

**GCSE – NEW
3300U60-1**

MATHEMATICS

UNIT 2:

**CALCULATOR – ALLOWED
HIGHER TIER**

**TUESDAY,
20 JUNE 2017 – AFTERNOON**

**1 hour 45 minutes
(plus your additional
time allowance)**

**A CALCULATOR WILL
BE REQUIRED FOR
THIS PAPER**

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	4	
2.	5	
3.	4	
4.	3	
5.	3	
6.	3	
7.	5	
8.	5	
9.	2	
10.	2	
11.	7	
12.	5	
13.	5	
14.	3	
15.	3	
16.	5	
17.	1	
18.	5	
19.	2	
20.	4	
21.	4	
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 21.

Cut out shapes for Question 15.

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, taking care to number the question(s) correctly.

(Turn over)

Take π as 3.14 or use the π button on your calculator.

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

1. (a) Calculate $\sqrt[4]{8.5^3 + (4.5 - 0.76)^2}$
correct to 3 significant figures.

[2 marks]

- (b) Calculate the reciprocal of -0.07
correct to 1 decimal place.

[2 marks]

(Turn over)

2. Look at the diagram for Question 2 in the separate Diagram Booklet. The diagram is NOT drawn to scale.

Show that the triangle is NOT a right – angled triangle.

6

[5 marks]

(Turn over)

3. A solution to the equation

$$x^3 - 2x - 45 = 0$$

lies between 3 and 4

Use the method of trial and improvement
to find this solution correct to 1 decimal place.
You must show all your working.

(Turn over)

Lined writing area consisting of 20 horizontal lines.

9

[4 marks]

(Turn over)

4. Look at the diagram for Question 4 in the separate Diagram Booklet. The diagram is NOT drawn to scale.

A right – angled triangle LMN is shown.

$LN = 16.9$ cm and $LM = 6.5$ cm.

Calculate the length MN .

[3 marks]

(Turn over)

5. On the sheet provided for Question 5 in the separate Diagram Booklet, construct an accurate drawing of triangle ABC , where $AB = 8 \text{ cm}$, angle $ABC = 90^\circ$ and angle $BAC = 60^\circ$

Use only a ruler and a pair of compasses.

The side AB has been drawn for you.

You must show your construction arcs.

[3 marks]

6. Look at the diagram for Question 6 in the separate Diagram Booklet. The diagram is NOT drawn to scale. The diagram shows triangle PQR .

In the triangle PQR ,

$$PQ = 18 \text{ cm}$$

angle $RPQ = 24^\circ$ and

angle RQP is a right angle.

Calculate the length of the side QR .

(Turn over)

[3 marks]

7. **100** boxes each contain **10** balls.

45 of the boxes are labelled **A**.

They each contain **7** black balls and **3** white balls.

25 of the boxes are labelled **B**.

They each contain **4** black balls and **6** white balls.

The rest of the boxes are labelled **C**.

They each contain **8** black balls and **2** white balls.

In a game, a player chooses a box at random,
and then chooses a ball at random from
that box.

(a) Look at the diagram for Question 7 (a)
in the separate Diagram Booklet.

The diagram shows a tree diagram.

Complete the tree diagram shown.

[1 mark]

continued on the next page . . .

(Turn over)

Question 7 continued

7. (b) What is the probability that a player will select a black ball?

[3 marks]

continued on the next page . . .

(Turn over)

Question 7 continued

7. (c) If a large number of people played the game, approximately what fraction of them would you expect to choose a white ball?
Circle your answer.

$\frac{1}{10}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$
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[1 mark]

(Turn over)

8. (a) Factorise $x^3 - 5x$

[1 mark]

(b) Expand and simplify $(2x - 3)(x + 4)$

[2 marks]

continued on the next page . . .

(Turn over)

Question 8 continued

8. (c) Factorise $x^2 - 3x - 28$

[2 marks]

(Turn over)

9. (a) Circle the equation of a straight line that is parallel to the line $3y = 2x + 6$

$$3y = 2x + 7$$

$$2y = 3x + 6$$

$$3y = -2x + 6$$

$$-3y = 2x + 6$$

$$2y = -3x + 6$$

[1 mark]

continued on the next page . . .

(Turn over)

Question 9 continued

9. (b) Circle the equation of a straight line that is perpendicular to the line $y = 5x - 3$

$$y = \frac{x}{5} + 3$$

$$y = 5x + 3$$

$$y = 5x + \frac{1}{3}$$

$$y = -5x + 3$$

$$y = \frac{-x}{5} + 3$$

[1 mark]

(Turn over)

10. Look at the diagram for Question 10 in the separate Diagram Booklet. The diagram is NOT drawn to scale.

Points A , B and C lie on the circumference of a circle, centre O .

Angle $ACB = 37^\circ$

Calculate the size of the REFLEX angle AOB .

[2 marks]

(Turn over)

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

Look at the diagram for Question 11 in the separate Diagram Booklet.

The diagram is NOT drawn to scale.

The area of triangle ABD , shown in the diagram, is 35 cm^2

$AD = 5 \text{ cm}$ and $BC = 32 \text{ cm}$.

D is on the line AC , and

BD is perpendicular to AC .

Calculate the size of angle X .

You must show all your working.

(Turn over)

[5 marks + 2 marks OCW]

(Turn over)

12. Make **C** the subject of the following formula.
Give your answer in its simplest form.

$$c - 5 = \frac{3c - 7}{d}$$

(Turn over)

[5 marks]

(Turn over)

13. Look at the diagram for Question 13 in the separate Diagram Booklet. The diagram is NOT drawn to scale.

The diagram shows triangle ***ABC***.

In the diagram,

$$AC = 5.3 \text{ cm}$$

$$BC = 6.4 \text{ cm}$$

$$\text{Angle } ABC = 46^\circ$$

By first calculating the size of angle ***BAC***, calculate the area of triangle ***ABC***.

You must show all your working.

[5 marks]

(Turn over)

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

The diagram is NOT drawn to scale.

The region between two rectangles is shaded, as shown in the diagram.

All of the measurements shown are given CORRECT TO THE NEAREST CM.

Calculate the greatest possible area of the shaded region.

[3 marks]

(Turn over)

15. Look at the diagram for Question 15
in the separate Diagram Booklet.

The diagram shows shape **A** and shape **B**
on a coordinate grid.

Describe fully a **SINGLE** transformation that
transforms shape **A** onto shape **B**.

[3 marks]

(Turn over)

16. The table below shows the three – day rain forecast for Monday, Tuesday and Wednesday in Eglwyswrw.

Day	Probability of rain
Monday	80%
Tuesday	80%
Wednesday	80%

For these three days,

- (a) calculate the probability that it will rain on all three days.

(Turn over)

[2 marks]

**16. (b) calculate the probability that it will rain
on exactly **2** consecutive days.**

[3 marks]

(Turn over)

17. Circle the expression that is equivalent

to $w^{-\frac{3}{5}}$

$$-\left(\sqrt[3]{w}\right)^5$$

$$-\frac{3}{5}w$$

$$-\left(\sqrt[5]{w}\right)^3$$

$$\frac{1}{\left(\sqrt[5]{w}\right)^3}$$

$$\frac{1}{\left(\sqrt[3]{w}\right)^5}$$

[1 mark]

(Turn over)

18. Solve the equation $x = \frac{7}{5x - 3}$

Give your answers correct to 2 decimal places.

(Turn over)

[5 marks]

(Turn over)

19. (a) Give one example to show that the square of an irrational number is NOT always rational.

Number = _____

Square of the number = _____

[1 mark]

continued on the next page . . .

Question 19 continued

19. (b) Find two DIFFERENT irrational numbers to make the answer to the calculation below rational.

Complete the calculation by filling in the three boxes.

$$\square \times \square = \square$$

[1 mark]

(Turn over)

20. Look at the diagram for Question 20 in the separate Diagram Booklet.

A sketch of the graph $y = f(x)$ is shown.

Two specific points are shown on the graph.

They are called a maximum point and a minimum point.

The maximum point shown is $(-2, 2)$ and the minimum point shown is $(2, -2)$.

(a) Look at the diagrams for Question 20 (a) in the separate Diagram Booklet.

The graphs shown are transformations of $y = f(x)$.

There are five graphs shown, and seven equations given.

Draw a line connecting each graph to the equation describing the transformation.

One has been done for you.

[4 marks]

(Turn over)

21. Ask for the model for Question 21.

The model is NOT accurate.

The model is a cube with an internal diagonal of length 20 cm.

Each edge of the cube is of length X cm.

Calculate the value of X .

You must use an algebraic method and show all your working.

[4 marks]

END OF PAPER

TOTAL 80 MARKS

(Turn over)

Question number	Additional Pages, if required. Write the question number in the left - hand margin.

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MATHEMATICS

UNIT 2: CALCULATOR – ALLOWED

HIGHER TIER

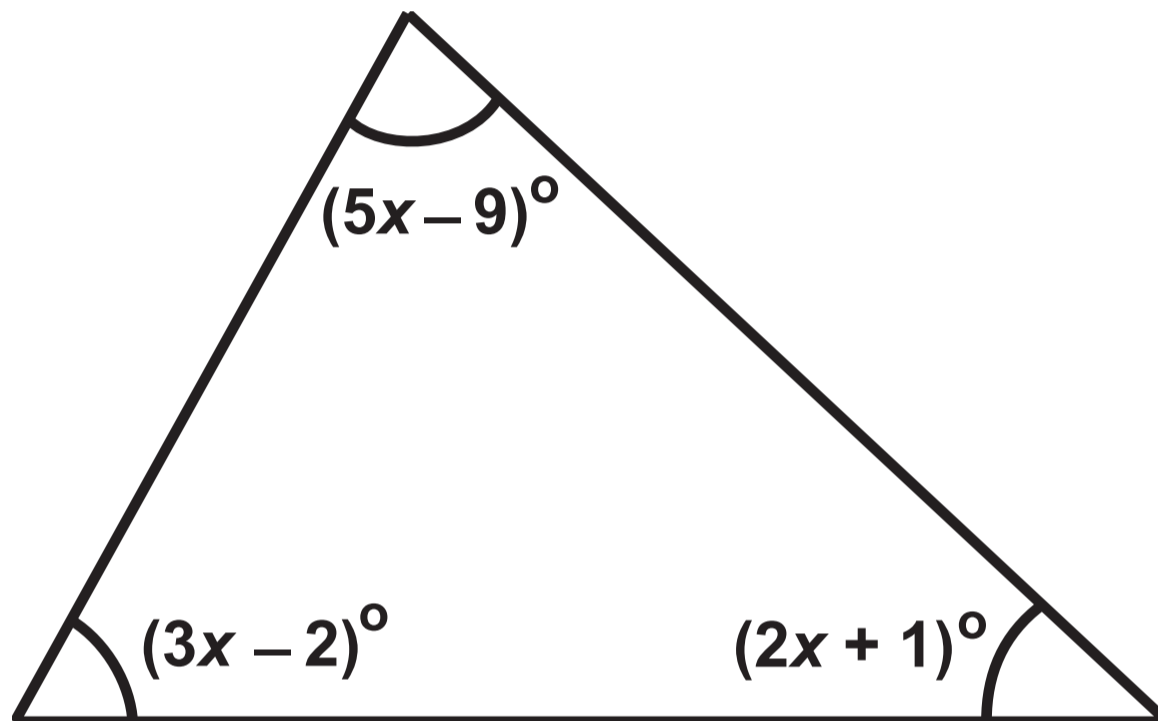
TUESDAY, 20 JUNE 2017 – AFTERNOON

Diagram Booklet

Surname:	
Other Names:	
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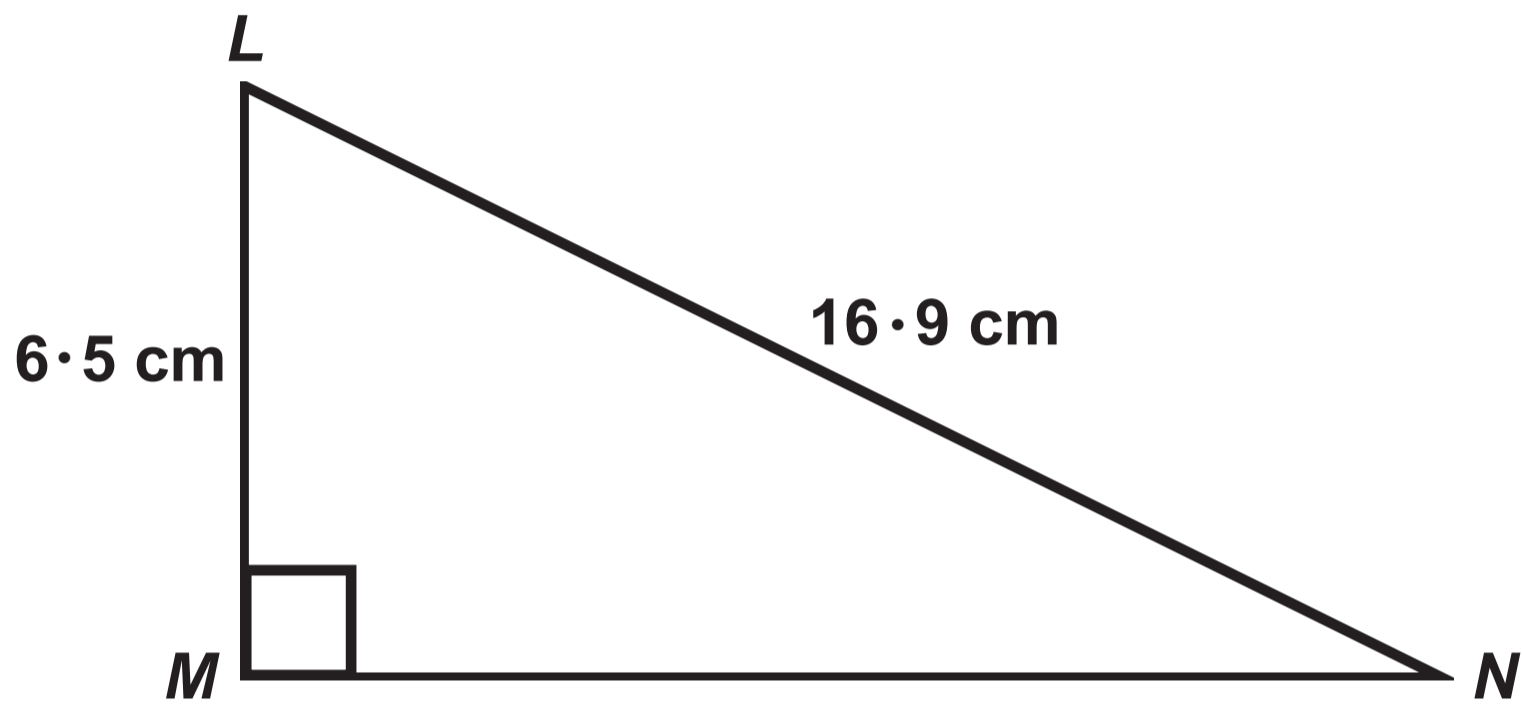
Question 2

