



GCSE

3300U30-1

TUESDAY, 23 MAY 2023 – MORNING

MATHEMATICS

UNIT 1: NON – CALCULATOR

INTERMEDIATE 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.	3	
2.	2	
3.	5	
4.	2	
5.	3	
6.	3	
7.	3	
8.	7	
9.	6	
10.	4	
11.	4	
12.	4	
13.	6	
14.	4	
15.	5	
16.	3	
17.	5	
18.	3	
19.	4	
20.	4	
Total	80	

(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.

Cut out shapes for Question 11 (a) and Question 11 (b) (i).

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 π 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 8, the assessment will take into account the quality of your organisation, communication and accuracy in writing.

(Turn over)

1. Write $\frac{2}{5}$, 9% and 0.3 in ascending order.

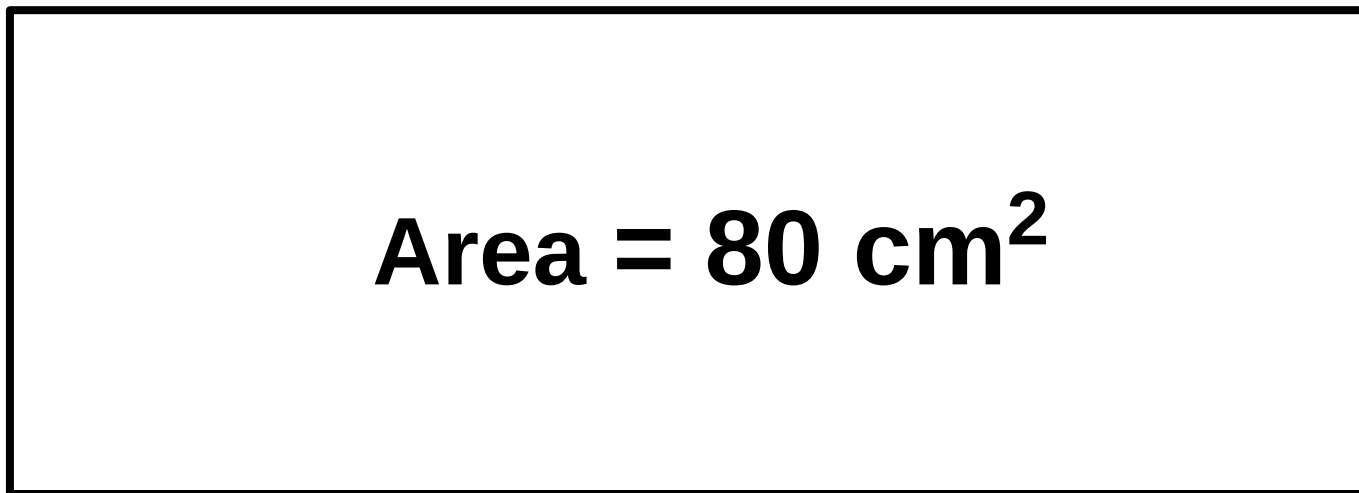
You must show all your working.

(Turn over)

Smallest value → Greatest value
[3 marks]

2. Look at the diagram below.

The diagram is NOT drawn to scale.



The area of this rectangle is 80 cm²

**The length of the rectangle is
5 times its width.**

**Calculate the length and width
of the rectangle.**

(Turn over)

8

Length = _____ cm

Width = _____ cm

[2 marks]

(Turn over)

3. (a) Solve the equations

(i) $\frac{x}{3} = 8$

[1 mark]

continued on the next page . . .

(Turn over)

Question 3 (a) continued

3. (a) (ii) $3x - 10 = 17$

[2 marks]

continued on the next page . . .

(Turn over)

Question 3 continued

3. (b) Simplify $6f - 4g + 2f - 9g$

[2 marks]

(Turn over)

4. (a) Which of the following is nearest in mass to 5 kg ?

Circle the correct answer.

7 lb	11 lb	15 lb	19 lb	23 lb
------	-------	-------	-------	-------

[1 mark]

continued on the next page . . .

(Turn over)

Question 4 continued

4. (b) Which of the following is nearest in volume to 100 litres?

