



GCSE



C300UB0 – 1

WEDNESDAY, 4 JUNE 2025 – MORNING

**MATHEMATICS – COMPONENT 2
CALCULATOR – ALLOWED MATHEMATICS
HIGHER TIER**

**2 hours 15 minutes plus your additional
time allowance**

**THE USE OF A CALCULATOR WILL BE
REQUIRED IN THIS EXAMINATION**

Surname: _____

First name(s): _____

Centre Number: _____

Candidate Number: 0 _____

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	7	
2.	7	
3.	5	
4.	6	
5.	5	
6.	6	
7.	6	
8.	6	
9.	3	
10.	2	
11.	3	
12.	6	
13.	5	
14.	4	
15.	4	
16.	4	
17.	6	
18.	5	
19.	4	
20.	3	
21.	6	
22.	2	
23.	2	
24.	5	
25.	8	
Total	120	

ADDITIONAL MATERIALS

An additional Formulae Booklet.

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

ITEMS INCLUDED WITH QUESTION PAPER

A separate Formula List.

A separate Diagram Booklet.

Models for Question 8, Question 13, Question 15 and Question 20.

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

Take π as $3 \cdot 142$ or use the π button on your calculator.

(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.

You are reminded of the need for good English and orderly, clear presentation in your answers.

(Turn over)

Answer ALL questions.

1. (a) Solve $3(4x - 2) = 7 - 8x$

[3 marks]

(b) Look at the diagram for Question 1 (b) in the separate Diagram Booklet. The diagram is a number line. Represent the solution to the inequality $-2 \leq 4n < 4$ on the number line.

[2 marks]

continued on the next page . . .

(Turn over)

Question 1 continued

1. (c) Factorise $2x^2 - 14x$

[2 marks]

(Turn over)

2. Look at the diagram for Question 2 in the separate Diagram Booklet. The diagram is a scatter diagram. When selling an apartment, the selling price can be calculated using the price per square metre of floor area.

The scatter diagram shows the price per square metre of **12** apartments and their distance from Educastle city centre.

It also shows the line of best fit for the data.

- (a) Describe the relationship between the price per square metre of an apartment and its distance from Educastle city centre.

[1 mark]

continued on the next page . . .

(Turn over)

Question 2 continued

- 2. (b) Use the line of best fit to estimate the price per square metre of an apartment that is 4 miles from Educastle city centre.**

[1 mark]

continued on the next page . . .

(Turn over)

Question 2 continued

2. (c) Ellie says,

**“All apartments $7\frac{1}{2}$ miles from
Educastle city centre cost £4000
per square metre.”**

Is Ellie’s statement correct?

Yes ☐ **No** ☐

Give the reason for your answer.

[1 mark]

continued on the next page . . .

(Turn over)

Question 2 continued

- 2. (d) Look at the table for Question 2 (d) in the separate Diagram Booklet. The table shows information about the house prices of 35 houses on a street outside Educastle city centre.**

Calculate an estimate for the mean house price on the street.

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

(Turn over)

[4 marks]

(Turn over)

3. Look at the diagram for Question 3 in the separate Diagram Booklet. The diagram is NOT drawn to scale. The diagram shows a square inside a circle. Each corner of the square lies on the circumference of the circle.

The length of each side of the square is 13 cm.

Calculate the area of the circle.

Give your answer correct to 1 decimal place.

You must show all your working.

(Turn over)

Area of the circle = _____ cm^2
[5 marks]

4. Yasmin has two bags, Bag **A** and Bag **B**.
Each bag contains some red counters and some blue counters.

Bag **A** contains 2 red counters and 3 blue counters.
In Bag **B** the number of red counters is three times the number of blue counters.

Yasmin randomly chooses one counter from Bag **A** and then one counter from Bag **B**.

- (a) Look at the diagram for Question 4 (a) in the separate Diagram Booklet. The diagram shows an incomplete probability tree diagram.
Complete the probability tree diagram.

[3 marks]

continued on the next page . . .

(Turn over)

Question 4 continued

4. (b) Calculate the probability that Yasmin chooses at least one blue counter.

[3 marks]

5. (a) Look at the diagram for Question 5 (a) in the separate Diagram Booklet. The diagram shows five straight – line graphs. Their equations are shown in the table below.

Complete the table to match each graph to its equation.

One has been completed for you.

Equation	Graph
$y = 2x + 1$	
$y = x$	Graph A
$y = -x - 1$	
$y = 2x$	
$y = -2x + 1$	

[2 marks]

continued on the next page . . .

(Turn over)

Question 5 continued

5. (b) Circle the equation of the straight line that is parallel to $y = 3x + 5$

$$3y = x + 5$$

$$y = -3x$$

$$2y = 6x + 8$$

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

$$y + 3x = 7$$

[1 mark]

continued on the next page . . .

(Turn over)

Question 5 continued

5. (c) Make ***y*** the subject of the following formula.

$$\frac{y}{t} + u = x$$

[2 marks]

(Turn over)

6. (a) Look at the diagram for Question 6 (a) in the separate Diagram Booklet. The diagram is NOT drawn to scale. The diagram shows triangle ***ABC***.

In the diagram:

AC = 15 cm

Angle ***BAC*** = 38°

Angle ***ABC*** is a right angle.

Calculate the length of ***AB***.

[3 marks]

continued on the next page . . .

(Turn over)

Question 6 continued

6. (b) Look at the diagram for Question 6 (b) in the separate Diagram Booklet. The diagram is NOT drawn to scale. The diagram shows triangle *DFE*.

In the diagram:

$$DF = 19 \text{ cm}$$

$$FE = 17 \text{ cm}$$

Angle *DFE* is a right angle.

Calculate the size of angle *DEF*.

[3 marks]

(Turn over)

7. Greg has been saving 10p and 20p coins in a money jar.

The ratio of the number of 10p coins to the number of 20p coins in Greg's money jar is 2:7

Greg gives all the 20p coins to his children, Rona and Jamie, in the ratio 3:4

The 20p coins that Rona was given have a total value of £3.60

What was the total value of the coins in Greg's money jar?

You must show all your working.

[6 marks]

8. Ask for the models for Question 8. The models are NOT made to scale. There are two models.

Model 1 represents a wooden block.

Zachary saws off a small block that is 30% of the original wooden block.

Model 2 represents the small block.

The mass of Zachary's small block is 5.4 kg.

The density of the wood is 0.75 g/cm³

- (a) Calculate the volume of the ORIGINAL wooden block.

[5 marks]

continued on the next page . . .

(Turn over)

Question 8 continued

8. (b) Zachary converts the volume of the wooden block from cubic centimetres (cm^3) to cubic inches (in^3).

He uses the conversion $2.5 \text{ cm} \approx 1 \text{ inch}$.

Zachary says,

“To convert the volume from cm^3 into in^3 I must divide the volume by 2.5”

Explain why Zachary’s method is incorrect.

[1 mark]

(Turn over)

9. (a) Circle the expression that is equivalent to $(b \times 10^x) \div (c \times 10^{-y})$

$bc \times 10^{x-y}$
$\frac{b}{c} \times 10^{x-y}$
$\frac{b}{c} \times 10^{x+y}$
$\frac{b}{c} \times 10^{\frac{x}{-y}}$
$(b - c) \times 10^{x+y}$

[1 mark]

continued on the next page . . .

(Turn over)

Question 9 continued

9. (b) Circle the expression that is equivalent to $(\sqrt{a})^5$

a^5
$5\sqrt{a}$
$\frac{1}{a^5}$
$a^2\sqrt{a}$
$a^4\sqrt{a}$

[1 mark]

continued on the next page . . .

(Turn over)

Question 9 continued

9. (c) Circle the expression that is equivalent to $\left(\frac{f}{g}\right)^{-\frac{1}{3}}$

$\sqrt[3]{\frac{g}{f}}$
$\sqrt[3]{\frac{f}{g}}$
$\frac{g}{\sqrt[3]{f}}$
$\frac{f}{\sqrt[3]{g}}$
$\left(\frac{f}{g}\right)^3$

[1 mark]

(Turn over)

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

In the diagram:

The lines AC and DE are parallel.

D is a point on the line AB such that $AD : DB$ is in the ratio $5 : 2$

The length of AC is 23.8 cm.

Calculate the length of DE .

[2 marks]

(Turn over)

- 11. Prove that $(n + 4)^2 - (n - 1)^2$ is a multiple of 5 for all integer values of n .**

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

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(Turn over)

[3 marks]

(Turn over)

- 12. Look at the diagram for Question 12 in the separate Diagram Booklet. The diagram shows seven box plots.**

Isaias recorded the number of hours of sleep he had each night last year.

The box plots show the results for Monday, Tuesday, Wednesday, Thursday, Friday, Saturday and Sunday.

- (a) On which day was the median number of hours of sleep the greatest?**

[1 mark]

- (b) Calculate the range of the number of hours of sleep on Fridays.**

[1 mark]

continued on the next page . . .

(Turn over)

Question 12 continued

12. (c) Complete the following sentence.

On **25%** of Mondays Isaias slept longer than

_____ hours _____ minutes.

[1 mark]

(d) Isaias recorded the number of hours of sleep he had on the **52** Thursdays last year.

On how many Thursdays last year did Isaias sleep for **7** hours or less?

[2 marks]

continued on the next page . . .

(Turn over)

Question 12 continued

12. (e) Which day of the week is Isaias's sleep pattern the most consistent?

Give a reason for your answer.

[1 mark]

(Turn over)

13. Ask for the models for Question 13. The models are NOT made to scale.

There are two models: Model **A** and Model **B**.

Model **A** is a hemisphere, centre **O**, with radius **9 cm** cut into **10** equal pieces.

One piece has been removed.

The removed piece is Model **B**.

Calculate the total surface area of the removed piece.

You must show all your working.

[5 marks]

14. Simplify $\frac{y^2 + y - 12}{3y + 12}$

[illegible]

[4 marks]

15. Ask for the models for Question 15. The models are NOT made to scale. There are two models.

Model 1 represents a large tank.