Diagram NOT drawn to scale



Question 4

Diagram NOT drawn to scale

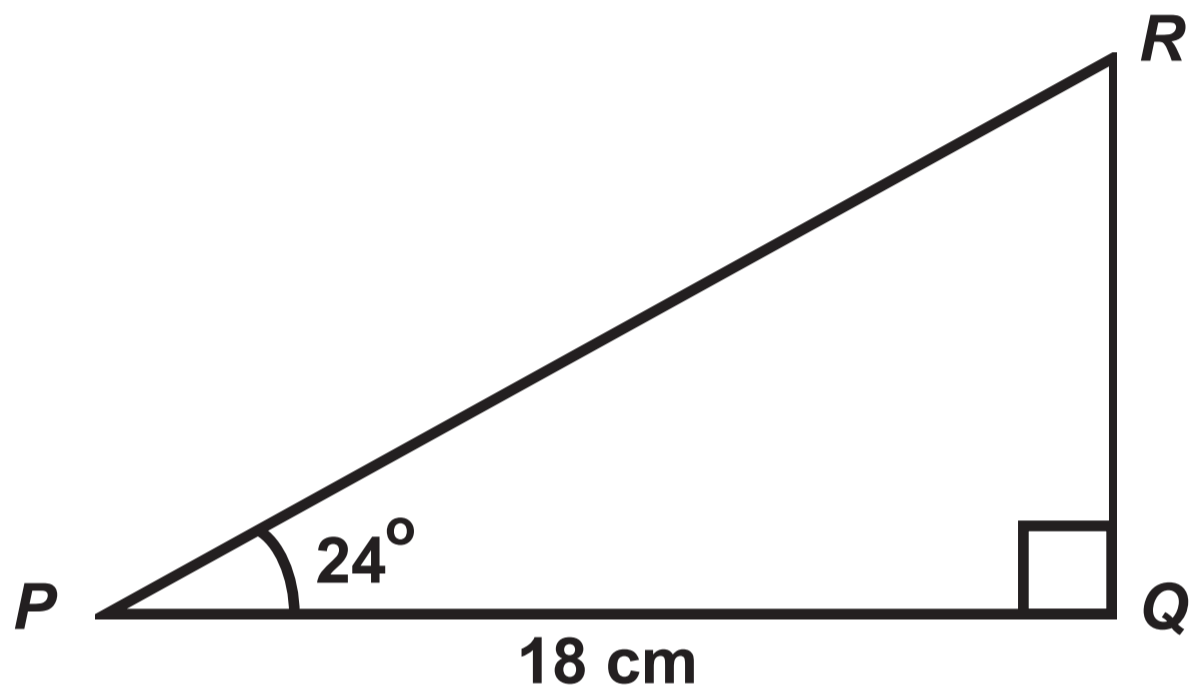


Question 5



Question 6

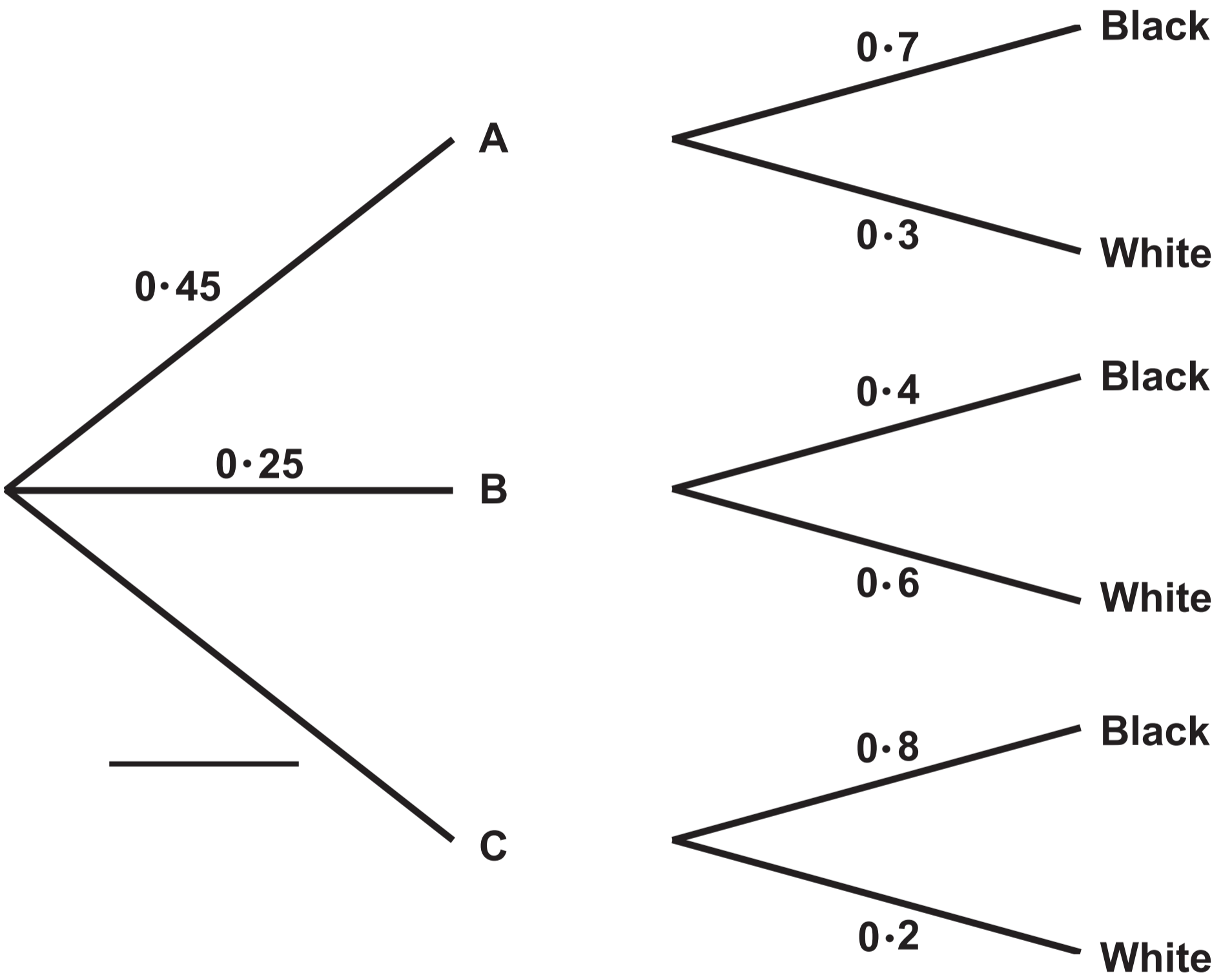
Diagram NOT drawn to scale



Question 7 (a)

