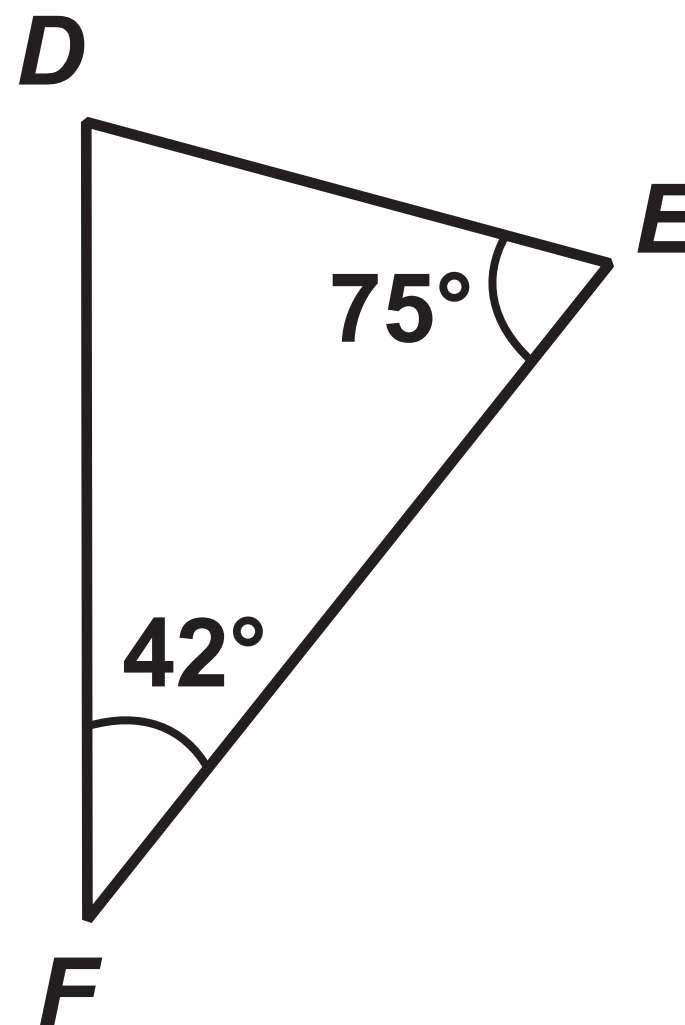
Question 12

Diagram NOT drawn to scale

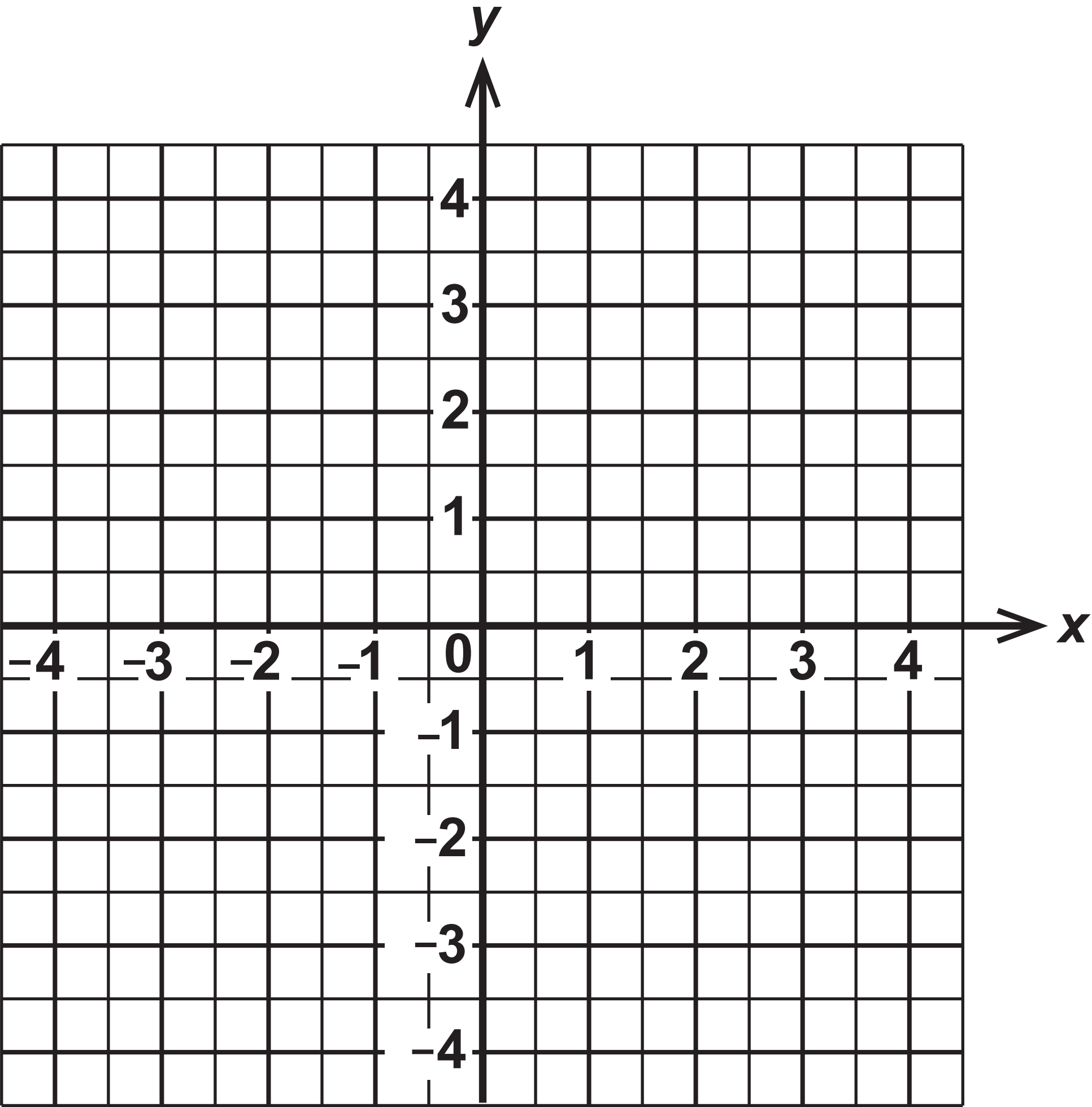
Triangle X



Triangle Y



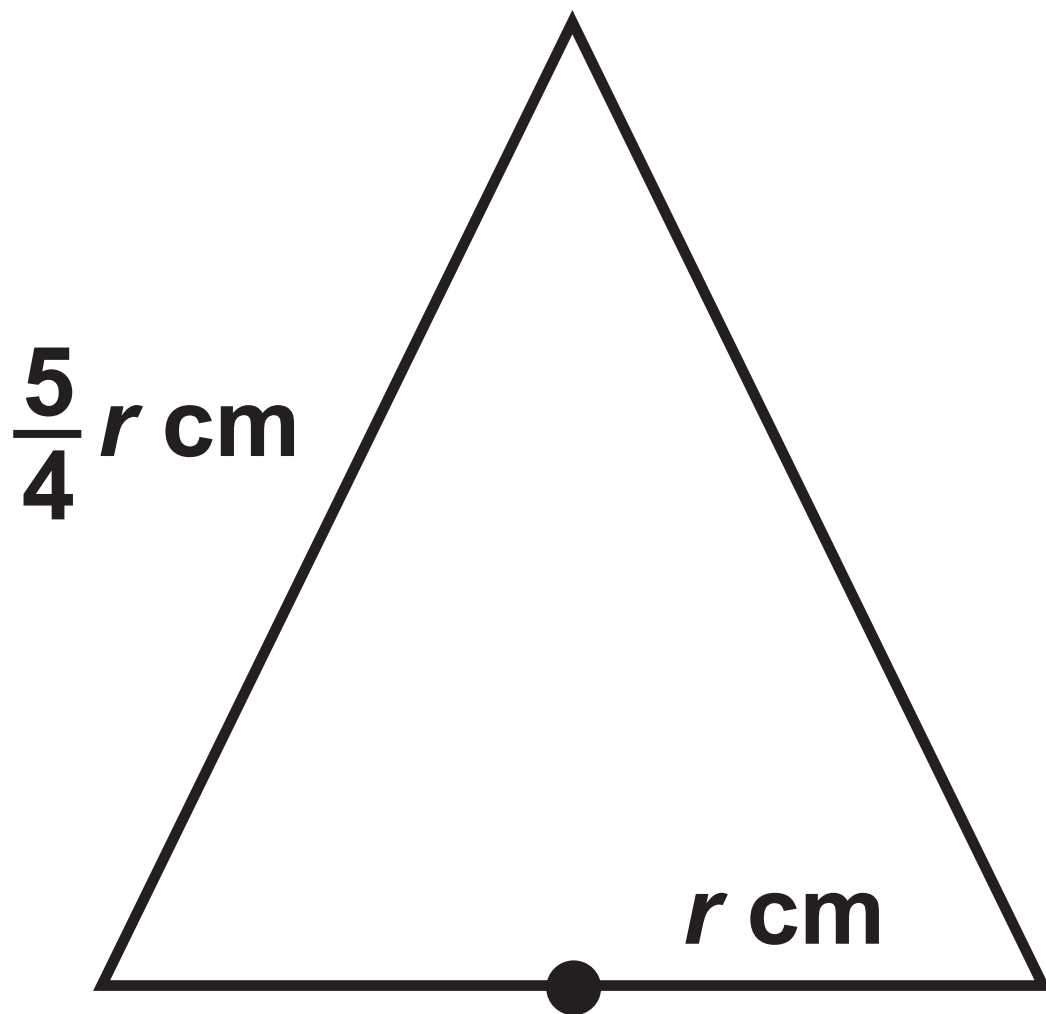