Model 2 represents a tin of paint.

Paint is stored in large tanks.

**The volume of paint in each tank is 1500 litres,
CORRECT TO THE NEAREST 20 LITRES.**

The paint from the tank is poured into tins.

**Each tin has a capacity of 10 litres, CORRECT TO
THE NEAREST 0.1 LITRE.**

**Calculate the maximum number of tins that can be
filled using paint from one of the tanks.**

(Turn over)

[4 marks]

16. Look at the diagram for Question 16 in the separate Diagram Booklet. The diagram is NOT drawn to scale. The diagram shows points A , B and C on the circumference of a circle with centre O . The line DAE is a tangent to the circle.

In the diagram:

Angle $EAC = 65^\circ$

Angle $BOC = x^\circ$

Show that angle $ABO = \left(\frac{1}{2}x - 25\right)^\circ$

Give a reason for each step of your answer.

(Turn over)

[4 marks]

(Turn over)

17. Look at the diagrams for Question 17 in the separate Diagram Booklet. The diagrams are NOT drawn to scale.

There are two diagrams:

Diagram 1 and Diagram 2

Diagram 1 shows a kite labelled *ABCD*.

In the diagram: *AB* = 11 mm

Angle *DAB* = 107°

Diagram 2 shows a logo created by arranging 8 of the kites inside an OCTAGON.

Calculate the area of one shaded triangle.

Hence, calculate the total area of the shaded region of the logo.

(Turn over)

[6 marks]

(Turn over)

- 18. Rohan invests money in a compound interest account with interest paid annually.**

The interest rate stays the same for the period of the investment.

In 4 years, his investment has increased in value from £7800 to £8950.70

How much will his investment be worth after a further 3 years?

Give your answer correct to the nearest pound.

After a further 3 years, Rohan's investment is worth _____ to the nearest pound.

[5 marks]

(Turn over)

19. y is directly proportional to the square root of x .

$$y = 0.14 \text{ when } x = 0.49$$

(a) Find the formula for y in terms of x .

[3 marks]

(b) Calculate the value of y when $x = 5.29$

[1 mark]

(Turn over)

- 20. Ask for the models for Question 20. The models are NOT made to scale. There are three models.**

Model 1 is a large pyramid. The base of the large pyramid is a square with sides of length 40 cm.

A small pyramid is REMOVED from the top of the large pyramid. Model 2 is the small pyramid that has been REMOVED. The base of the small pyramid is a square with sides of length 16 cm.

Model 3 is the part of the large pyramid that is left after the small pyramid has been removed.

What percentage of the large pyramid's volume has been removed?

(Turn over)

[3 marks]

21. Look at the diagram for Question 21 in the separate Diagram Booklet. The diagram is NOT drawn to scale. A boat makes the following journey from Port *A* to Port *C*.

- It sails 30 km on a bearing of 108° from Port *A* to Port *B*.
- It then sails 42 km on a bearing of 065° from Port *B* to Port *C*.

On its return journey, the boat travels directly from Port *C* to Port *A*.

This journey takes 1 hour and 45 minutes.

Calculate the average speed of the boat on its return journey.

**The average speed of the boat
is _____ km/h**

[6 marks]

(Turn over)

22. Look at the diagram for Question 22 in the separate Diagram Booklet. The diagram is NOT drawn to scale. The diagram shows Circle **A** and Circle **B**. Circle **A** has its centre at the origin. Circle **B** has its centre at $(7,0)$ and passes through the origin. Circle **A** and Circle **B** touch at the same point on the **X** axis.

Write down the equation of Circle **A**.

[2 marks]

23. Look at the diagram for Question 23 in the separate Diagram Booklet.

The diagram shows a sketch of $y = f(x)$

It has a stationary point at $(3,5)$

On the same diagram, sketch $y = f(x + 4)$

Mark clearly the coordinates of the stationary point.

[2 marks]

- 24. Look at the diagram for Question 24 in the separate Diagram Booklet. The diagram is a graph.**

The graph shows a curve and a straight line.

Use FIVE vertical strips of equal width to calculate an estimate for the area of the shaded region.

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.

[5 marks]

25. A tank containing 1000 litres of water was emptied in two stages.

During the first stage, 400 litres were emptied out of the tank at a constant rate.

This took X minutes.

During the second stage, the remaining water was emptied out at a different constant rate. This took $X-26$ minutes.

During the second stage, the rate of flow of the water from the tank was 17 litres per minute faster than the rate of flow during the first stage.

(a) Show that $17x^2 - 642x - 10\,400 = 0$

(Turn over)

[5 marks]

25. (b) By solving $17x^2 - 642x - 10\,400 = 0$ find the value of x .

You must show all your working.

(Turn over)

[3 marks]

END OF PAPER

TOTAL 120 MARKS

(Turn over)

[illegible]

(Turn over)

[illegible]

(Turn over)

[illegible]



GCSE



C300UB0 – 1

WEDNESDAY, 4 JUNE 2025 – MORNING

MATHEMATICS – COMPONENT 2

CALCULATOR – ALLOWED MATHEMATICS

HIGHER TIER

Diagram Booklet

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

Surname: _____

First name(s): _____

Centre Number: _____

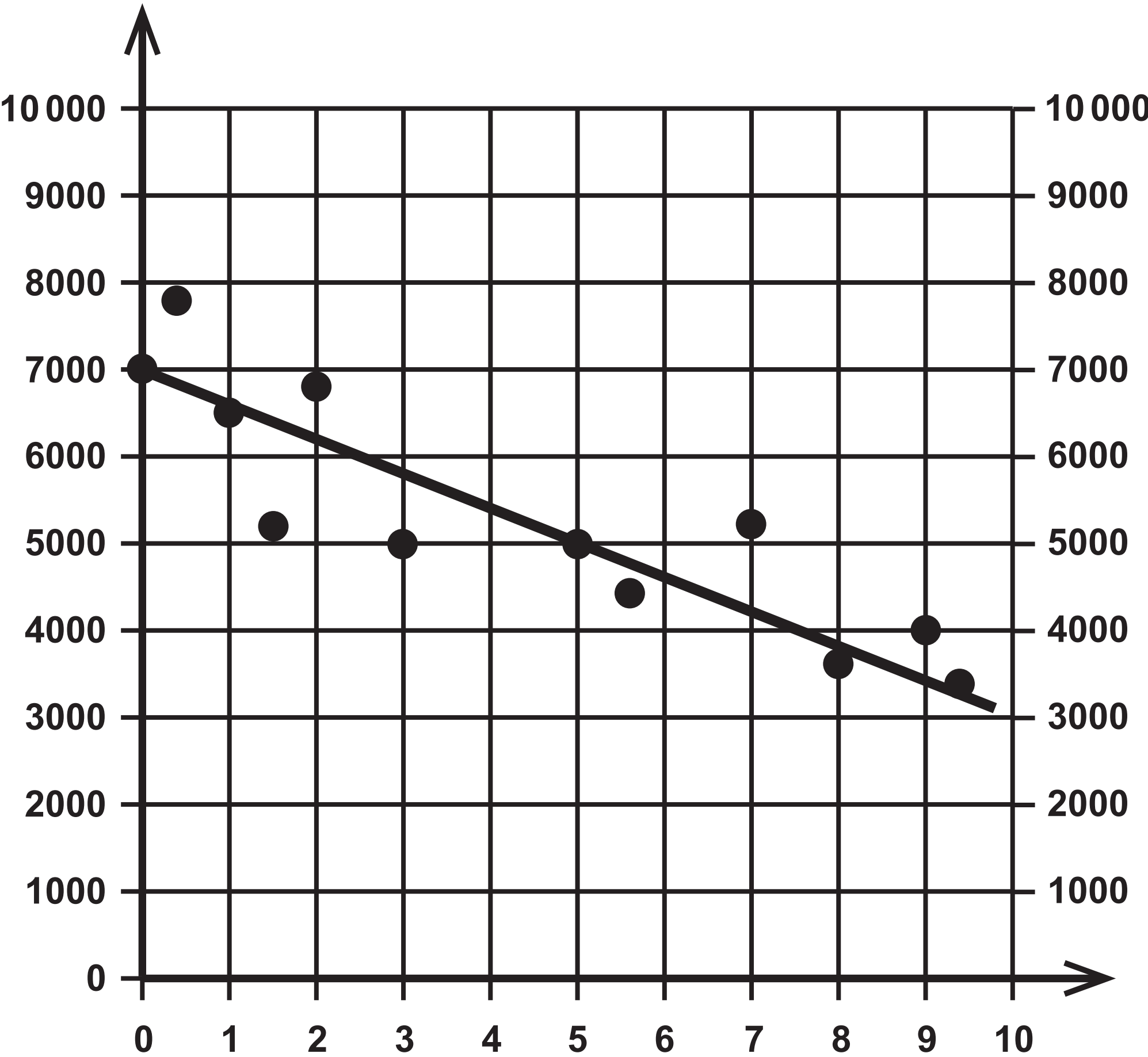
Candidate Number: 0 _____

Question 1 (b)



Question 2

Price per square metre in pounds (£)