Circle the correct answer.

100 pints	125 pints	150 pints
	175 pints	200 pints

[1 mark]

(Turn over)

5. Rhian is n years old.

Samir is 7 years younger than Rhian.

Nigel is twice as old as Samir.

Write down an expression,
in terms of n , for Nigel's age.

Nigel's age _____

[3 marks]

(Turn over)

6. The mean of four numbers is 7

**(a) What is the total of the
four numbers?**

[1 mark]

continued on the next page . . .

(Turn over)

Question 6 continued

6. (b) Find a set of four numbers such that:

- **their mean is 7**
- **their range is 6**

Write your four numbers in the boxes on the next page.

(Turn over)

17

☐☐☐☐

[2 marks]

(Turn over)

- 7. Look at the diagram for Question 7 in the separate Diagram Booklet. The diagram is NOT drawn to scale.**

Find the size of each of the angles w , x and y .

$w =$ _____ °

$x =$ _____ °

$y =$ _____ °

[3 marks]

(Turn over)

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

**Look at the diagram for Question 8
in the separate Diagram Booklet.**

**The diagram shows two FAIR
spinners, SPINNER A and
SPINNER B.**

**In a game, the numbers shown
by the two pointers are added
together.**

continued on the next page . . .

(Turn over)

Question 8 continued

**In the diagram, the score gained
would be $2 + 3 = 5$**

A winning score is 6 or more.

**How many winning scores would
you expect when the game is
played 60 times?**

You must show all your working.

(Turn over)

(Turn over)

22

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 + 2 marks OCW]

(Turn over)

**9. (a) Express 48 as a percentage
of 400**

[2 marks]

continued on the next page . . .

(Turn over)

Question 9 continued

9. (b) Share £45 in the ratio 8 : 1

£ _____ and

£ _____

[2 marks]

(Turn over)

Question 9 continued

9. (c) Express $1 - \frac{1}{2^3}$ as a single

fraction in the form $\frac{a}{b}$, where

a and b are integers.

(Turn over)

Answer = _____

[2 marks]

**10. Look at the diagram for
Question 10 in the separate
Diagram Booklet.**

**The diagram shows a number
machine.**

**For a given INPUT number,
there will be an OUTPUT number.
The OUTPUT is then put back in
the number machine as the
next INPUT.**

**This process is then repeated
many times.**

continued on the next page . . .

(Turn over)

Question 10 continued

The first INPUT number is 512

**What will be the first OUTPUT
number that is less than 300 ?**

(Turn over)

[illegible]

(Turn over)

30

**First OUTPUT number that is
less than 300 = _____**

[4 marks]

(Turn over)

- 11. (a) Look at the diagram for Question 11 (a) in the separate Diagram Booklet.**

The diagram shows a shape on a coordinate grid.

Rotate the shape shown by 90° anticlockwise about the origin.

A cut out shape is available for this question.

[2 marks]

continued on the next page . . .

(Turn over)

Question 11 continued

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

The diagram shows a shape on a coordinate grid.

(i) Translate the shape shown using the column vector

$$\begin{pmatrix} -1 \\ 7 \end{pmatrix}$$

A cut out shape is available for this question.

[1 mark]

continued on the next page . . .

(Turn over)

Question 11 (b) continued

11. (b) (ii) Write down the column vector that will reverse the translation in part (i).

[1 mark]

(Turn over)

12. (a) Express 675 as a product of its prime factors in index form.

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.

[3 marks]
(Turn over)

Question 12 continued

12. (b) 360 expressed as a product of its prime factors in index form is $2^3 \times 3^2 \times 5$

What is the smallest whole number that 360 can be multiplied by to give a square number?

(Turn over)

37

Smallest whole number is

[1 mark]

(Turn over)

13. (a) Simplify each of the following.
Circle your answer in each case.

(i) $m^4 \times m^3 =$

m^7	m^{12}	m^{43}	$7m$	$12m$
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[1 mark]

continued on the next page . . .

(Turn over)

Question 13 (a) continued

13. (a) (ii) $\frac{m^{15}}{m^5} =$

m^{75}	$\frac{1}{m^3}$	m^3	m^{10}	$\frac{1}{m^{10}}$
----------	-----------------	-------	----------	--------------------

[1 mark]

continued on the next page . . .