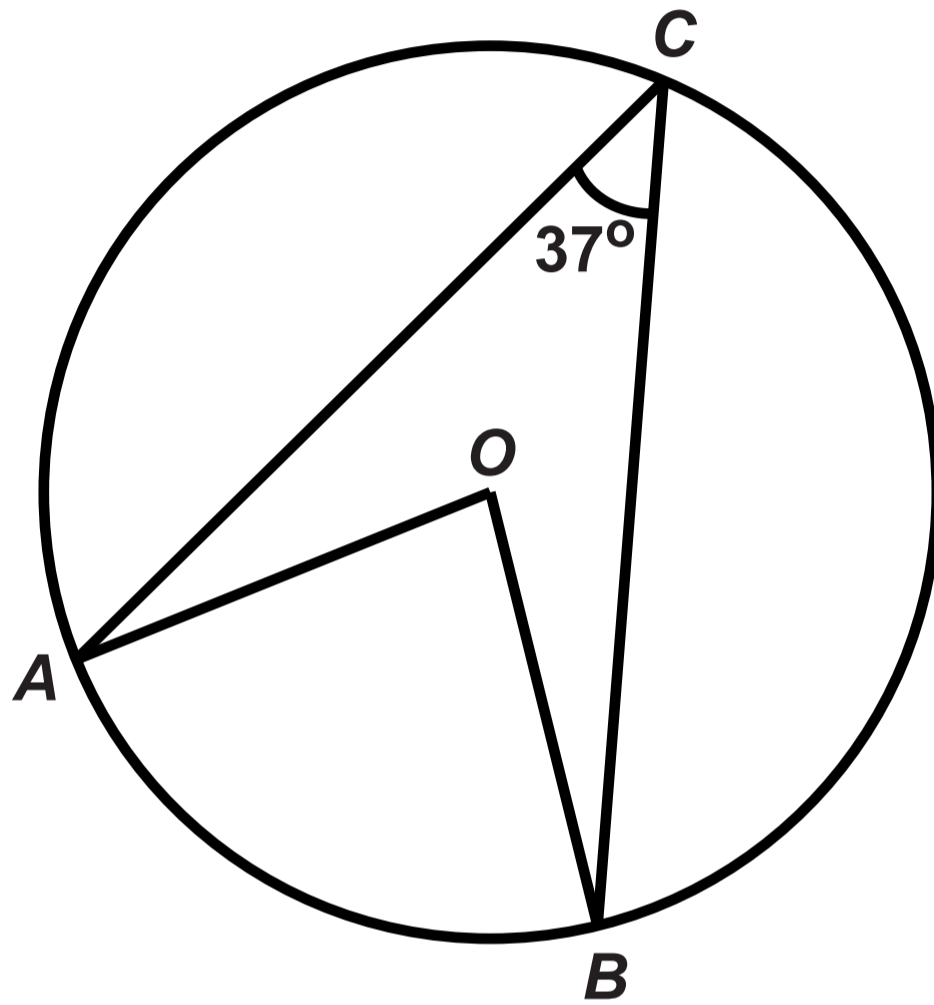
Choice of box

Choice of balls



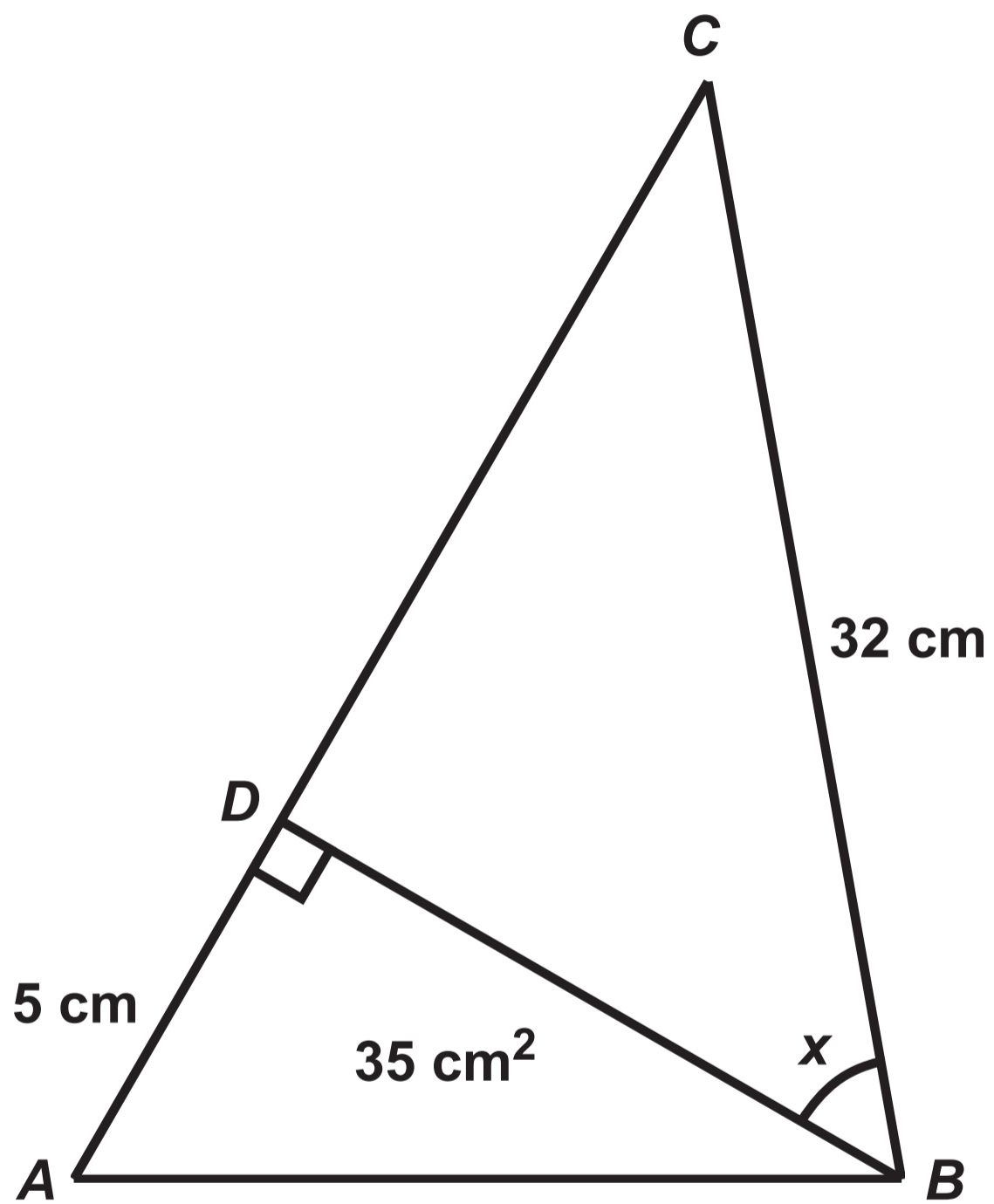
Question 10

Diagram NOT drawn to scale



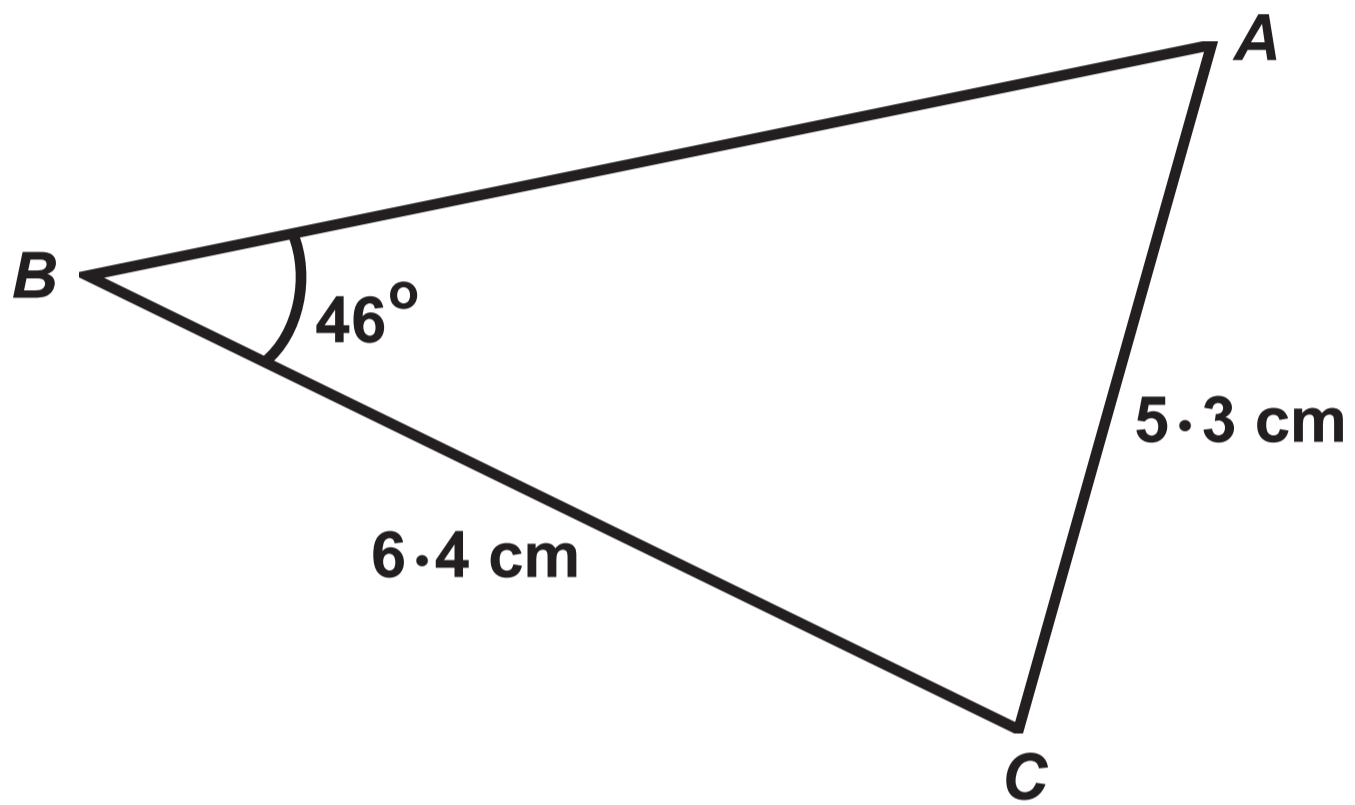
Question 11

Diagram NOT drawn to scale



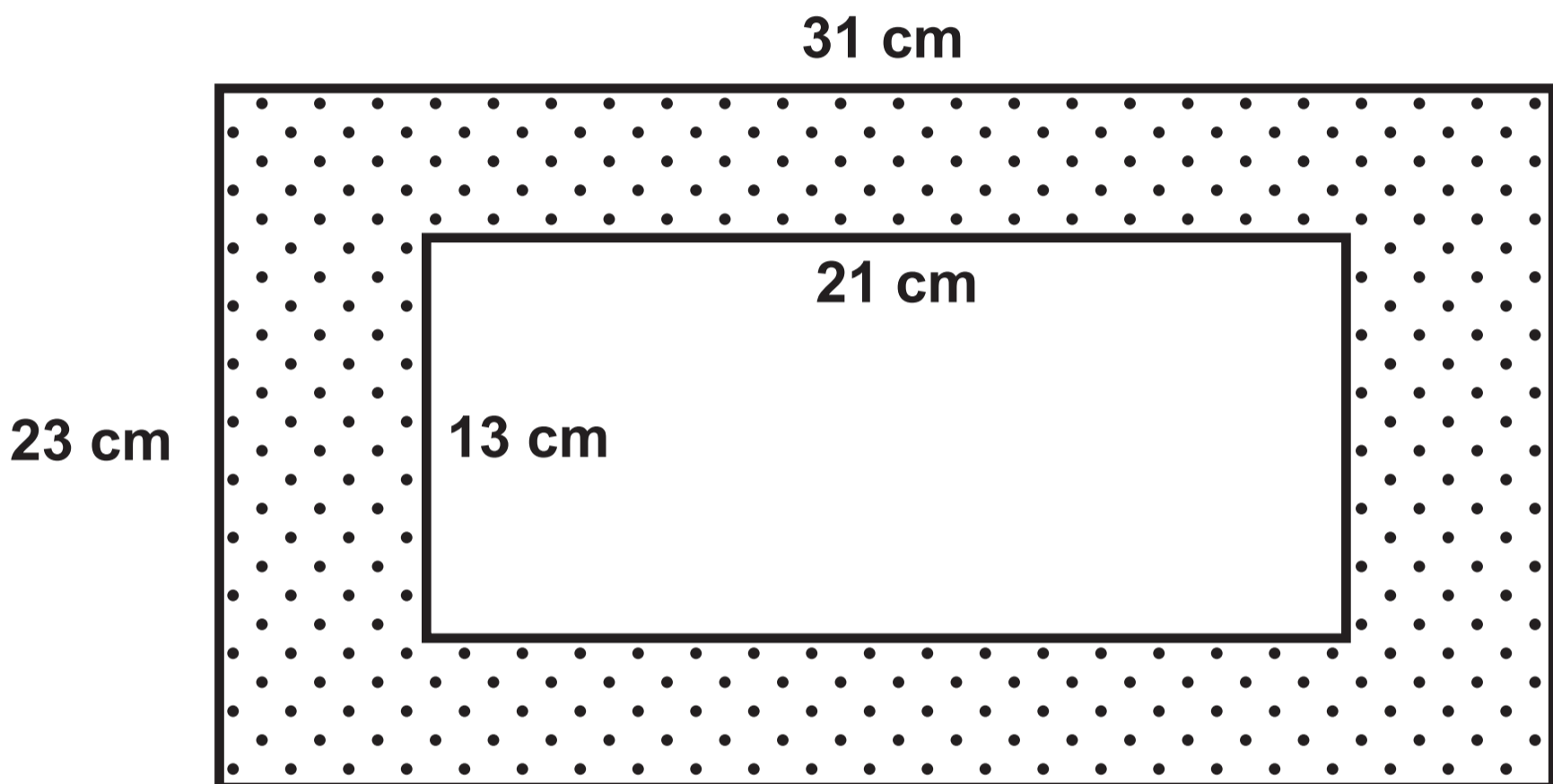
Question 13

Diagram NOT drawn to scale

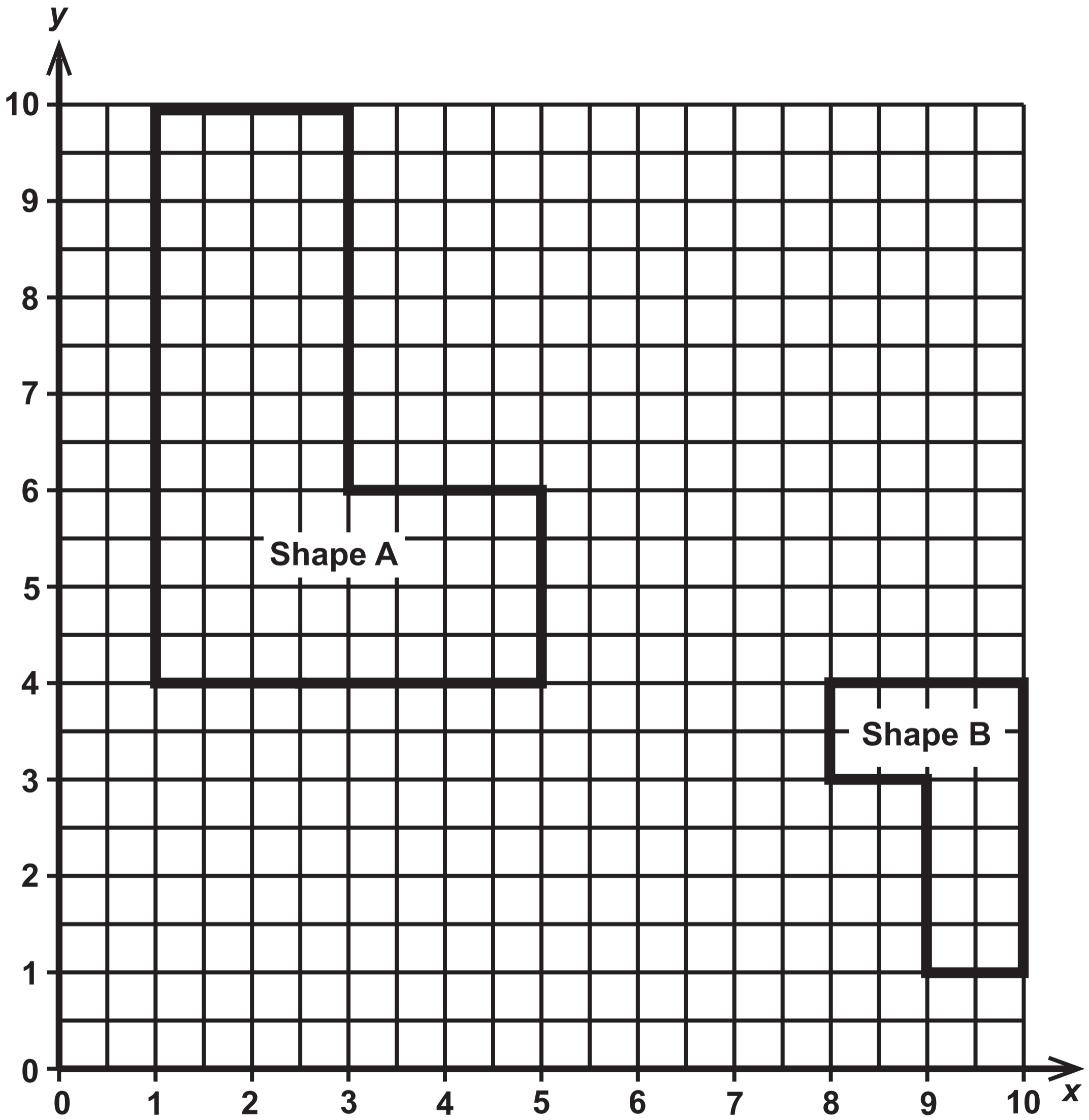


Question 14