Distance from Educastle city centre in miles

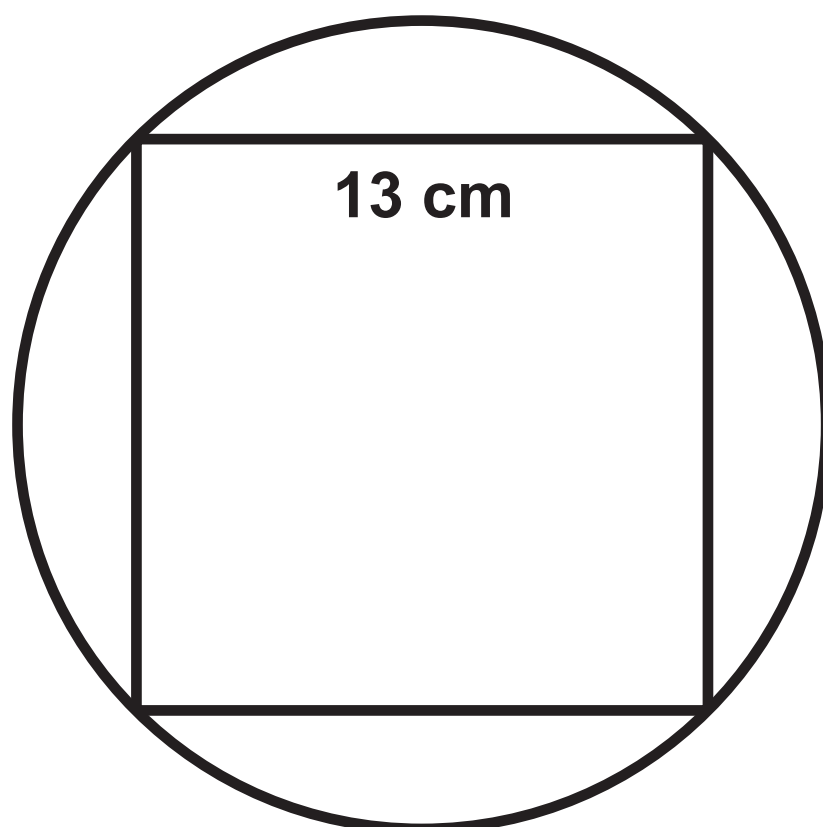
Question 2 (d)

Table

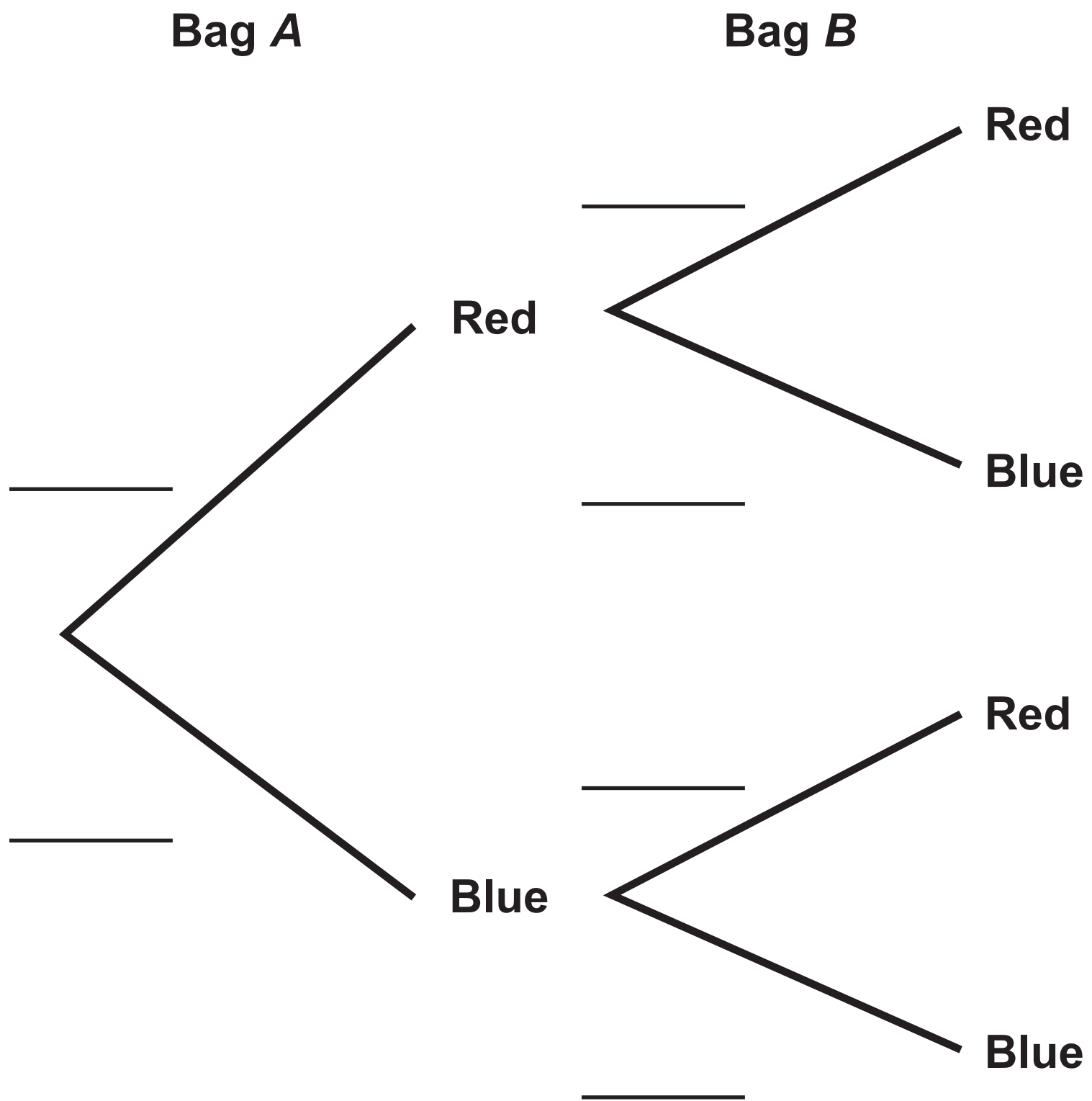
Price, p , thousand pounds	Frequency
$100 < p \leq 150$	8
$150 < p \leq 200$	12
$200 < p \leq 250$	9
$250 < p \leq 300$	5
$300 < p \leq 350$	1

Question 3

Diagram NOT drawn to scale

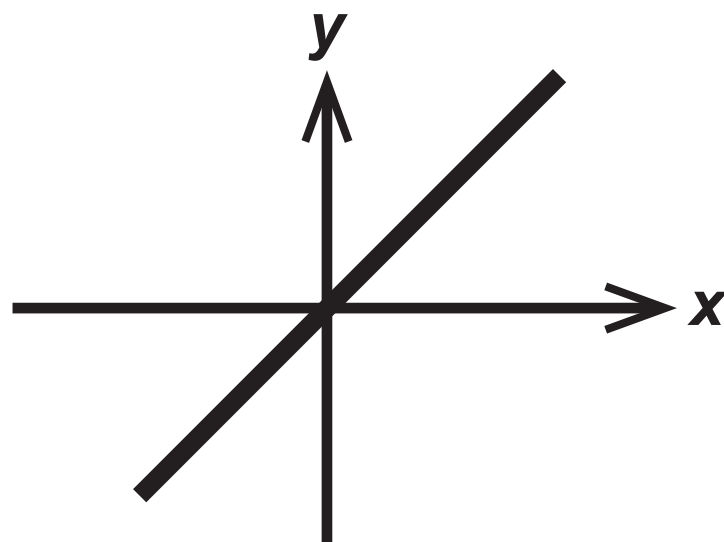


Question 4 (a)

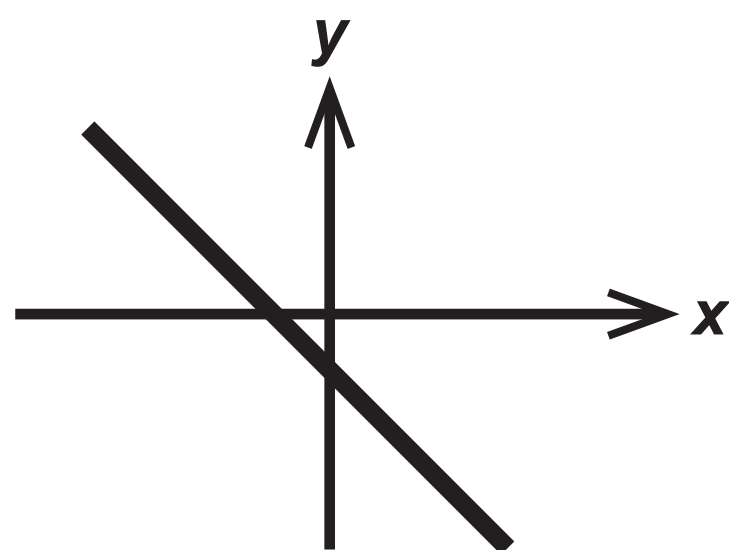


Question 5 (a)