(Turn over)

Question 13 continued

13. (b) Write down an expression for the n th term of the following sequence.

4, 11, 18, 25, ...

[2 marks]

continued on the next page . . .

(Turn over)

Question 13 continued

13. (c) List all of the integers that satisfy the following inequality.

$$13 < 2n < 19$$

(Turn over)

42

Integers are

[2 marks]

(Turn over)

- 14. (a) Look at the diagram for Question 14 (a) in the separate Diagram Booklet.**

**The diagram shows the line AB .
Using only a ruler and a pair of compasses, construct an angle of 60° at point B .**

[1 mark]

continued on the next page . . .

(Turn over)

Question 14 continued

- 14. (b) Look at the diagram for Question 14 (b) in the separate Diagram Booklet.**

The diagram shows the line LM .

R is a point on the line LM .

Using only a ruler and a pair of compasses, construct an angle of 90° at point R .

[1 mark]

continued on the next page . . .

(Turn over)

Question 14 continued

- 14. (c) Look at the diagram for Question 14 (c) in the separate Diagram Booklet.**

The diagram shows the line XY and a point P .

Using only a ruler and a pair of compasses, construct a perpendicular line from the point P to the line XY .

[2 marks]

(Turn over)

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

The diagram is NOT drawn to scale.

The shape consists of a semicircle attached to one side of a right – angled triangle.

In the diagram,

Angle $ABC = 90^\circ$

$AB = 8 \text{ cm}$

$BC = 6 \text{ cm}$

BC is the diameter of the semicircle.

continued on the next page . . .

(Turn over)

Question 15 continued

Calculate the perimeter of the shape.

Use $\pi = 3.14$

You must show all your working.

(Turn over)

(Turn over)

49

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]

(Turn over)

**16. Two time periods are measured as
4 hours 40 minutes and
2 hours 50 minutes.**

**Each measurement is correct to
the nearest 10 minutes.**

**What is the least possible sum
of these two time periods?**

**Give your answer in hours and
minutes.**

(Turn over)

52

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.

Answer =

_____ **hours** _____ **minutes**

[3 marks]
(Turn over)

17. Whitney walks, cycles or travels on the bus to work each day.

On any randomly chosen day:

- the probability that she walks to work is 0.25**
- the probability that she cycles to work is 0.45**

At work, the probability that there will be a fire drill on any randomly chosen day is 0.04

How Whitney travels to work is independent of whether or not there is a fire drill.

continued on the next page . . .

(Turn over)

Question 17 continued

**17. (a) Look at the diagram for
Question 17 (a) in the separate
Diagram Booklet.**

**The diagram is an incomplete
tree diagram.**

Complete the tree diagram.

[3 marks]

(Turn over)

Question 17 continued

**17. (b) On a randomly chosen day,
what is the probability that
Whitney walks to work
and there is a fire drill?**

[2 marks]
(Turn over)

18. Look at the table for Question 18 in the separate Diagram Booklet. The table shows six different formulae.

In the formulae, each measurement of length is represented by a letter.

Consider the dimensions implied by each formula.

For each case, write down whether the formula could be for a length, an area, a volume or none of these.

The first one has been done for you.

[3 marks]

(Turn over)

19. (a) Express 0.0076 in standard form.

[1 mark]

continued on the next page . . .

(Turn over)

Question 19 continued

19. (b) Calculate the value of

$$(3 \times 10^{17}) \times (2 \times 10^{-12})$$

Give your answer in standard form.

[1 mark]

continued on the next page . . .

(Turn over)

Question 19 continued

19. (c) Calculate the value of

$$(2.3 \times 10^4) + (5 \times 10^3)$$

Give your answer in standard form.

(Turn over)

60

[2 marks]

(Turn over)

20. Look at the diagram for Question 20 in the separate Diagram Booklet. The diagram is NOT drawn to scale.

XY is a tangent to a circle, centre O , at the point A .

Angle $AYO = 54^\circ$

(a) What percentage of the whole circle is shaded?

You MUST show how you calculated your answer.