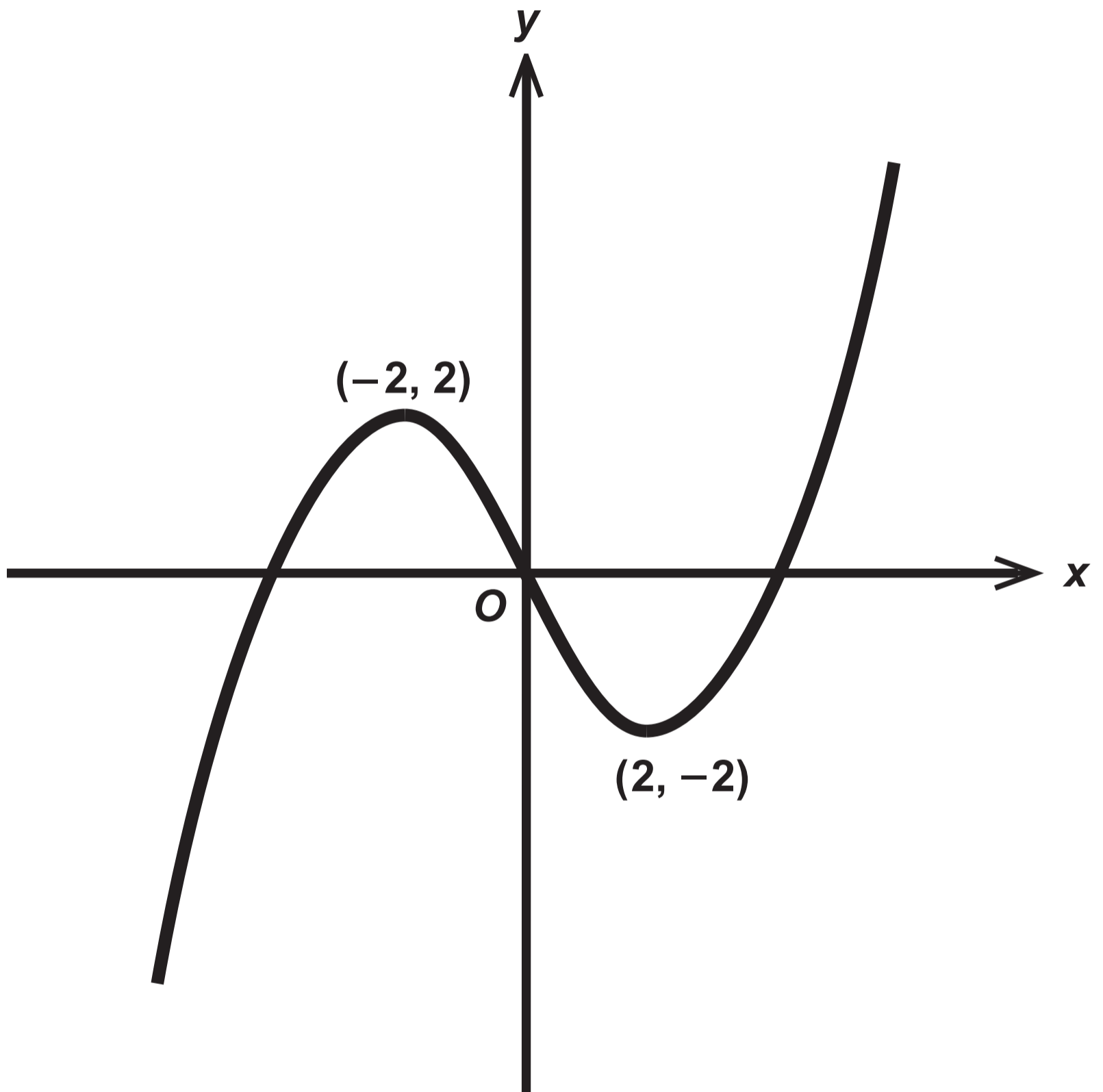
Diagram NOT drawn to scale



Question 15

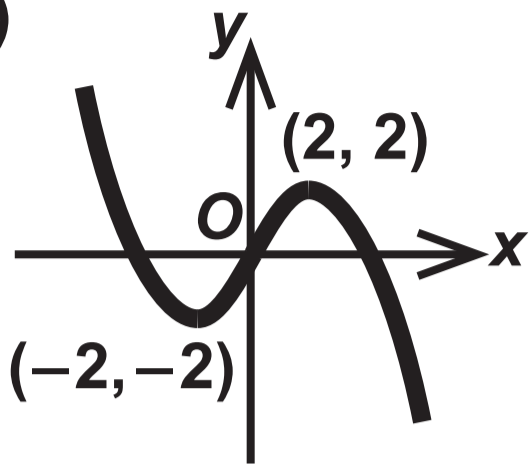


Question 20

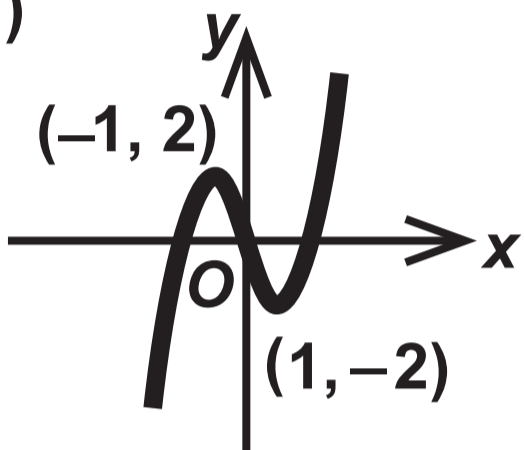


Question 20 (a)

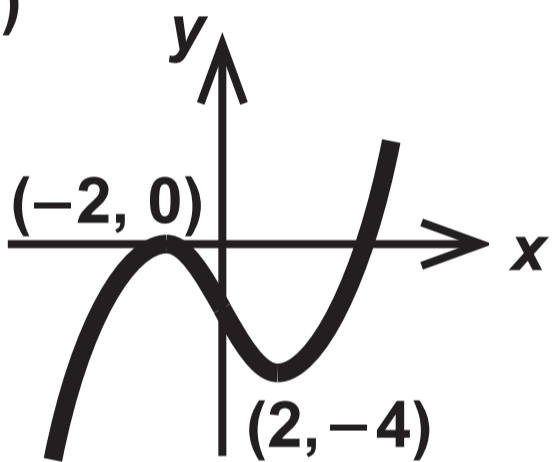
Graph (i)



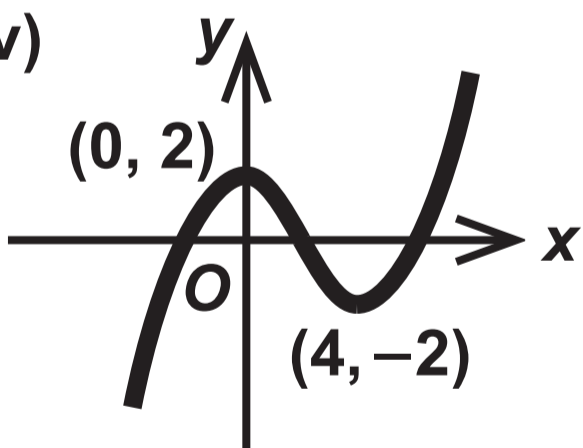
Graph (ii)



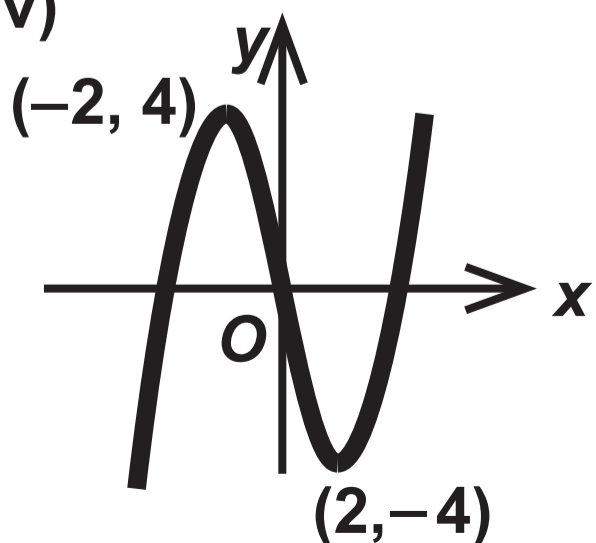
Graph (iii)



Graph (iv)



Graph (v)