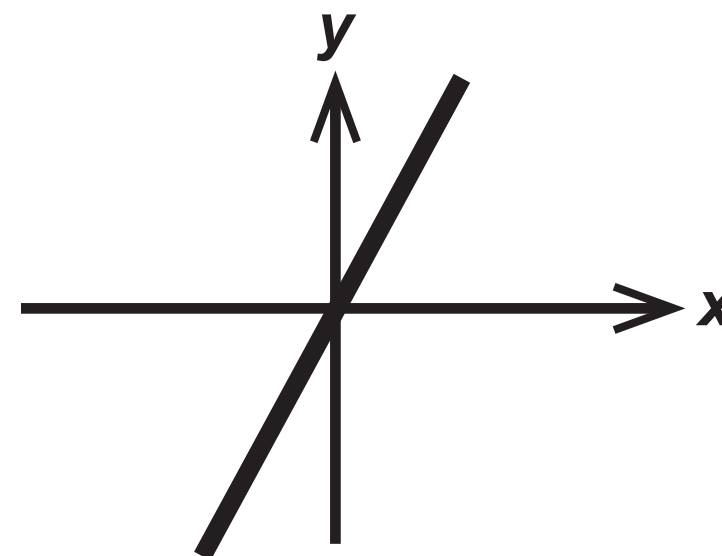
Graph A



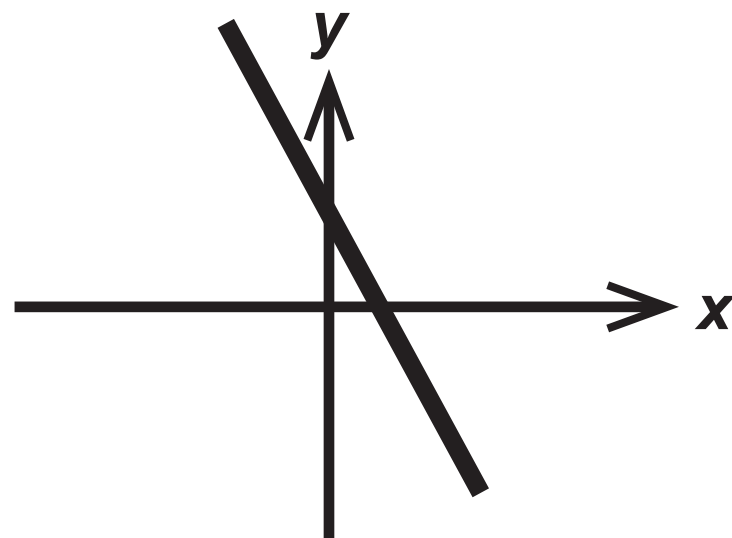
Graph B



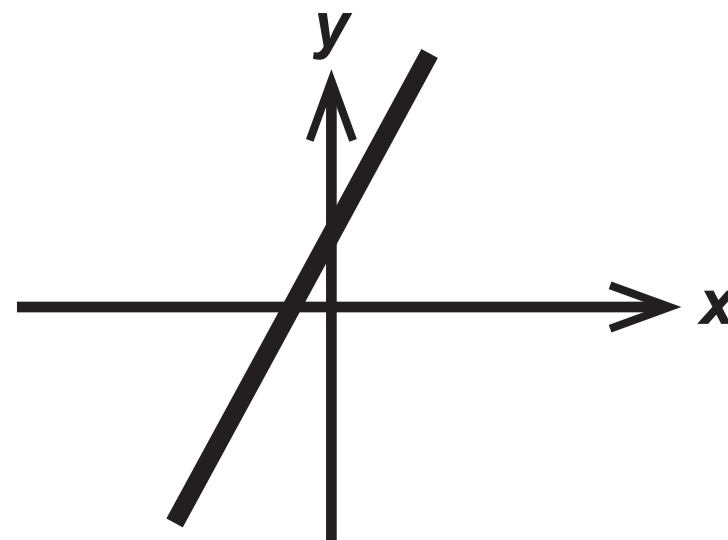
Graph C



Graph D

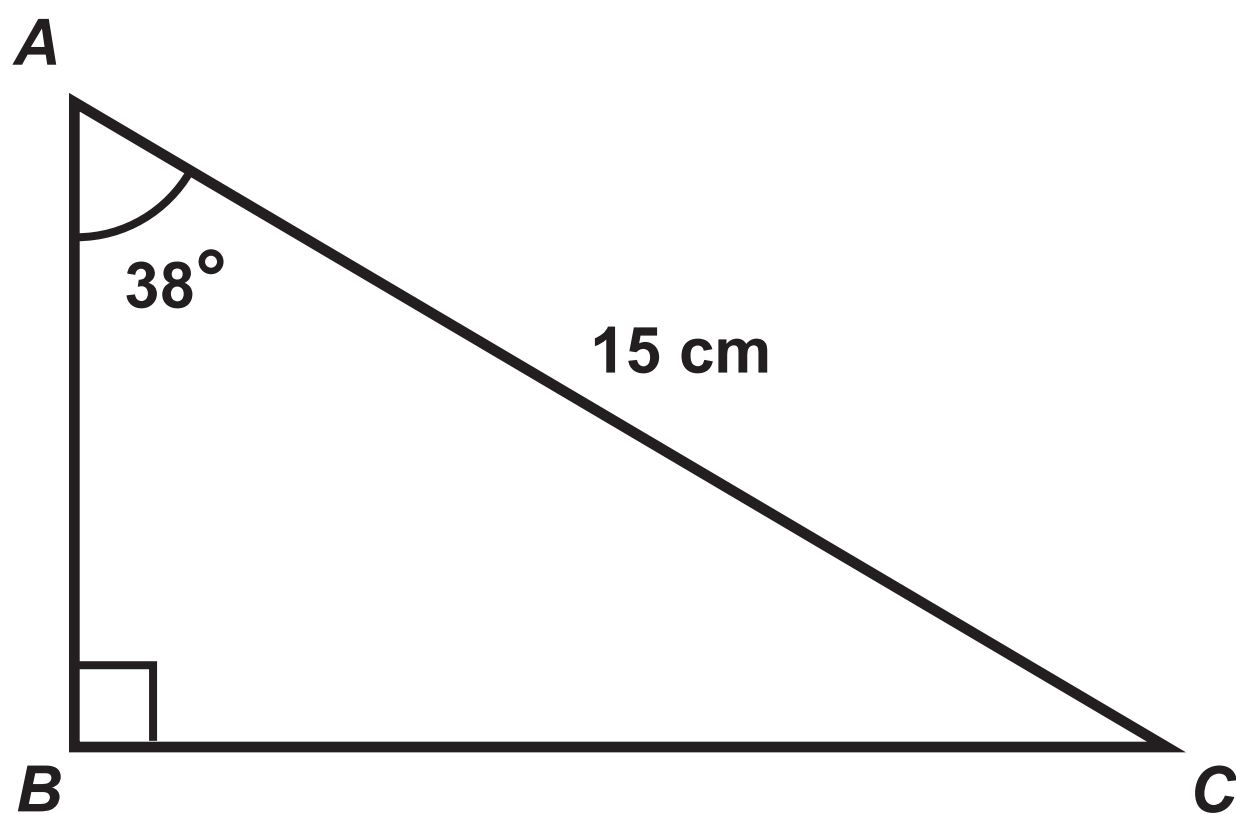


Graph E



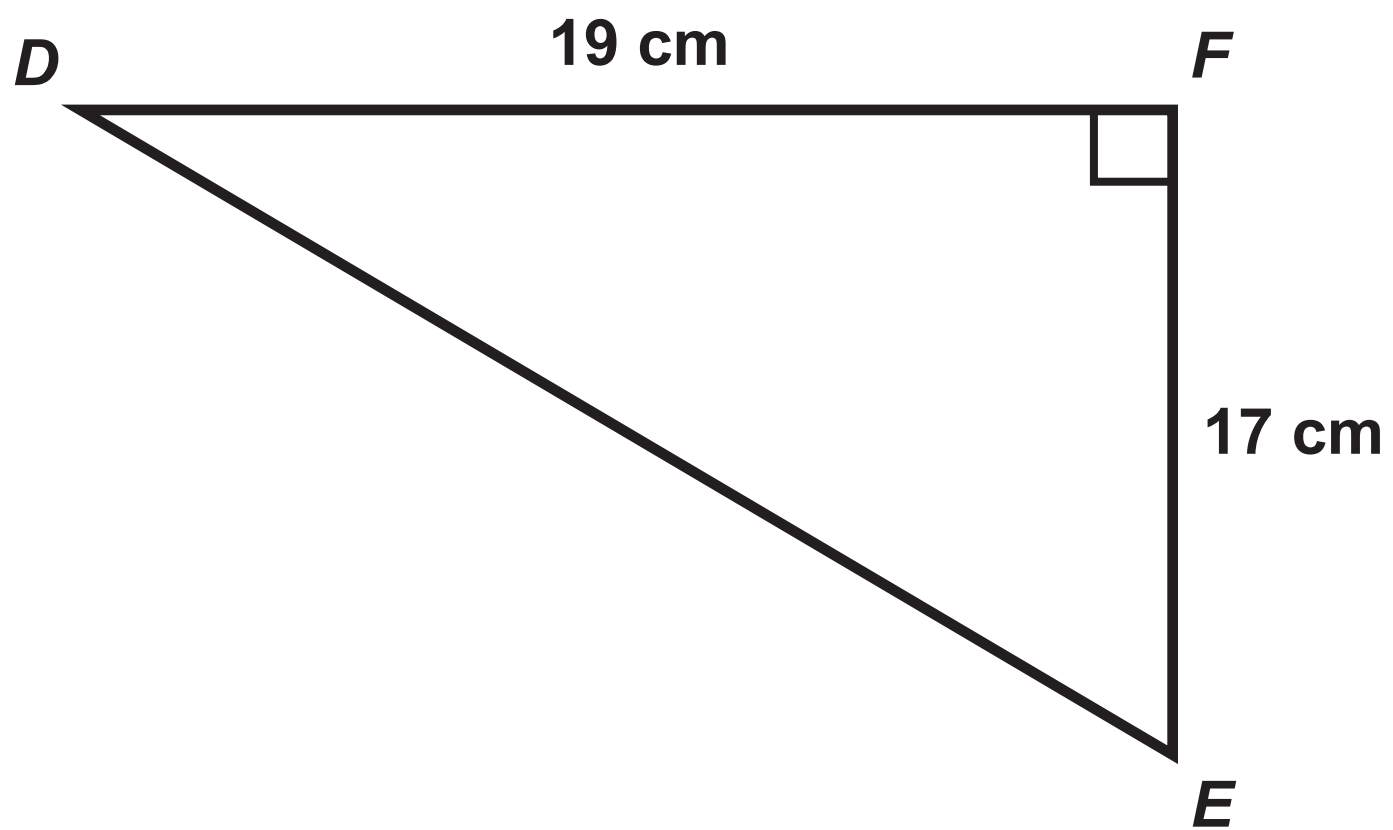
Question 6 (a)