Question 13



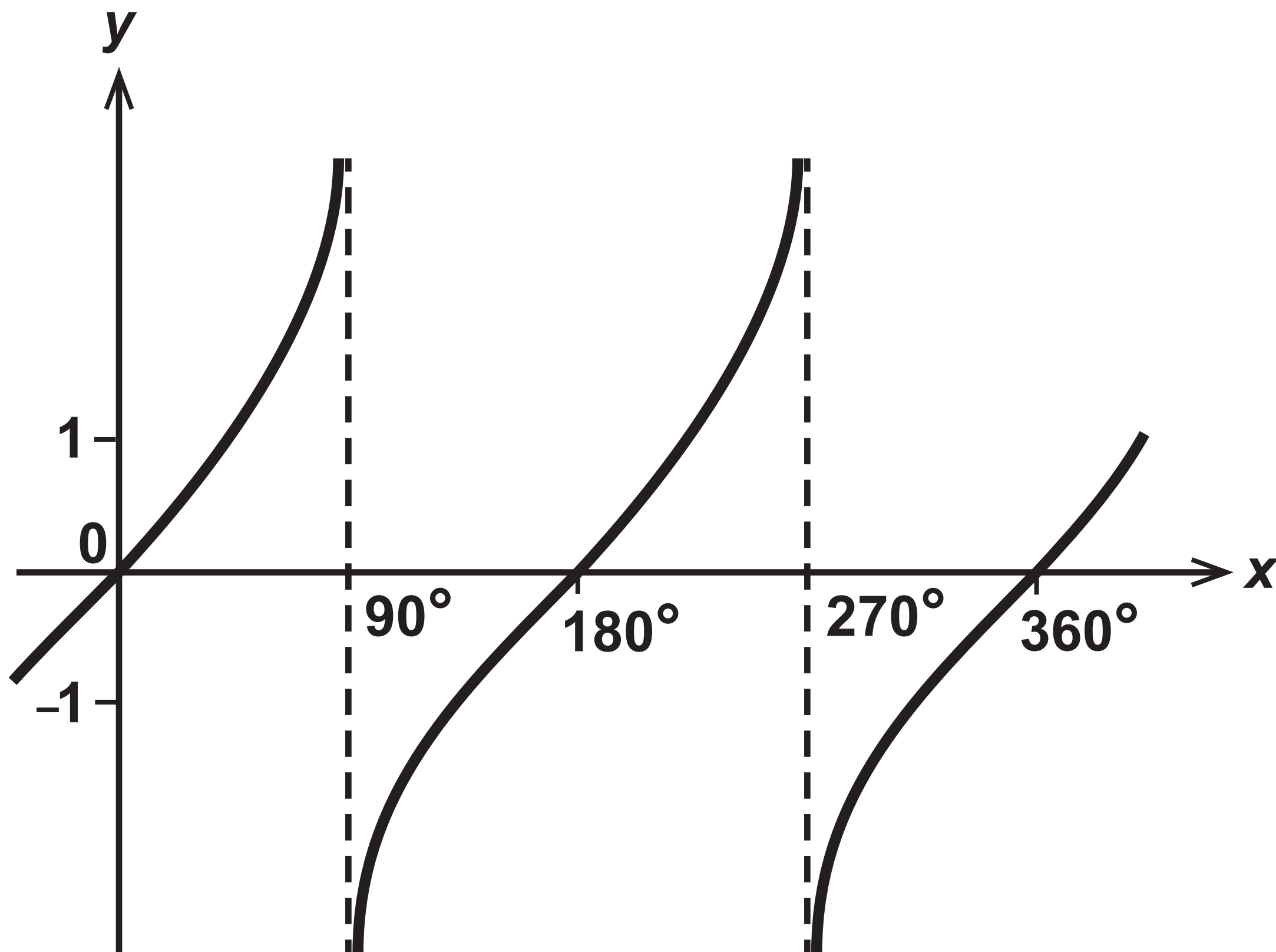
Question 14

Diagram NOT drawn to scale

Simplified 2D diagram of the solid cone



Question 17