(Turn over)

[illegible]

(Turn over)

[3 marks]

continued on the next page . . .

(Turn over)

Question 20 continued

20. (b) What tangent property of circles did you use in order to answer part (a)?

[1 mark]

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.

[illegible]

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be handed in to the invigilators
and sent for marking.**

Diagram Booklet

Surname: _____

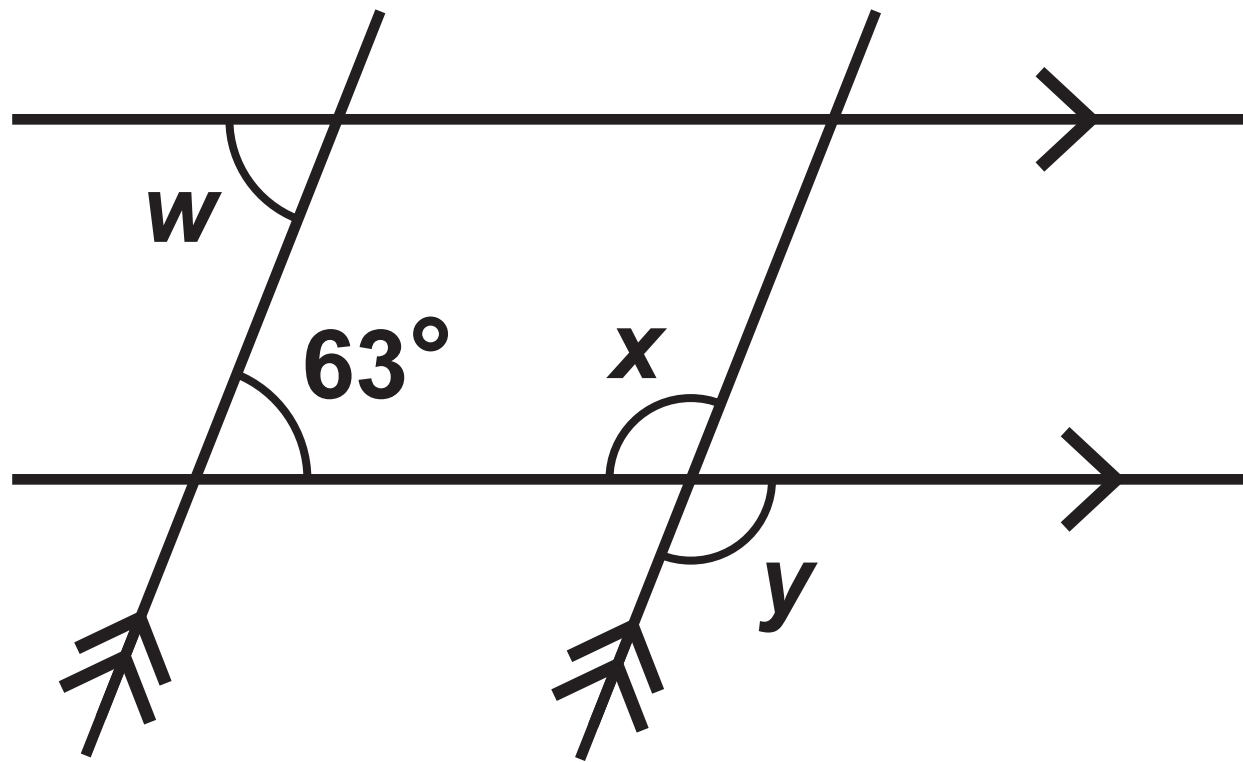
First name(s): _____

Centre Number: _____

Candidate Number: 0 _____