Diagram NOT drawn to scale



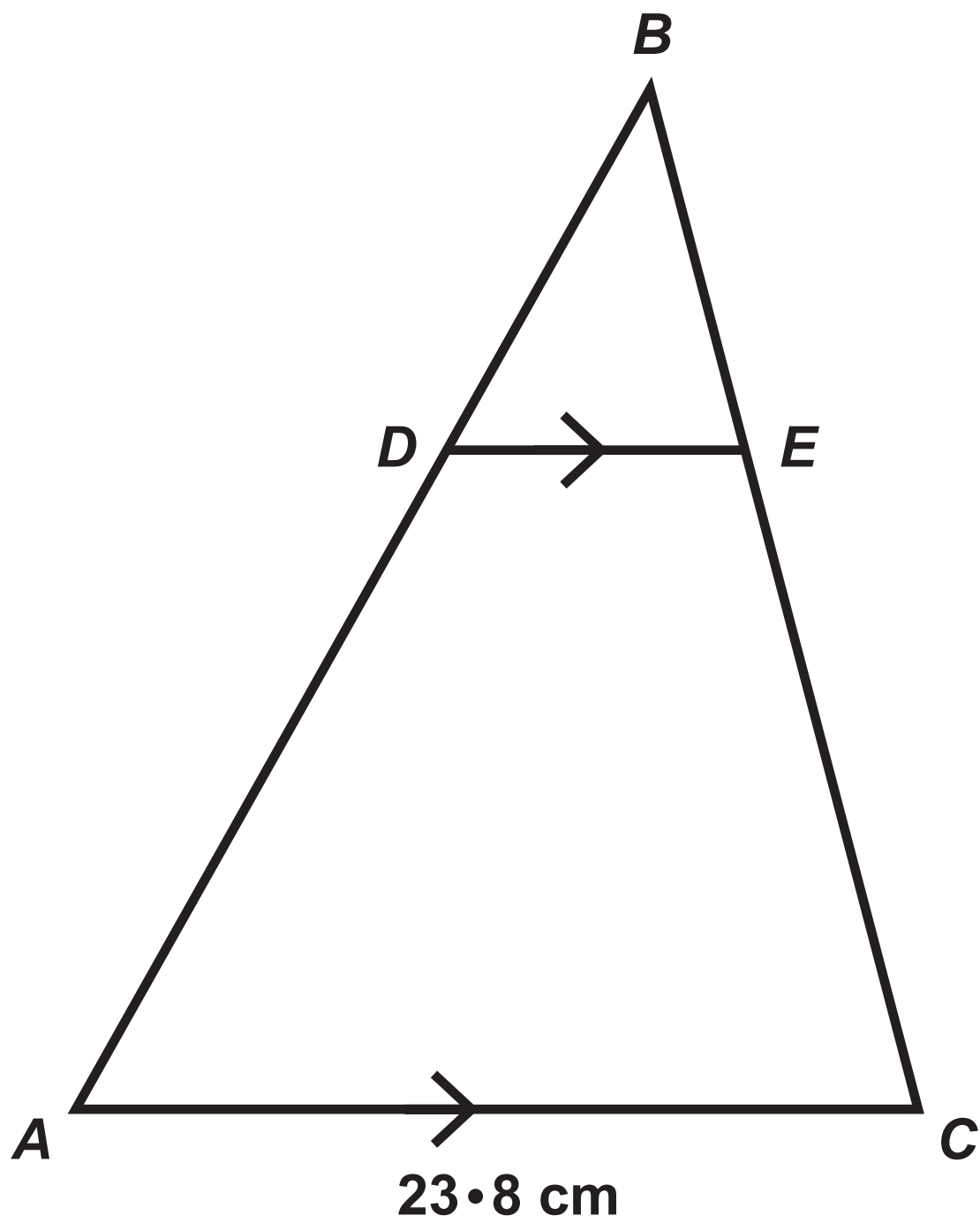
Question 6 (b)