$$y = f(x) - 2$$

$$y = f(x + 2)$$

$$y = -f(x)$$

$$y = 2f(x)$$

$$y = f(2x)$$

$$y = f(x) + 2$$

$$y = \frac{1}{2} f(x)$$

$$y = f(x - 2)$$

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MATHEMATICS

UNIT 2: CALCULATOR – ALLOWED

HIGHER TIER

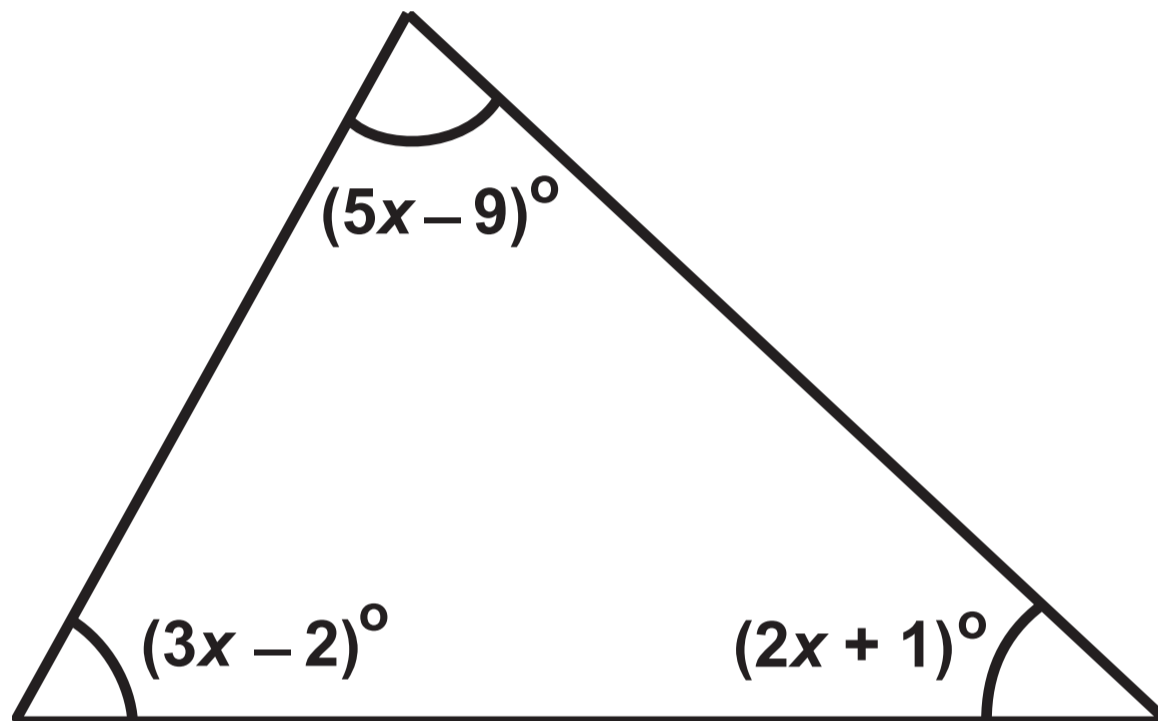
TUESDAY, 20 JUNE 2017 – AFTERNOON

Spare Diagram Booklet

Surname:	
Other Names:	
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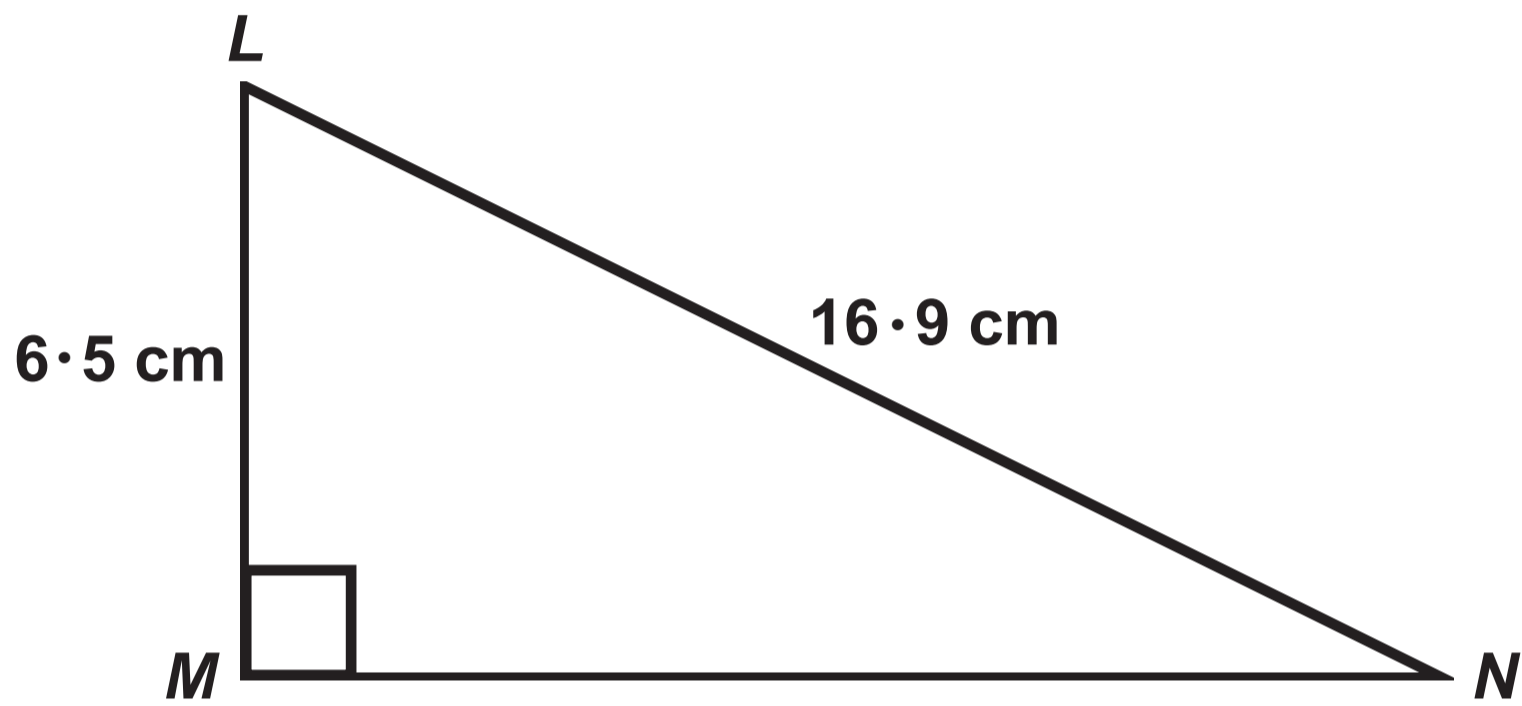
Question 2

Diagram NOT drawn to scale



Question 4

Diagram NOT drawn to scale

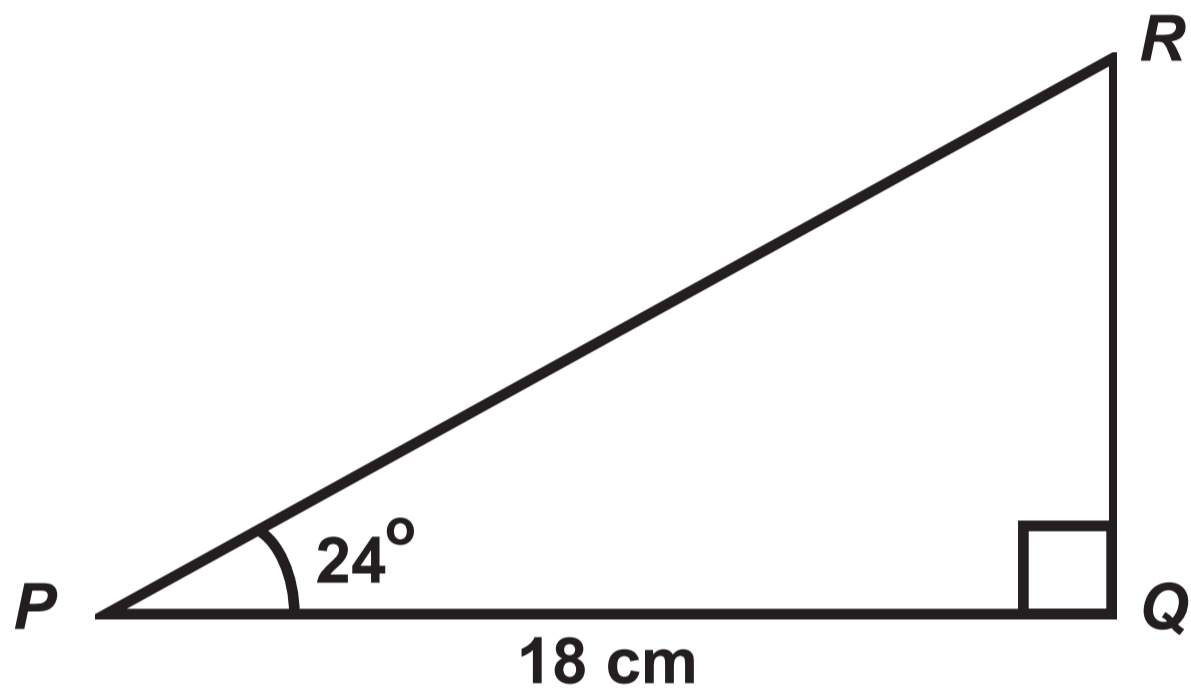


Question 5



Question 6

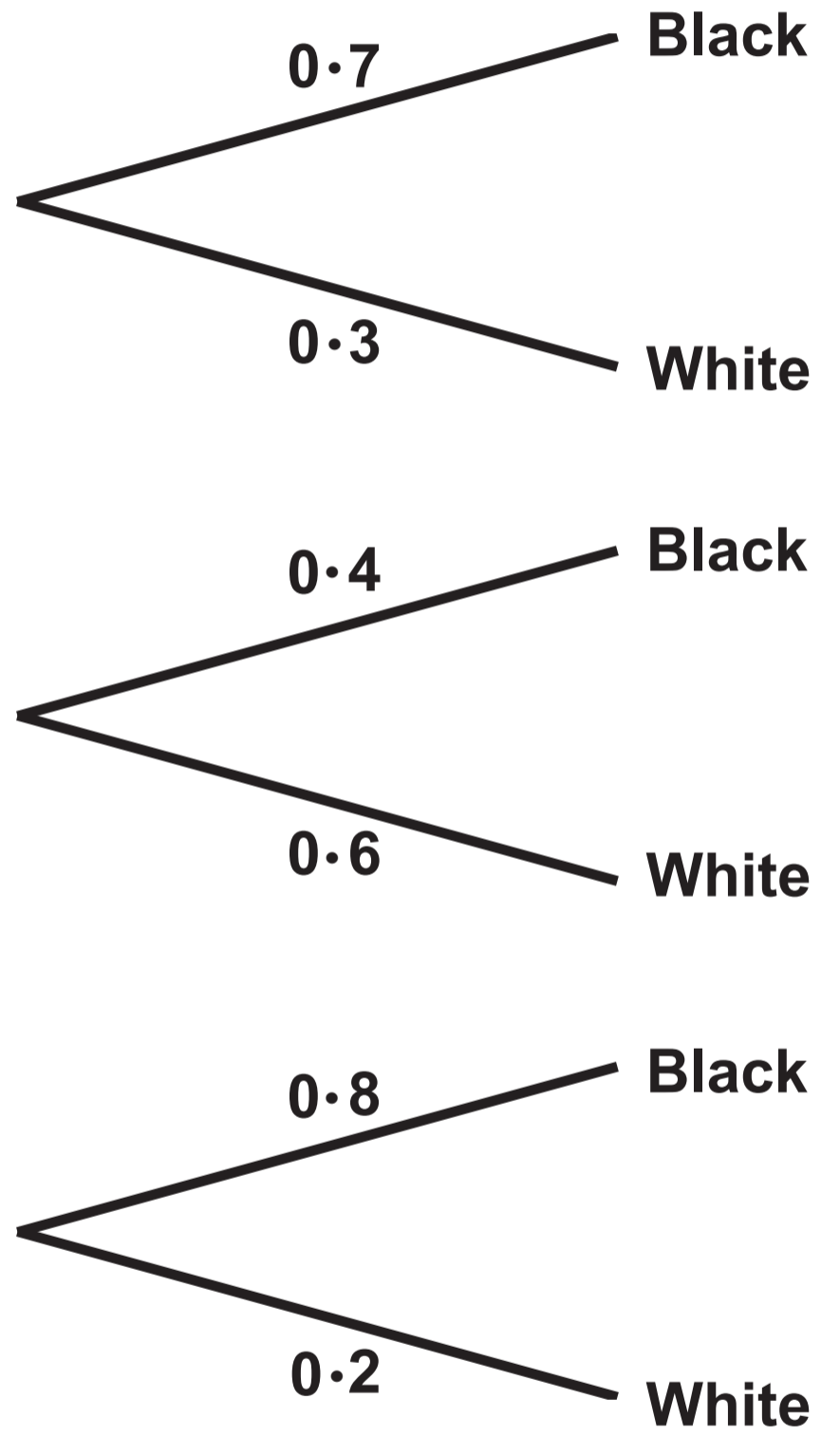
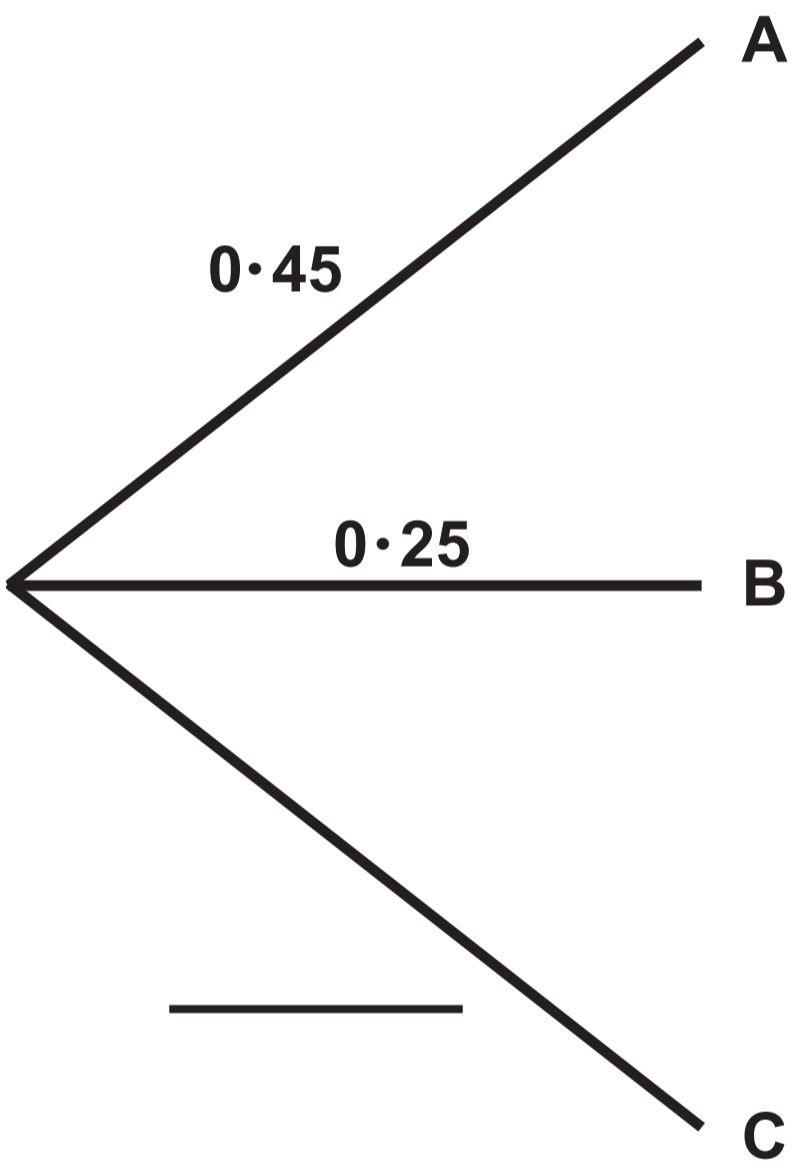
Diagram NOT drawn to scale



Question 7 (a)