Question 20

5	5	5	5	6	7
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MATHEMATICS**

and

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MATHEMATICS – NUMERACY



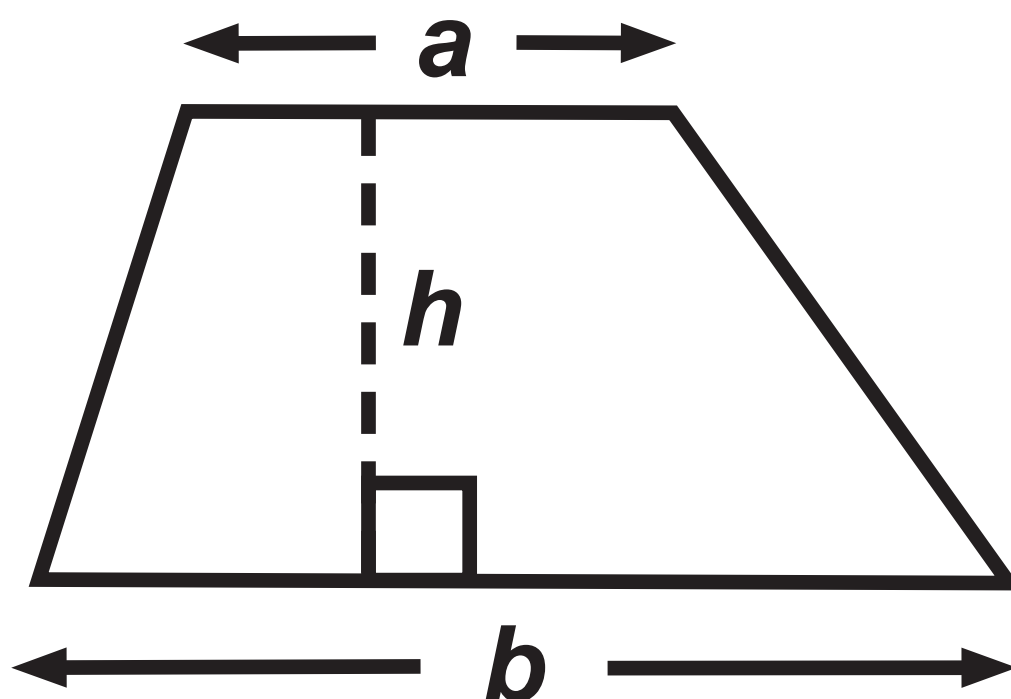
**FORMULA LIST
HIGHER TIER
GCSE**

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

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