Diagram NOT drawn to scale

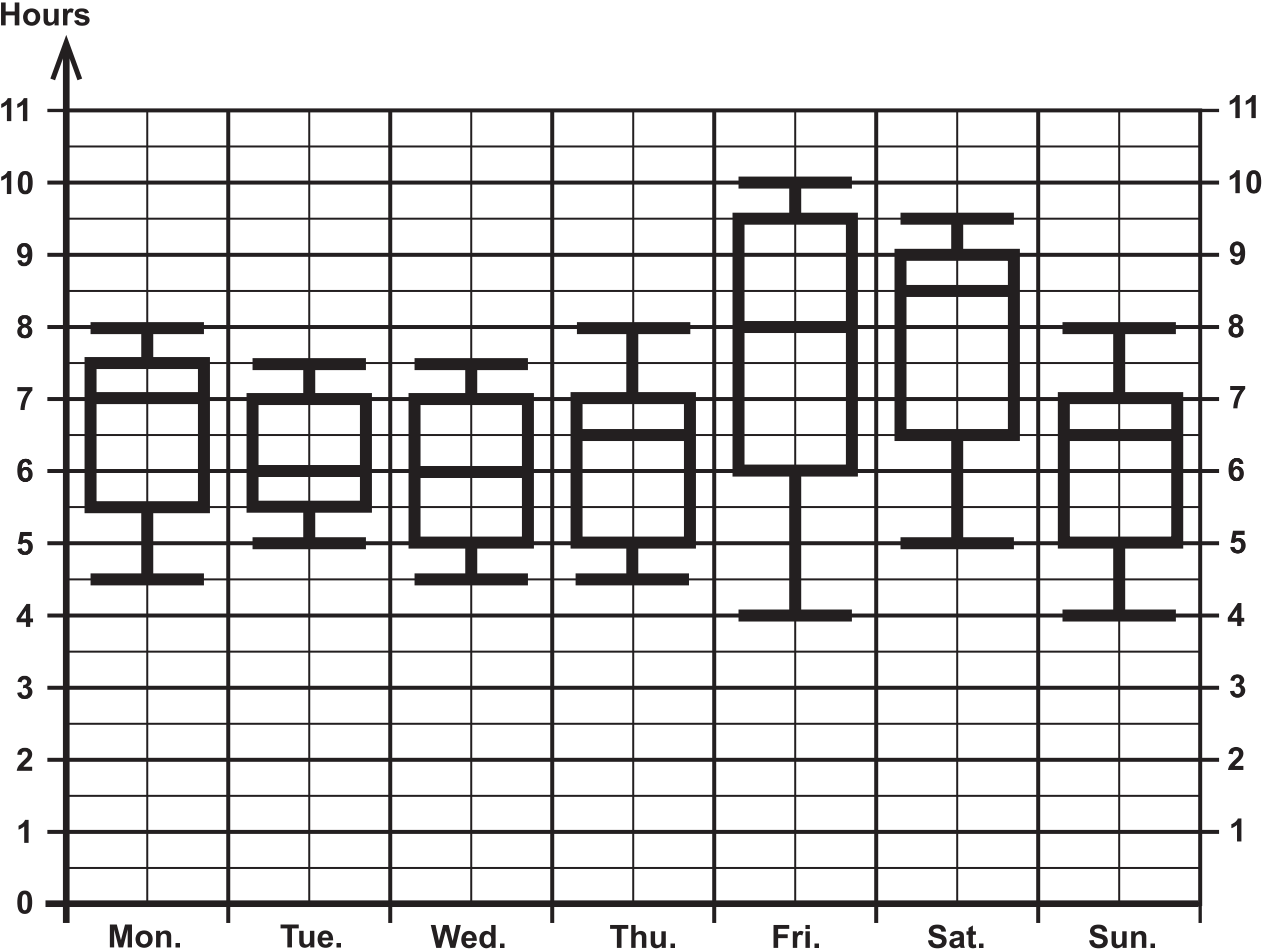


Question 10

Diagram NOT drawn to scale

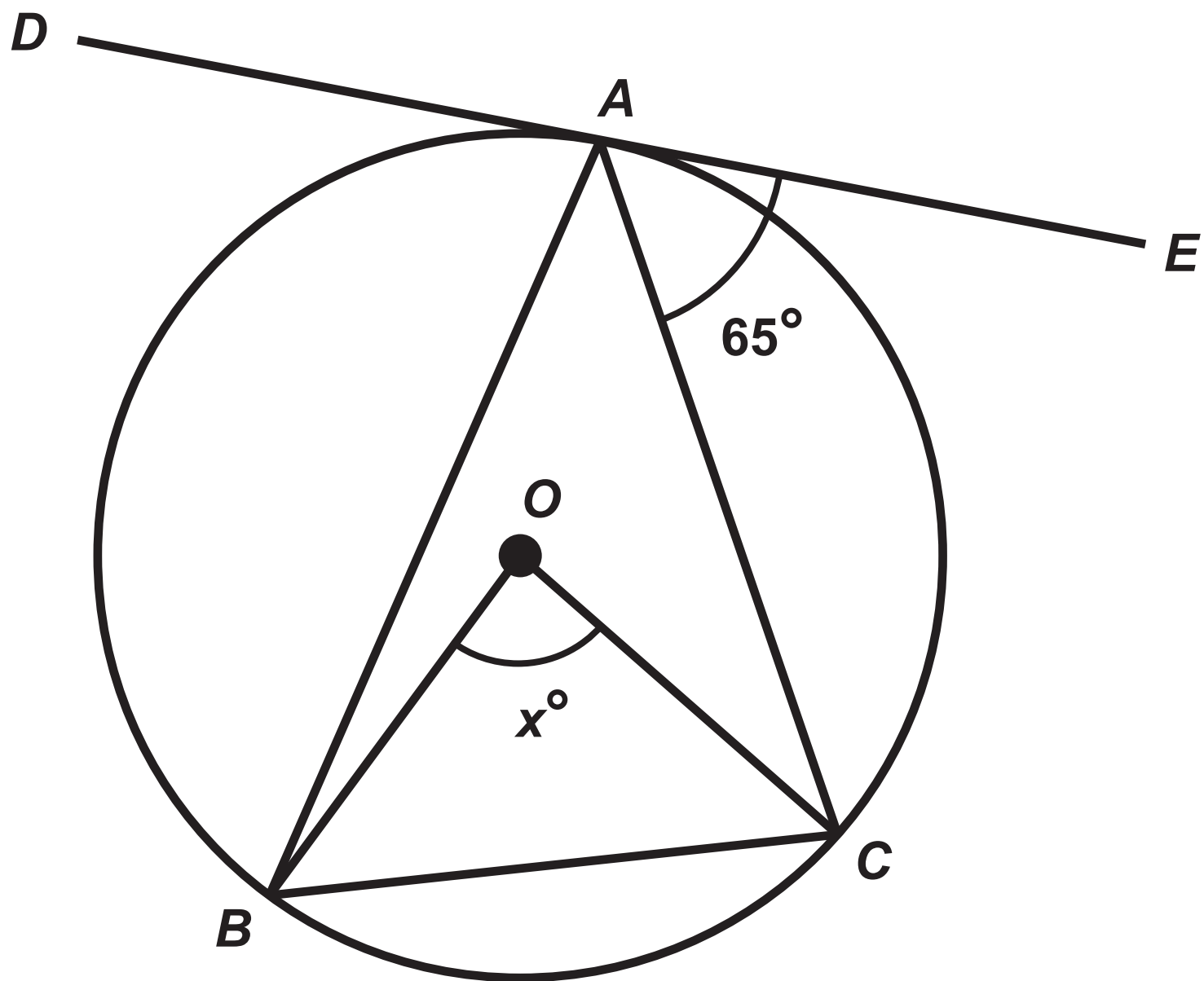


Question 12



Question 16

Diagram NOT drawn to scale



Question 17

Diagrams NOT drawn to scale

Diagram 1

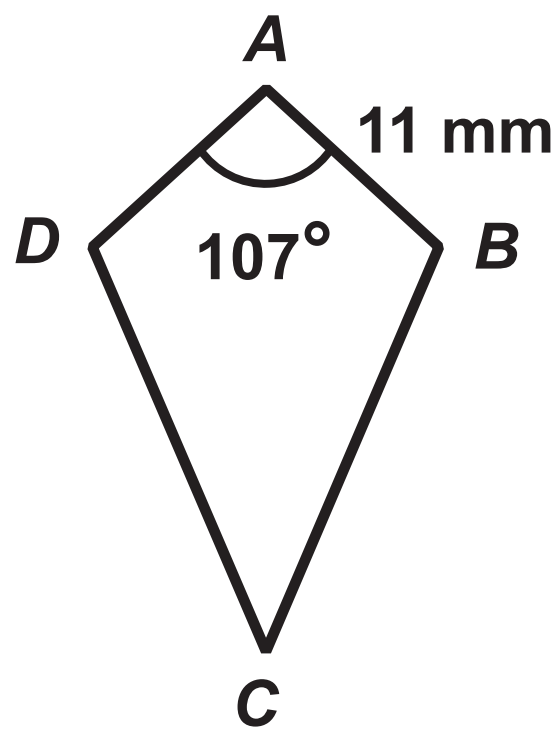
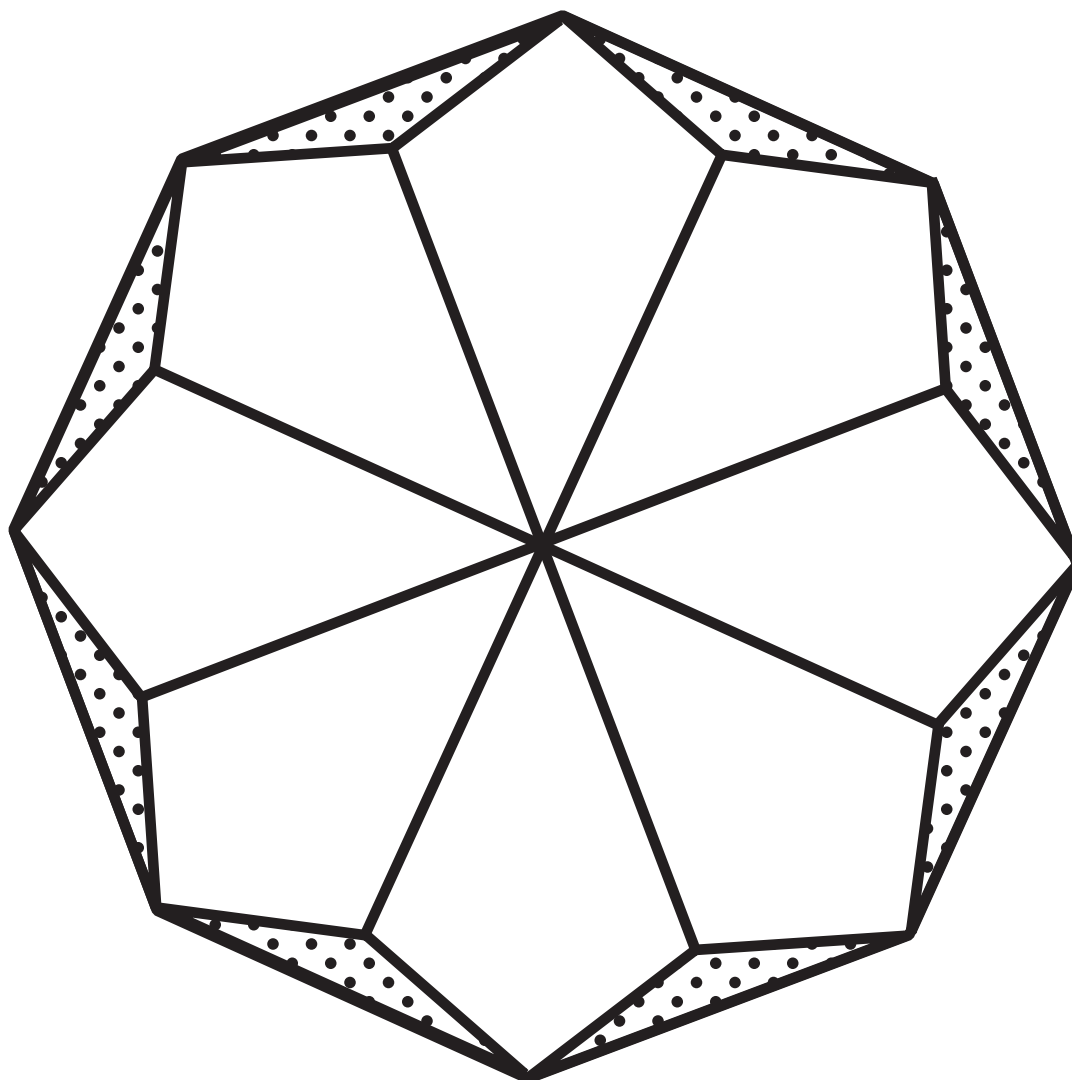
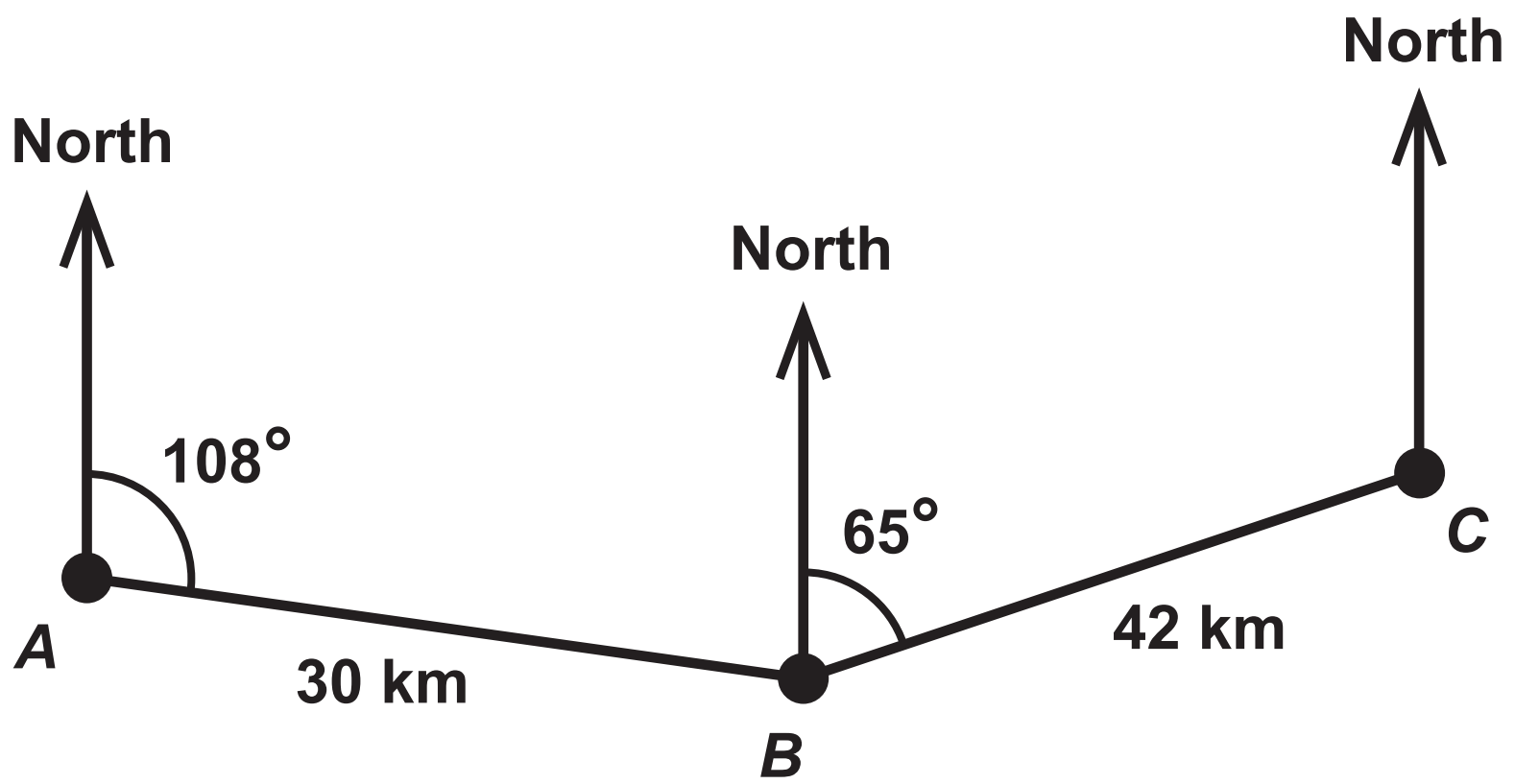