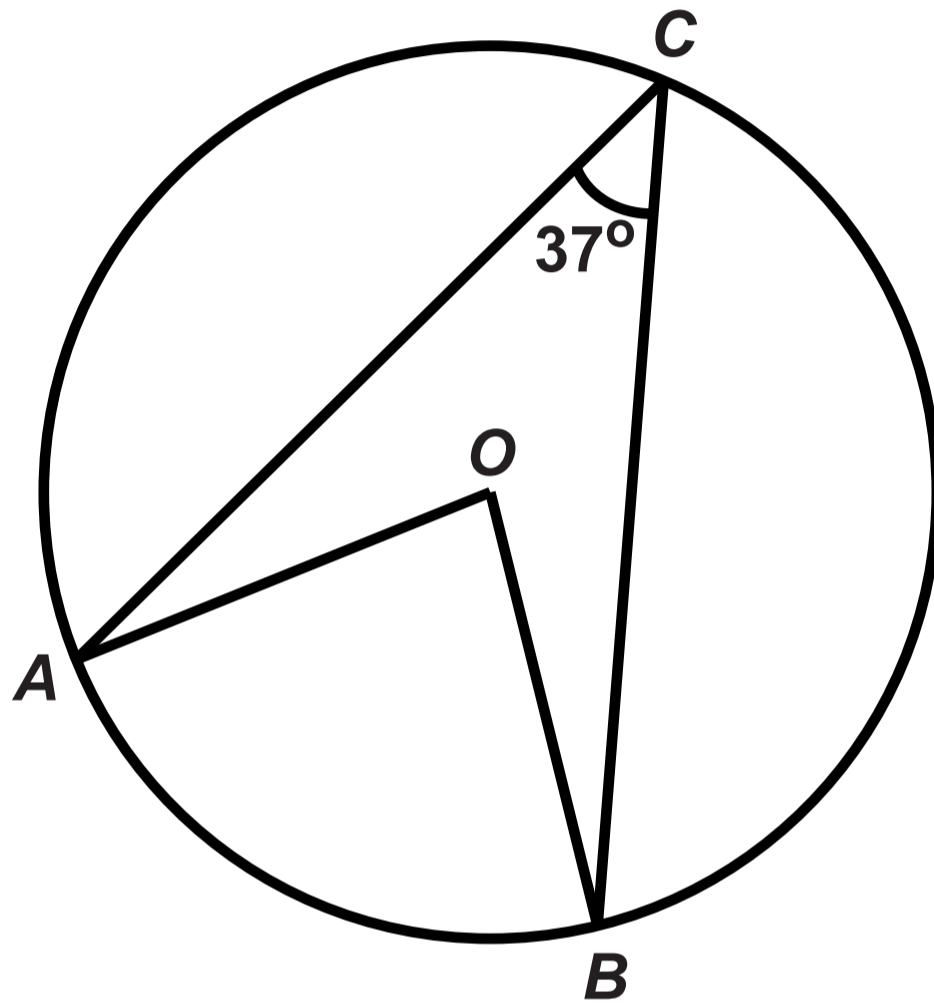
Choice of box

Choice of balls



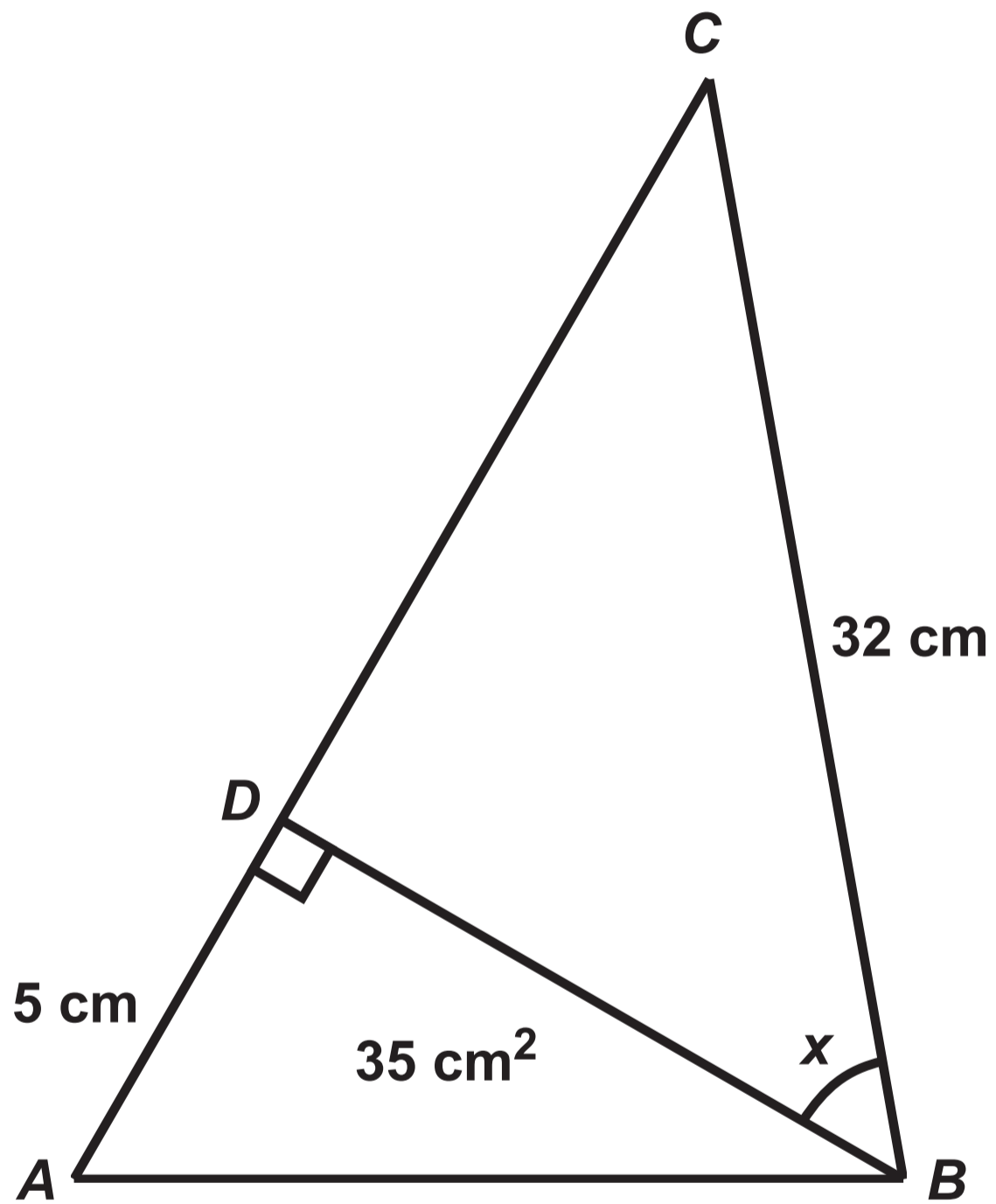
Question 10

Diagram NOT drawn to scale



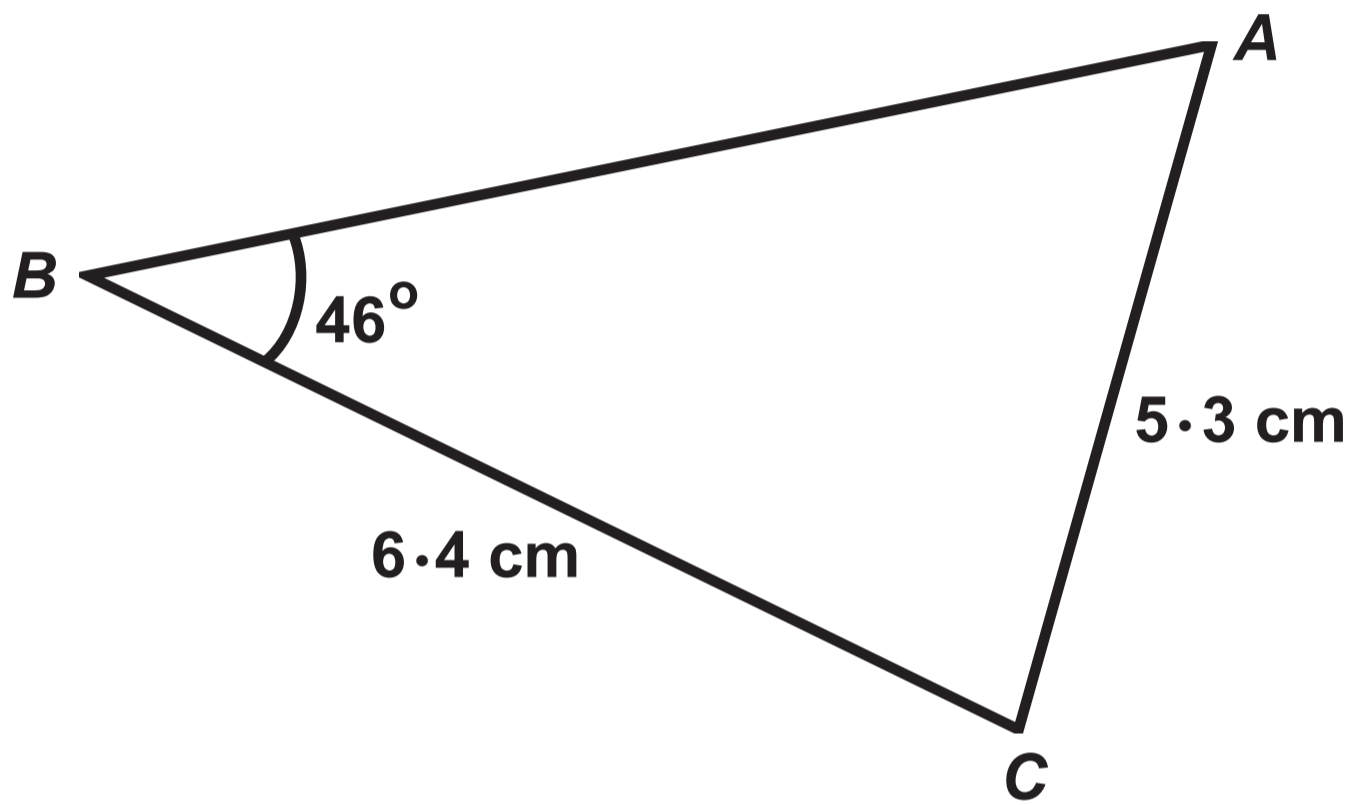
Question 11

Diagram NOT drawn to scale



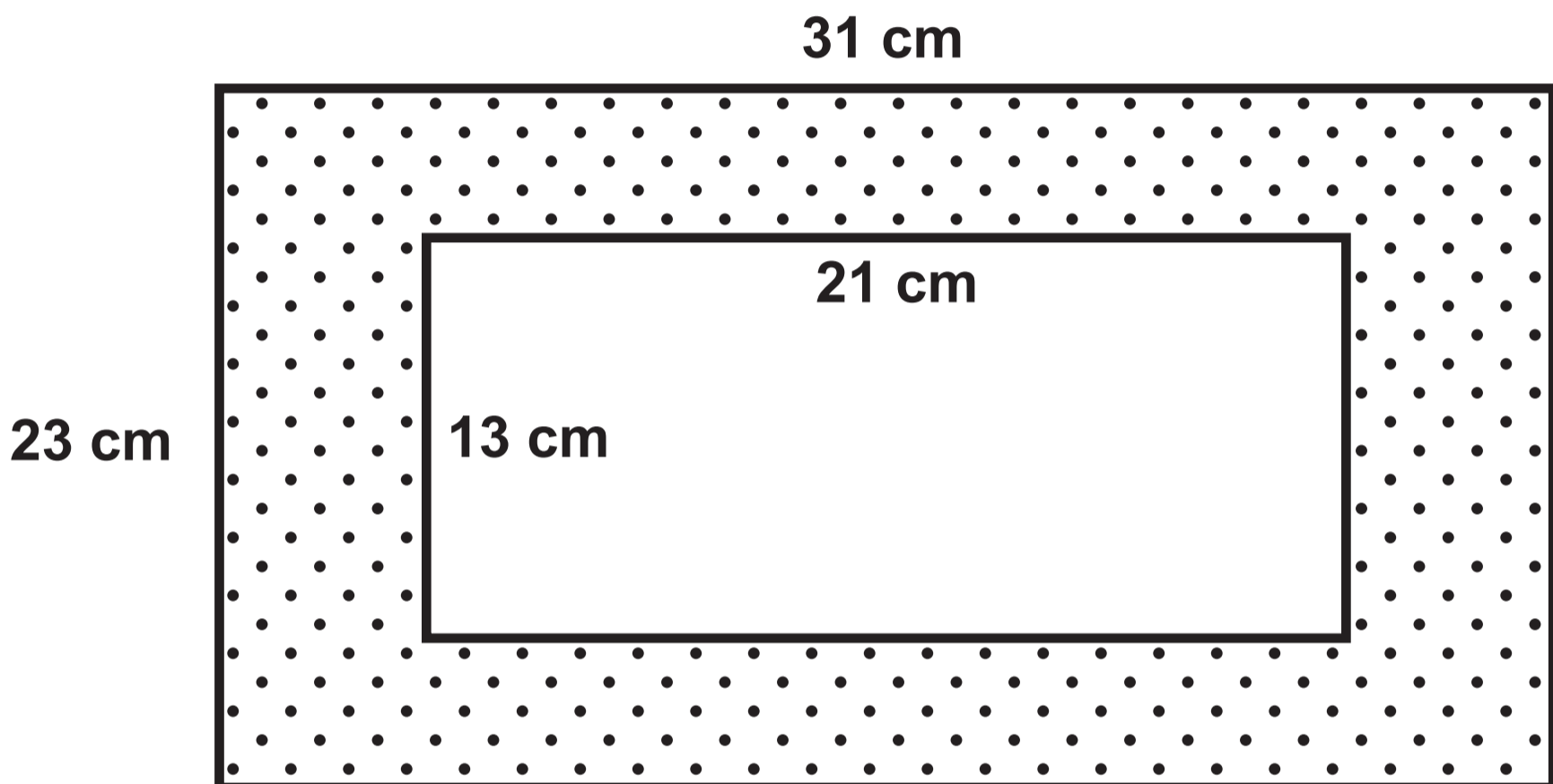
Question 13

Diagram NOT drawn to scale

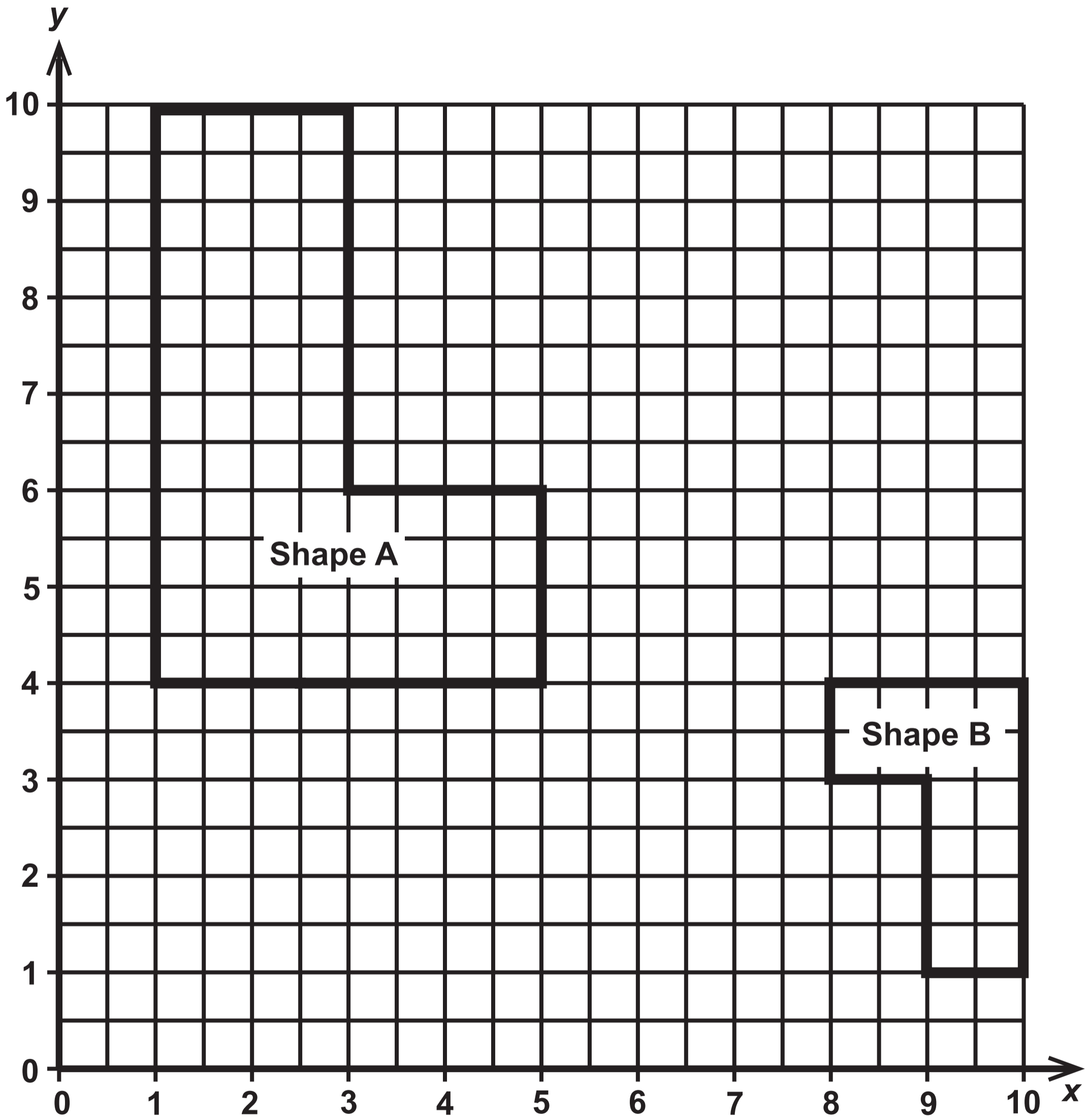


Question 14

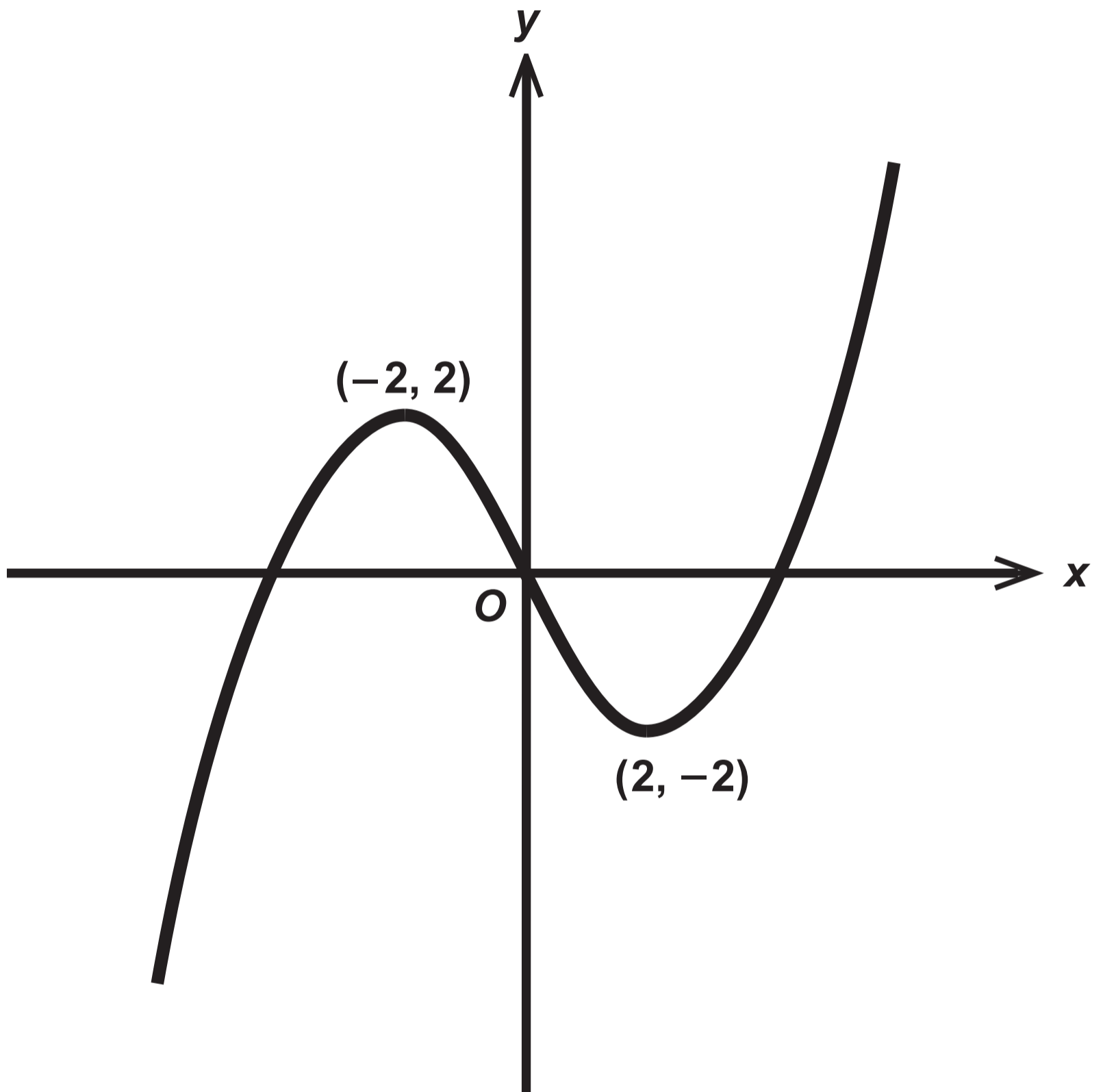
Diagram NOT drawn to scale



Question 15

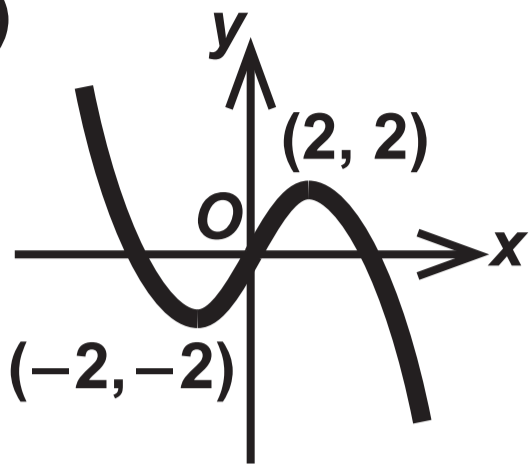


Question 20