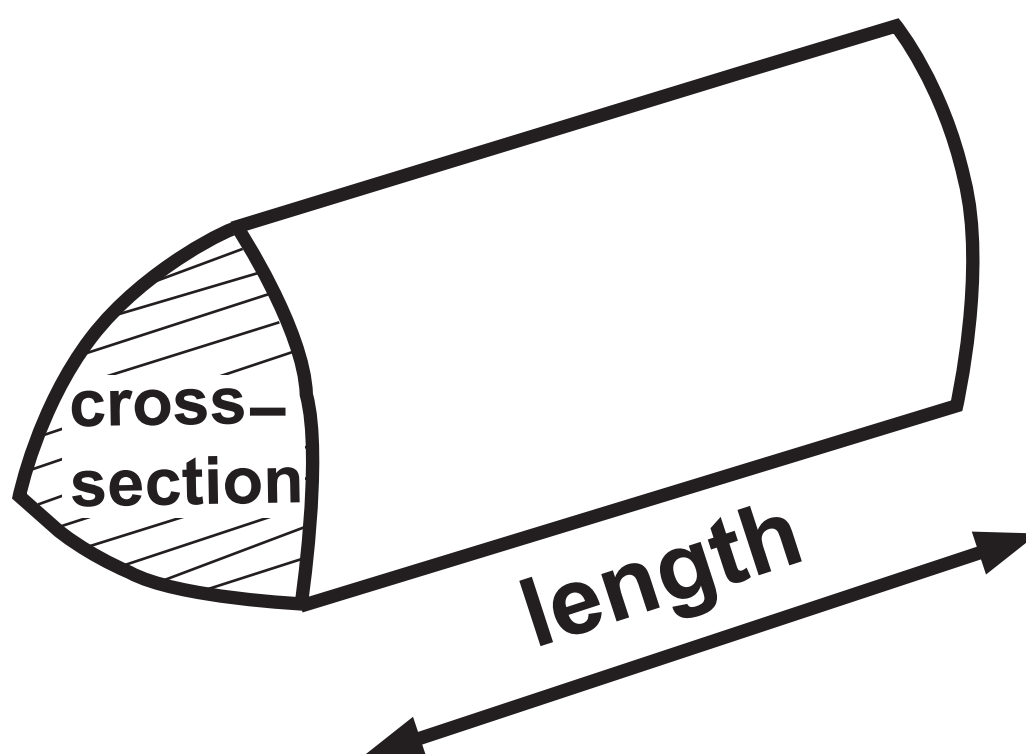
Formula List – Higher Tier

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



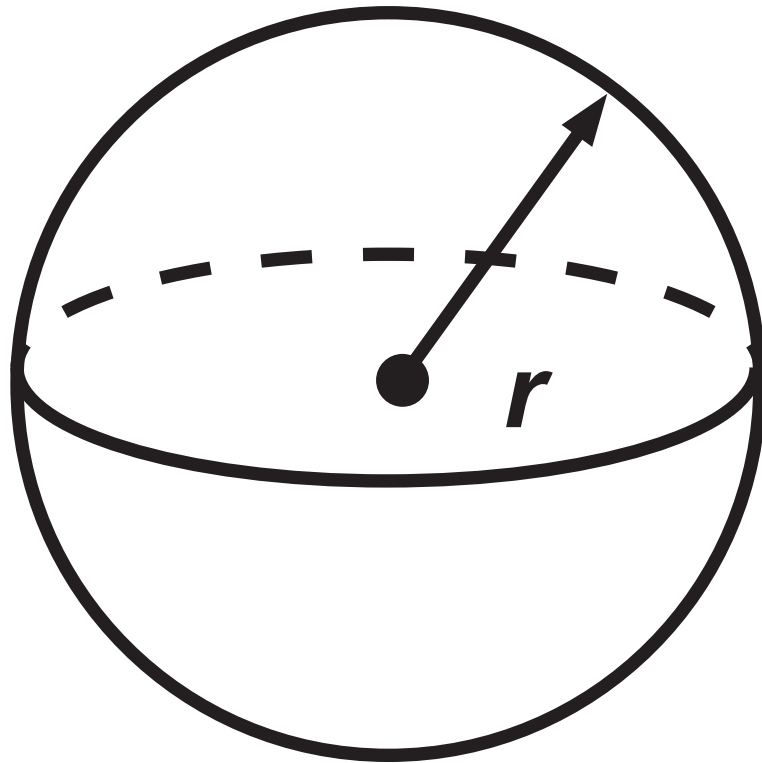