Diagram 2



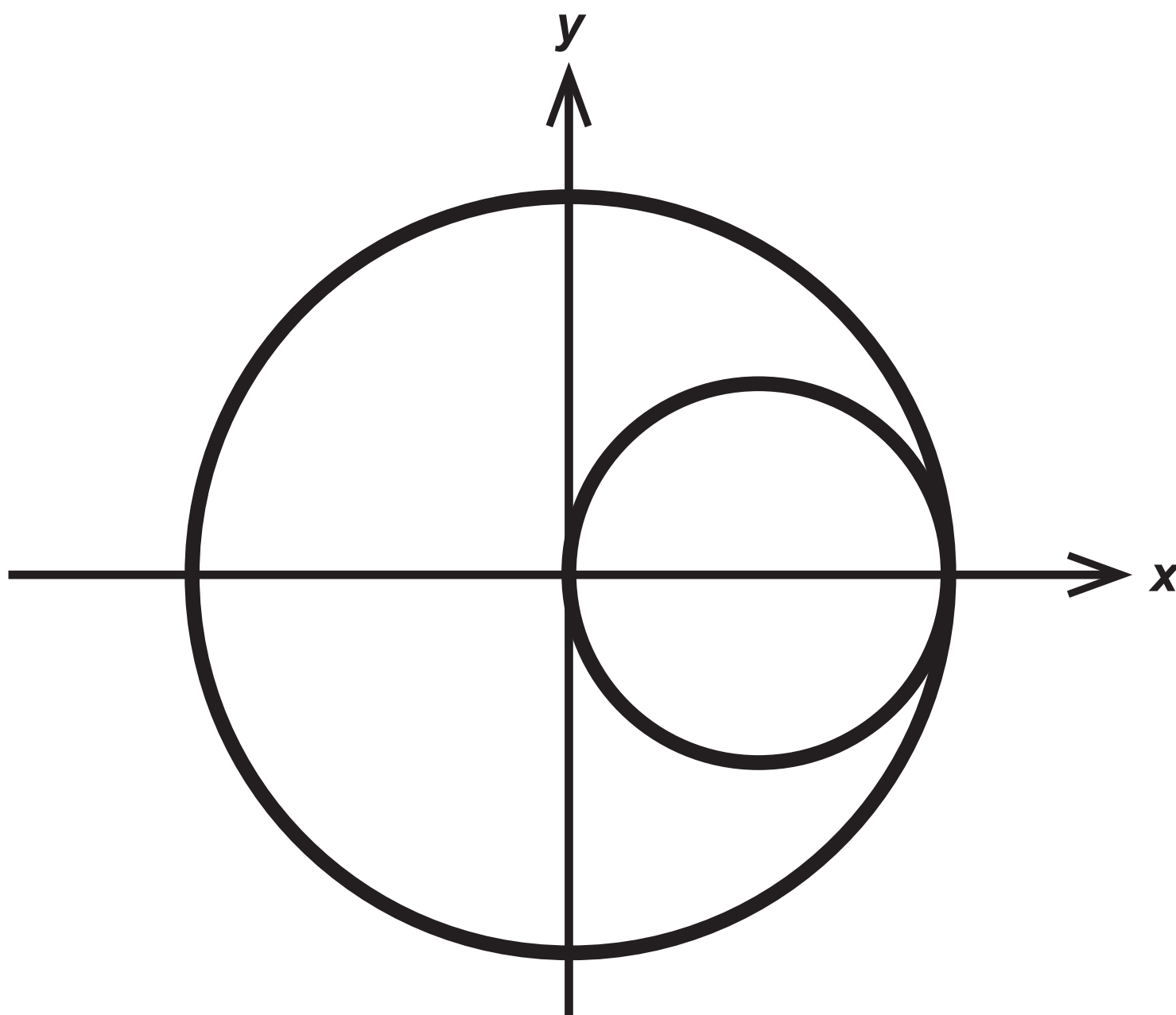
Question 21

Diagram NOT drawn to scale

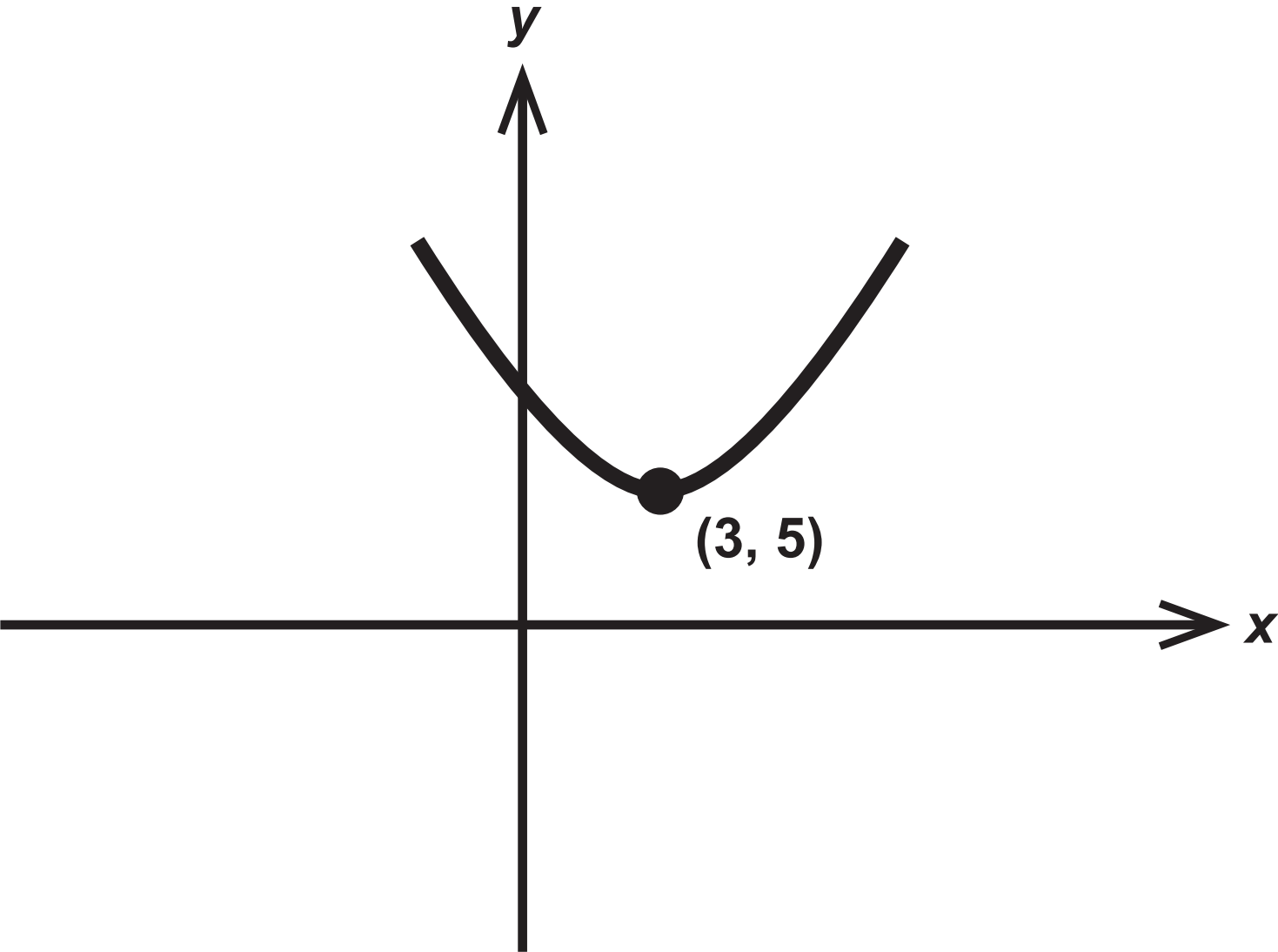


Question 22

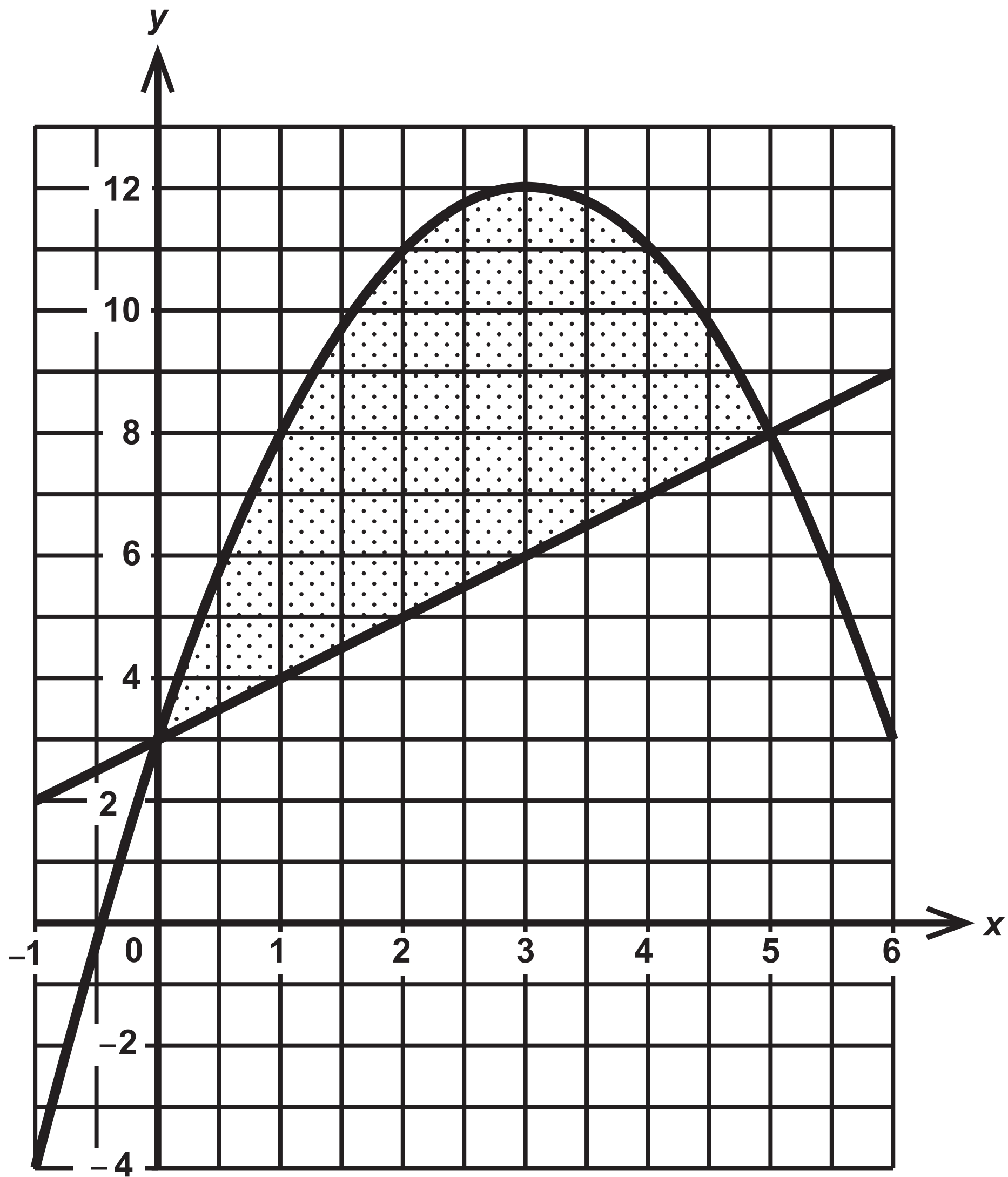
Diagram NOT drawn to scale



Question 23



Question 24



MATHEMATICS

**FORMULA LIST
FOUNDATION TIER
AND HIGHER TIER
GCSE**

You must not write on these formulae pages.

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

AREA AND VOLUME FORMULAE

Where r is the radius of the sphere or cone,
 l is the slant height of a cone and
 h is the perpendicular height of a cone:

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

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

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

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

KINEMATICS FORMULAE

Where a is constant acceleration,
 u is initial velocity, v is final velocity,
 s is displacement from the position
when $t = 0$ and t is time taken:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

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WEDNESDAY, 4 JUNE 2025 – MORNING

MATHEMATICS

HIGHER TIER

Additional Formulae

PERIMETER, AREA AND VOLUME

Where a and b are the lengths of the parallel sides and h is their perpendicular separation:

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