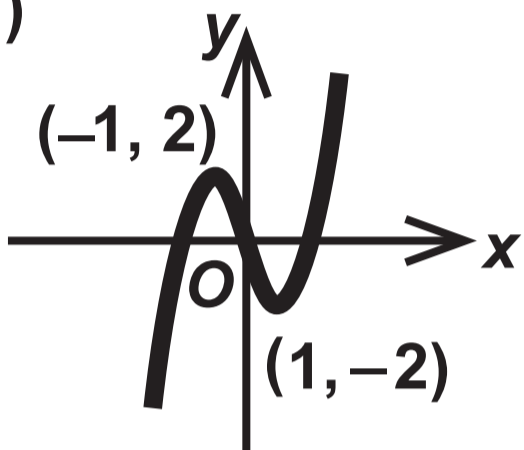


Question 20 (a)

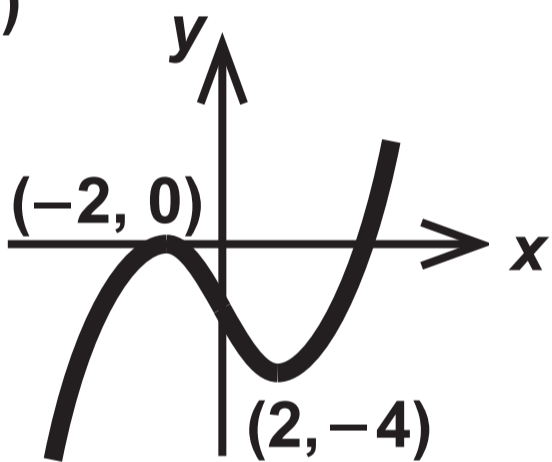
Graph (i)



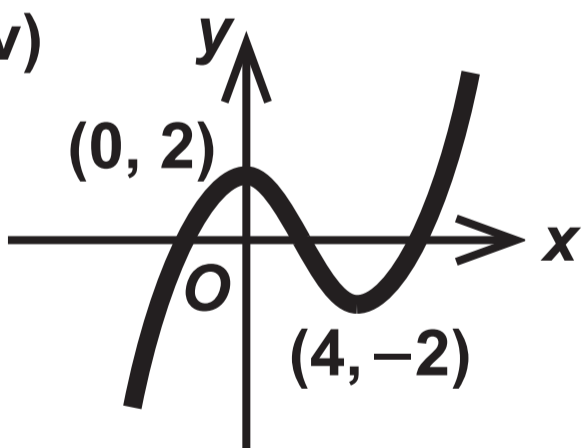
Graph (ii)



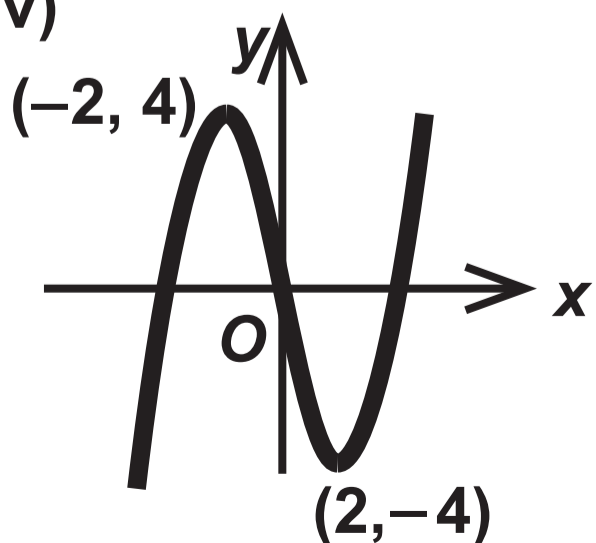
Graph (iii)



Graph (iv)



Graph (v)



$$y = f(x) - 2$$

$$y = f(x + 2)$$

$$y = -f(x)$$

$$y = 2f(x)$$

$$y = f(2x)$$

$$y = f(x) + 2$$

$$y = \frac{1}{2} f(x)$$

$$y = f(x - 2)$$

**GCSE – NEW
MATHEMATICS**



and

NUMERACY

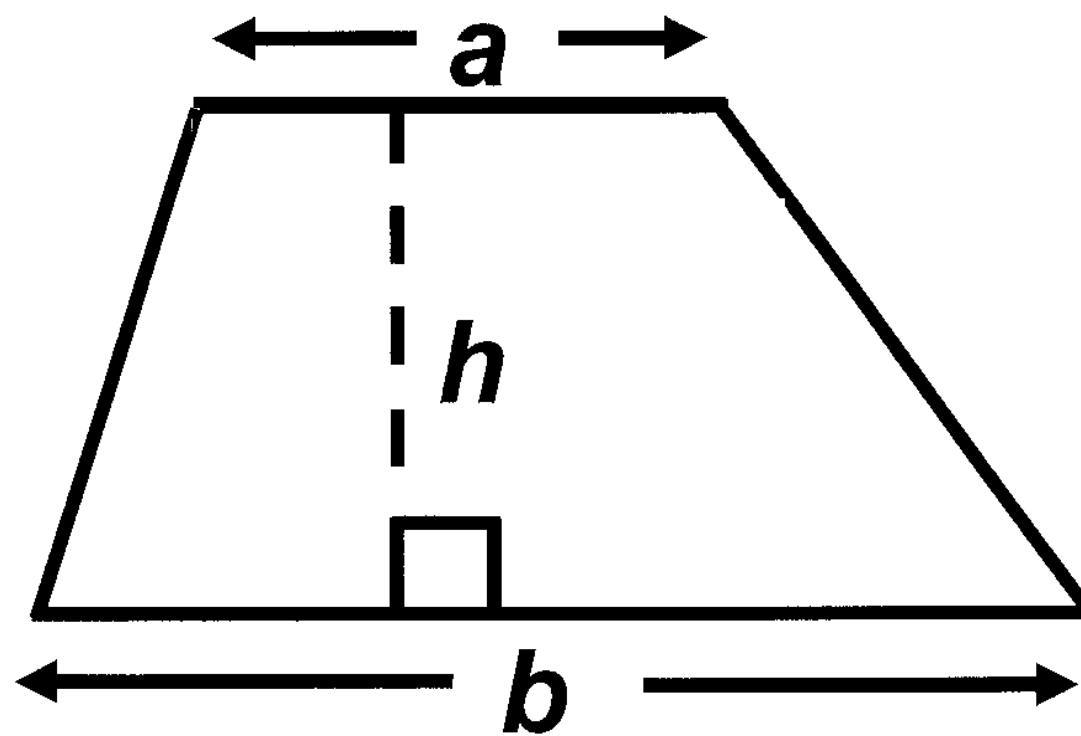
**FORMULA LIST
HIGHER TIER
GCSE**

You must not write on these formula pages.