Volume of prism =

area of cross – section $\times$ length



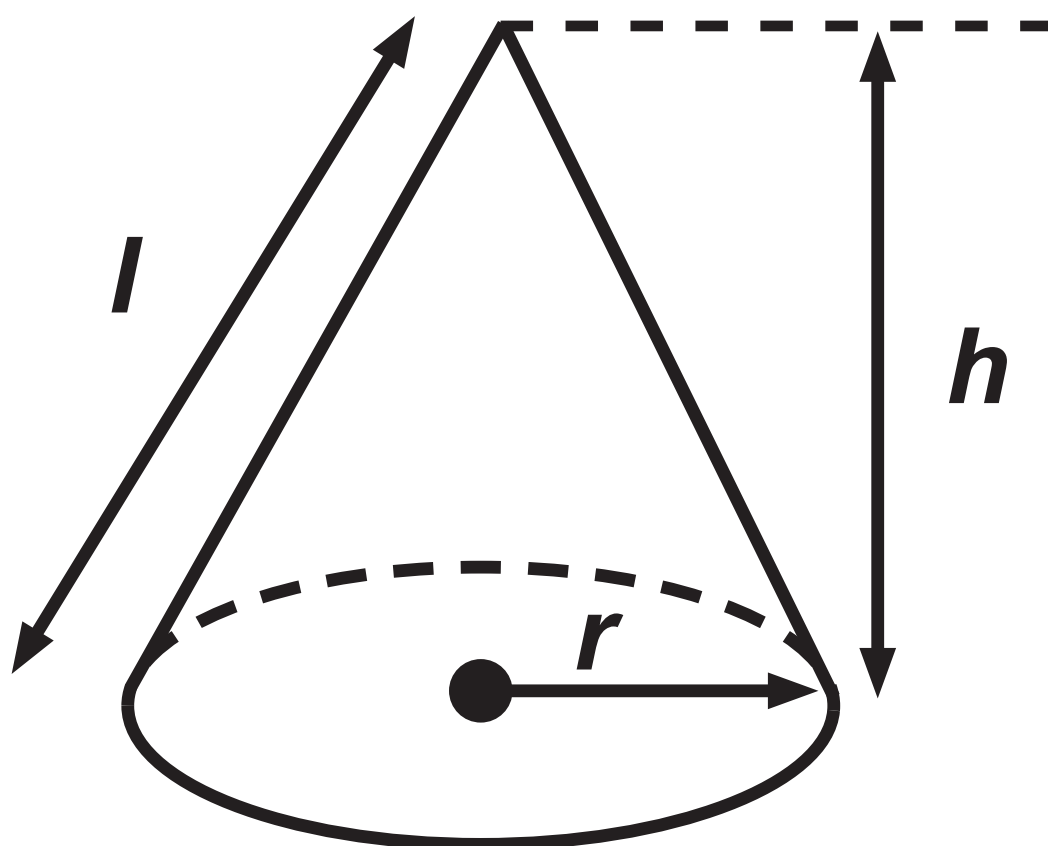
Volume of sphere = $\frac{4}{3}\pi r^3$

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