**Volume of a prism =
area of cross section $\times$ length**

**Where r is the radius and
 d is the diameter:**

$$\text{Circumference of a circle} = 2\pi r = \pi d$$

$$\text{Area of a circle} = \pi r^2$$

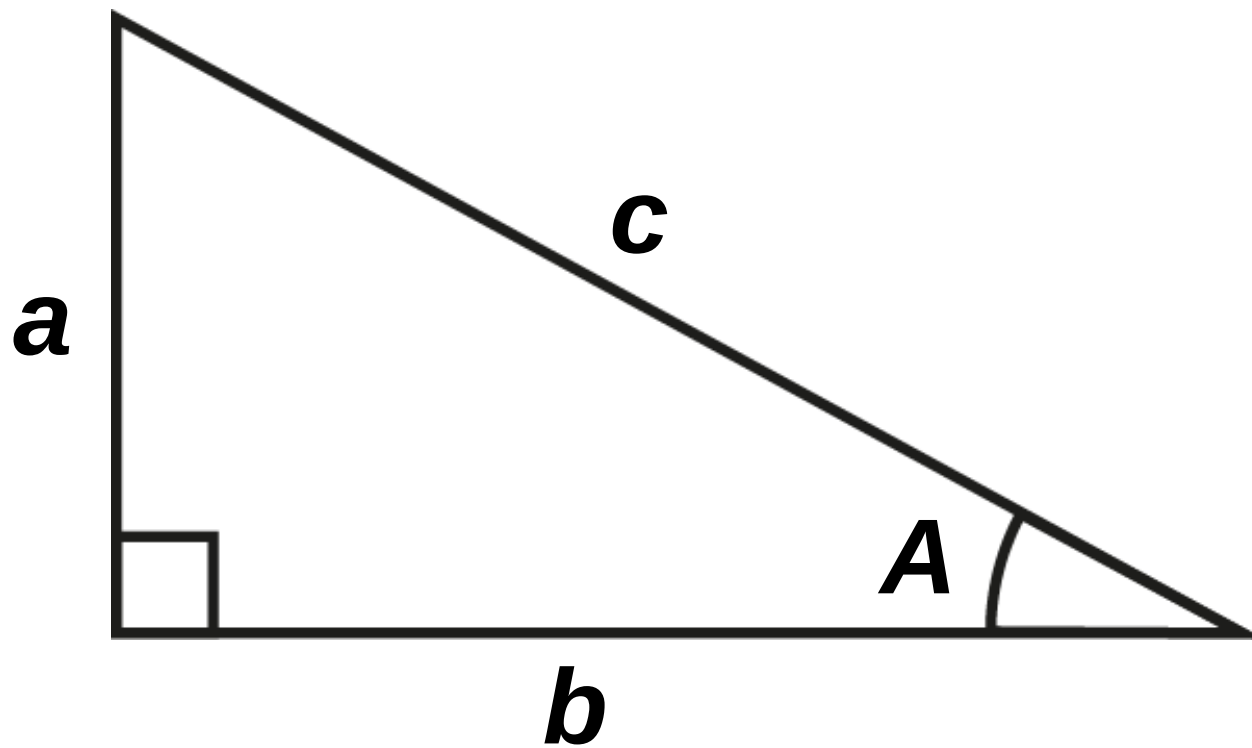
QUADRATIC FORMULA

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

PYTHAGORAS' THEOREM AND TRIGONOMETRY

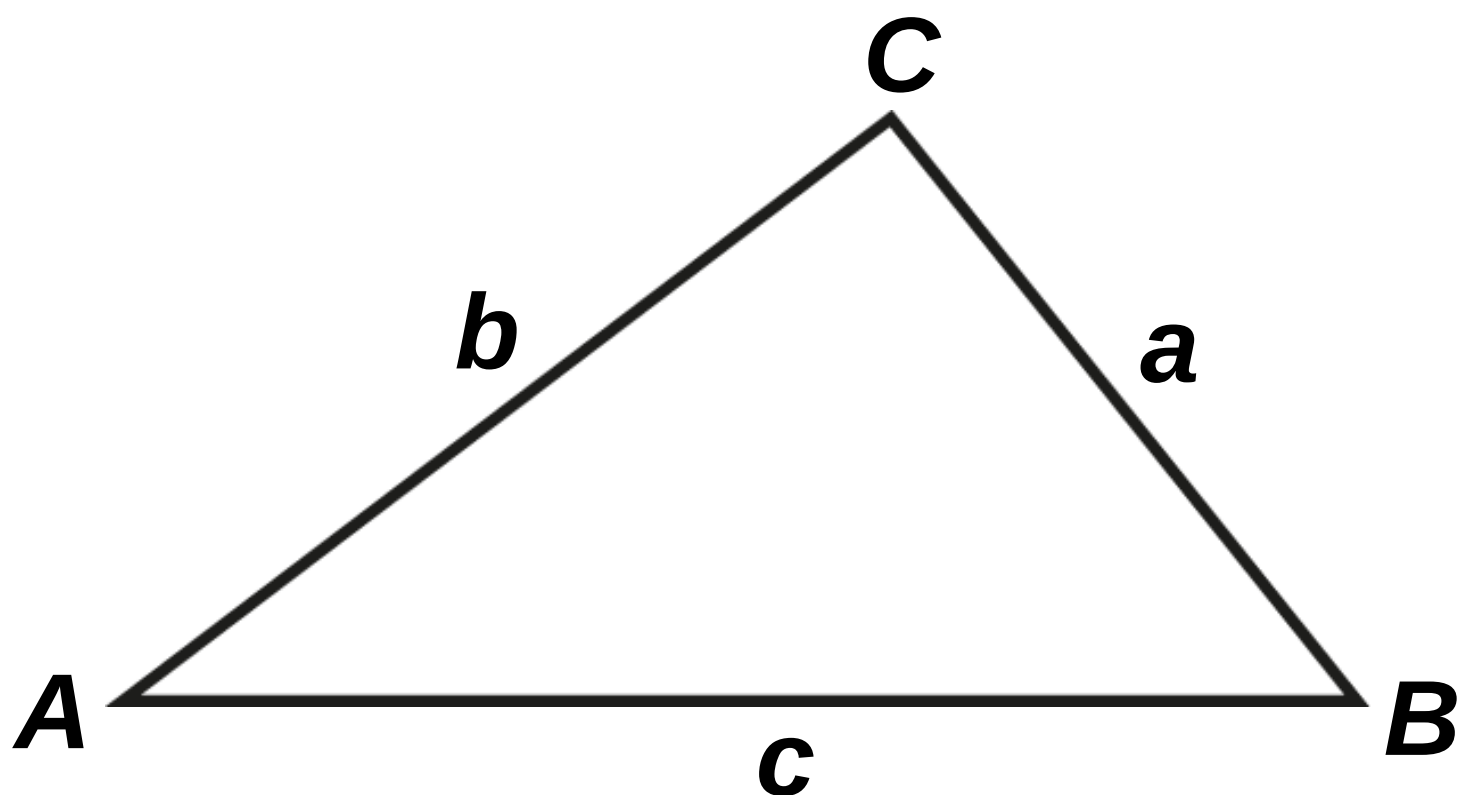


In any right – angled triangle where a , b and c are the length of the sides and c is the hypotenuse:

$$a^2 + b^2 = c^2$$

In any right – angled triangle ABC where a , b and c are the length of the sides and c is the hypotenuse:

$$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$$



In any triangle ABC where a , b and c are the length of the sides:

$$\text{sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

cosine rule:

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

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

COMPOUND INTEREST

Where P is the principal amount,
 r is the interest rate over a given period
and n is number of times that the
interest is compounded:

$$\text{Total accrued} = P \left(1 + \frac{r}{100} \right)^n$$

PROBABILITY

Where $P(A)$ is the probability of
outcome A and $P(B)$ is the probability
of outcome B :

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A \text{ and } B) = P(A \text{ given } B) P(B)$$