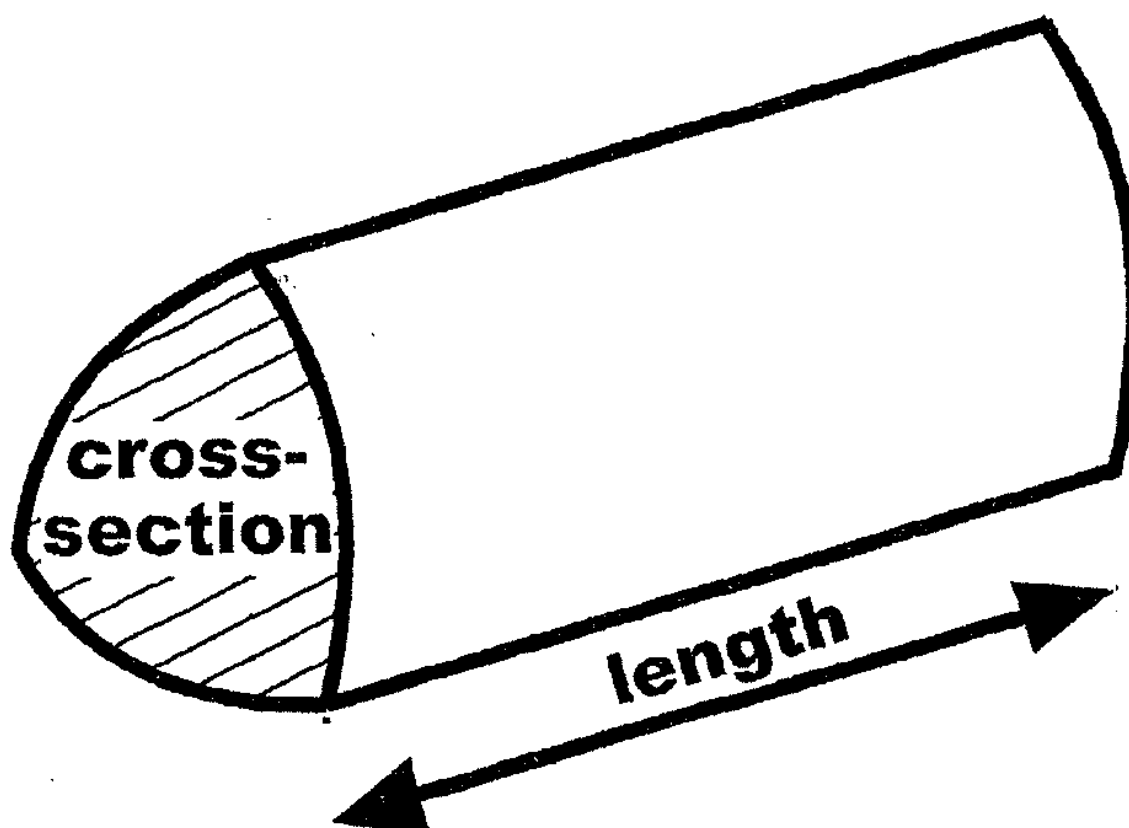
Anything you write on these formula pages will gain NO credit.

Formula List – Higher Tier

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

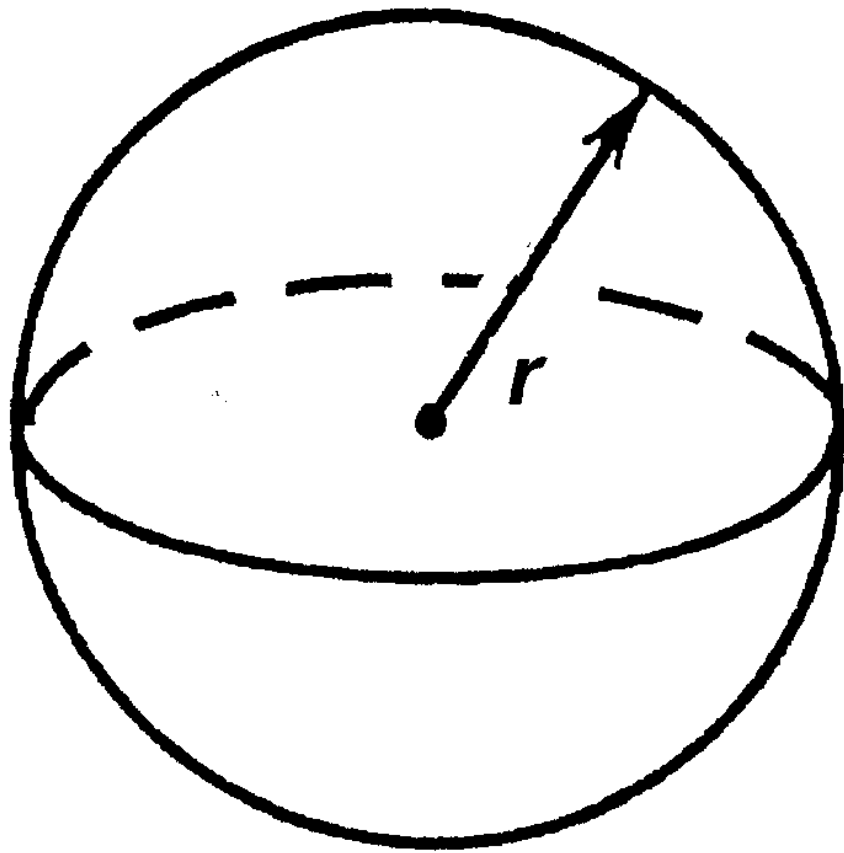


Volume of prism =
area of cross – section \times length



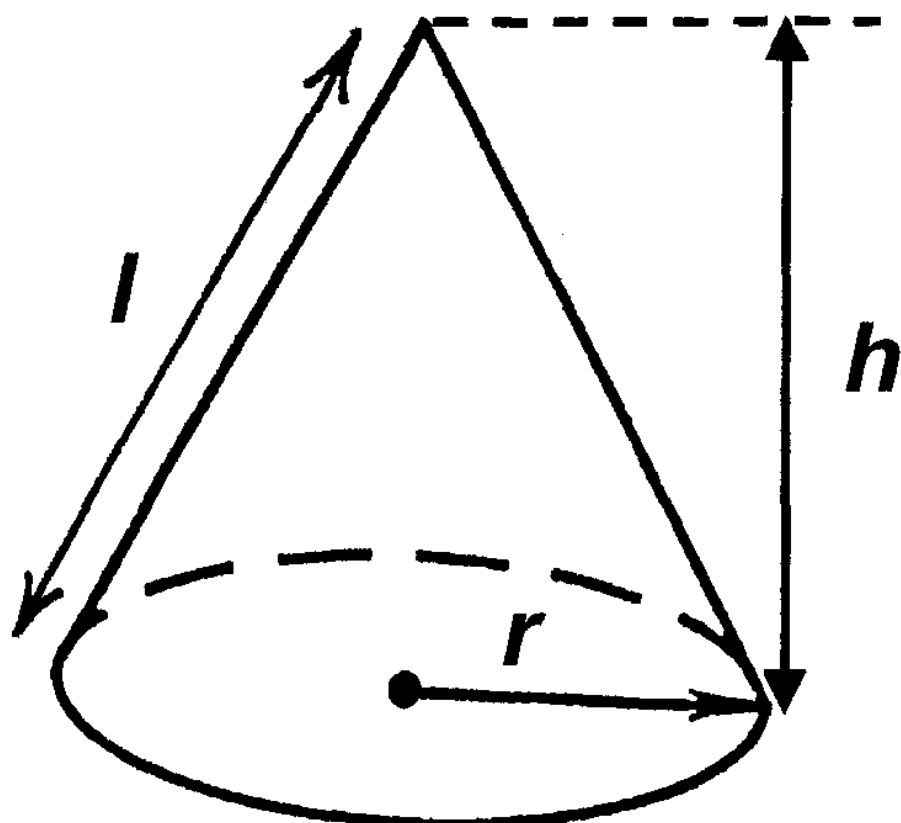
Volume of sphere = $\frac{4}{3}\pi r^3$

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

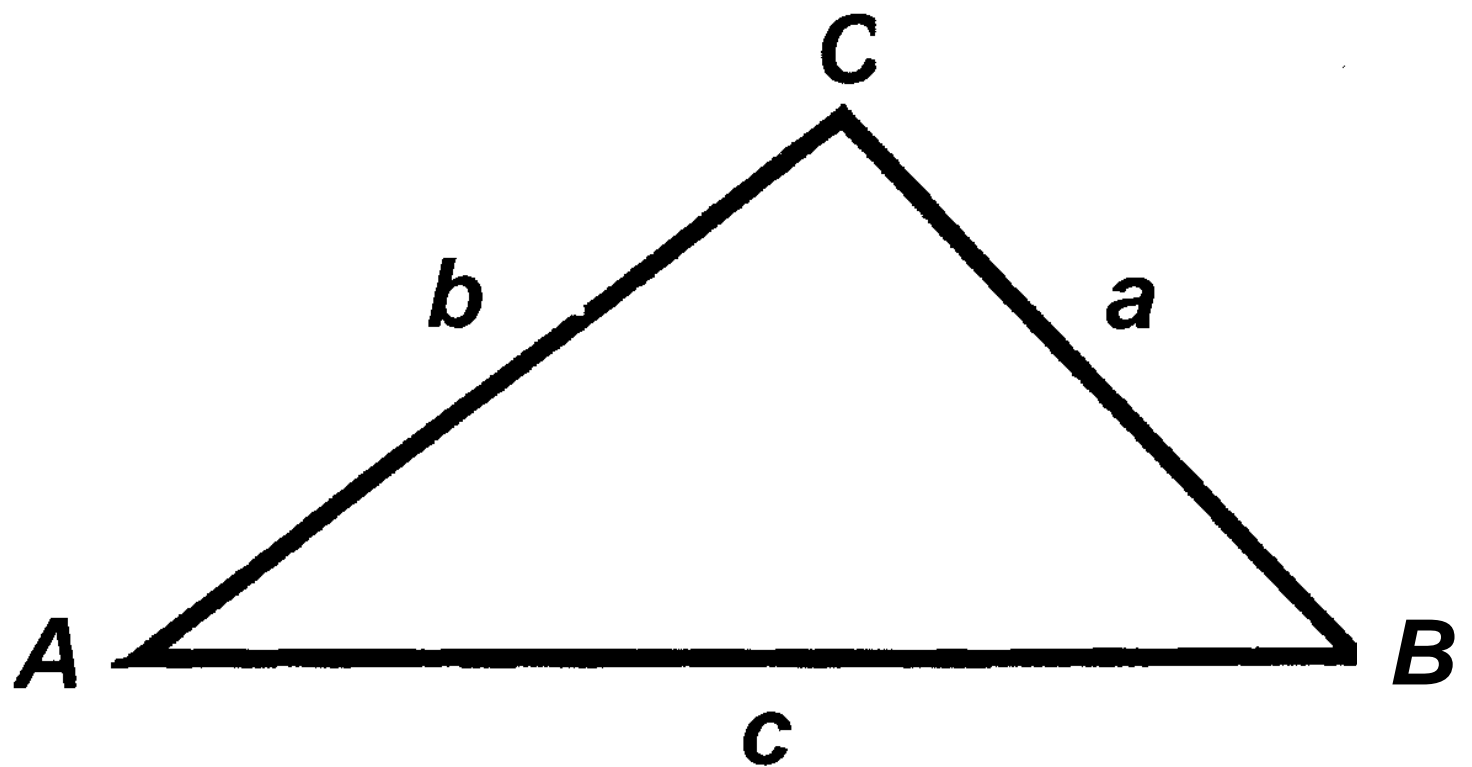


Volume of cone = $\frac{1}{3}\pi r^2 h$

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.