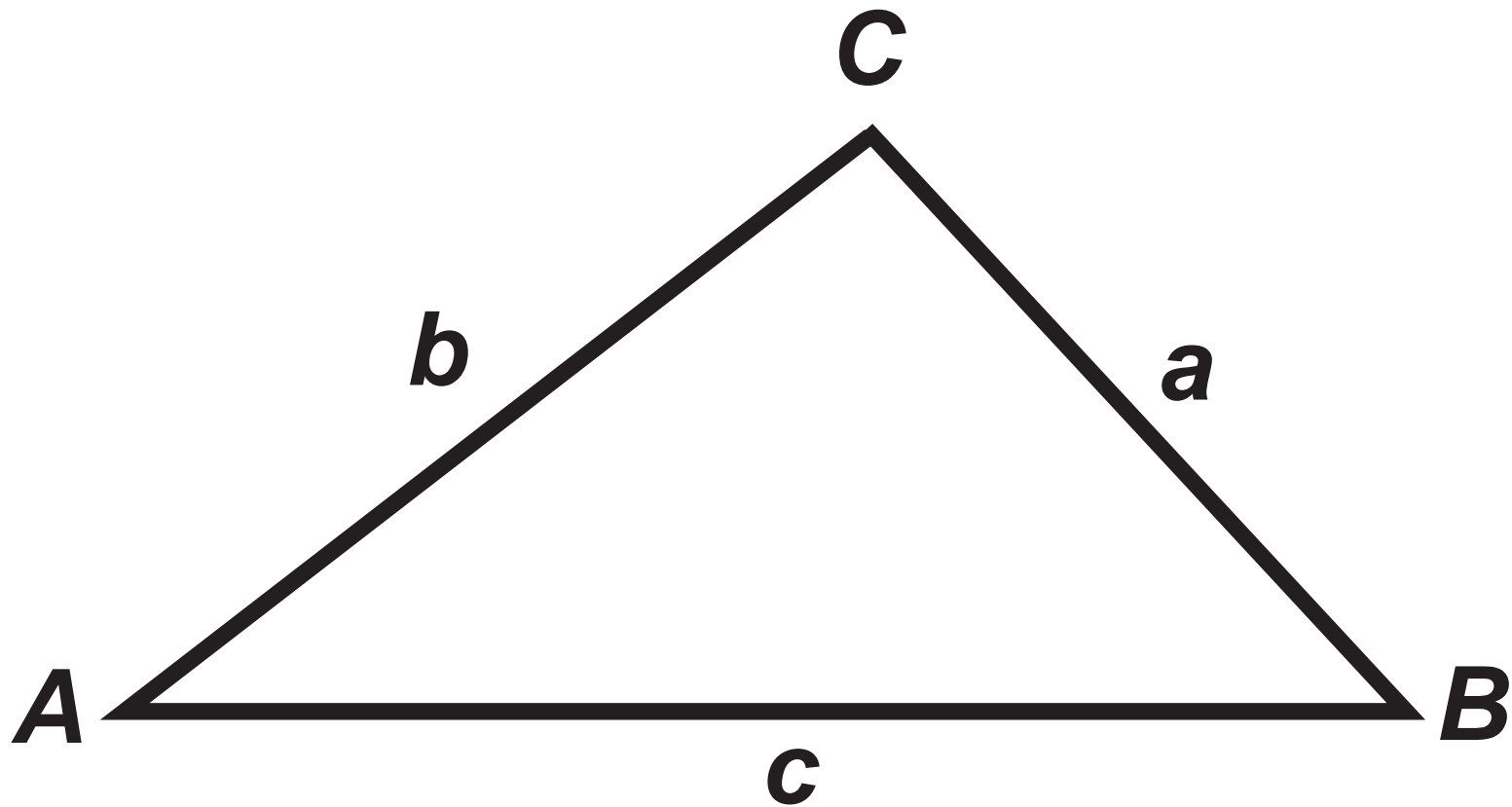


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of a 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.