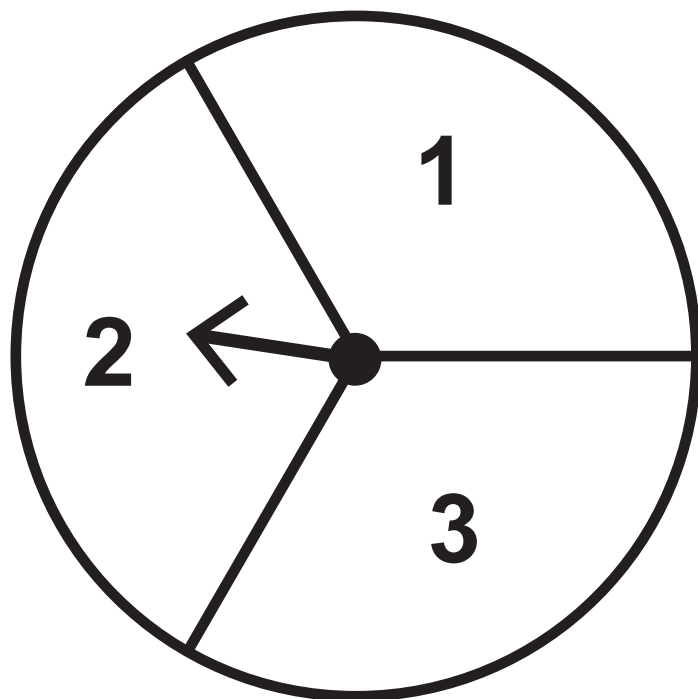
Question 7

Diagram NOT drawn to scale

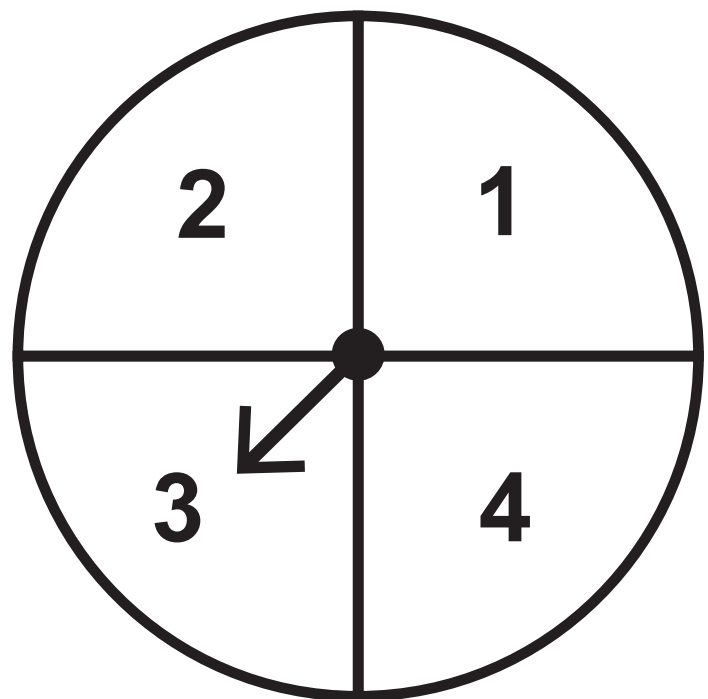


Question 8

SPINNER A

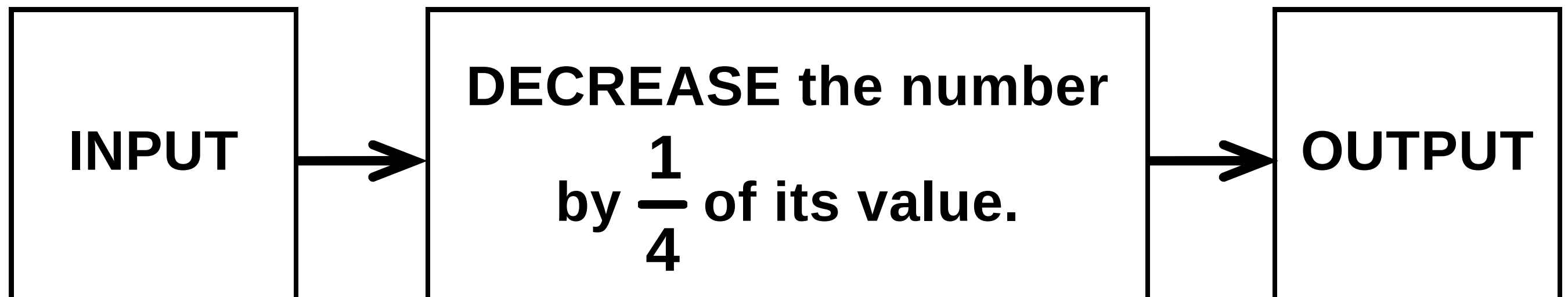


SPINNER B

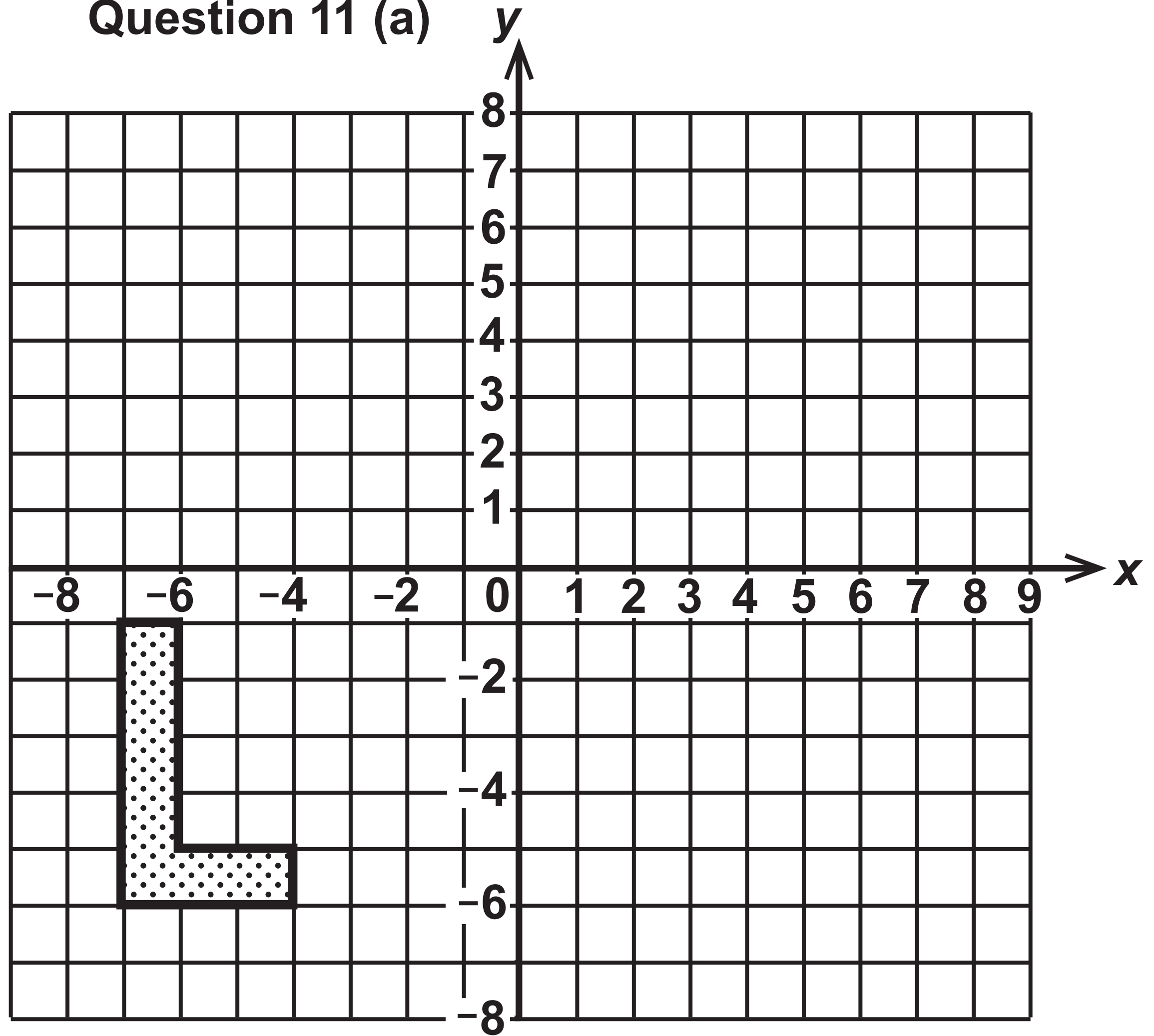


Question 10

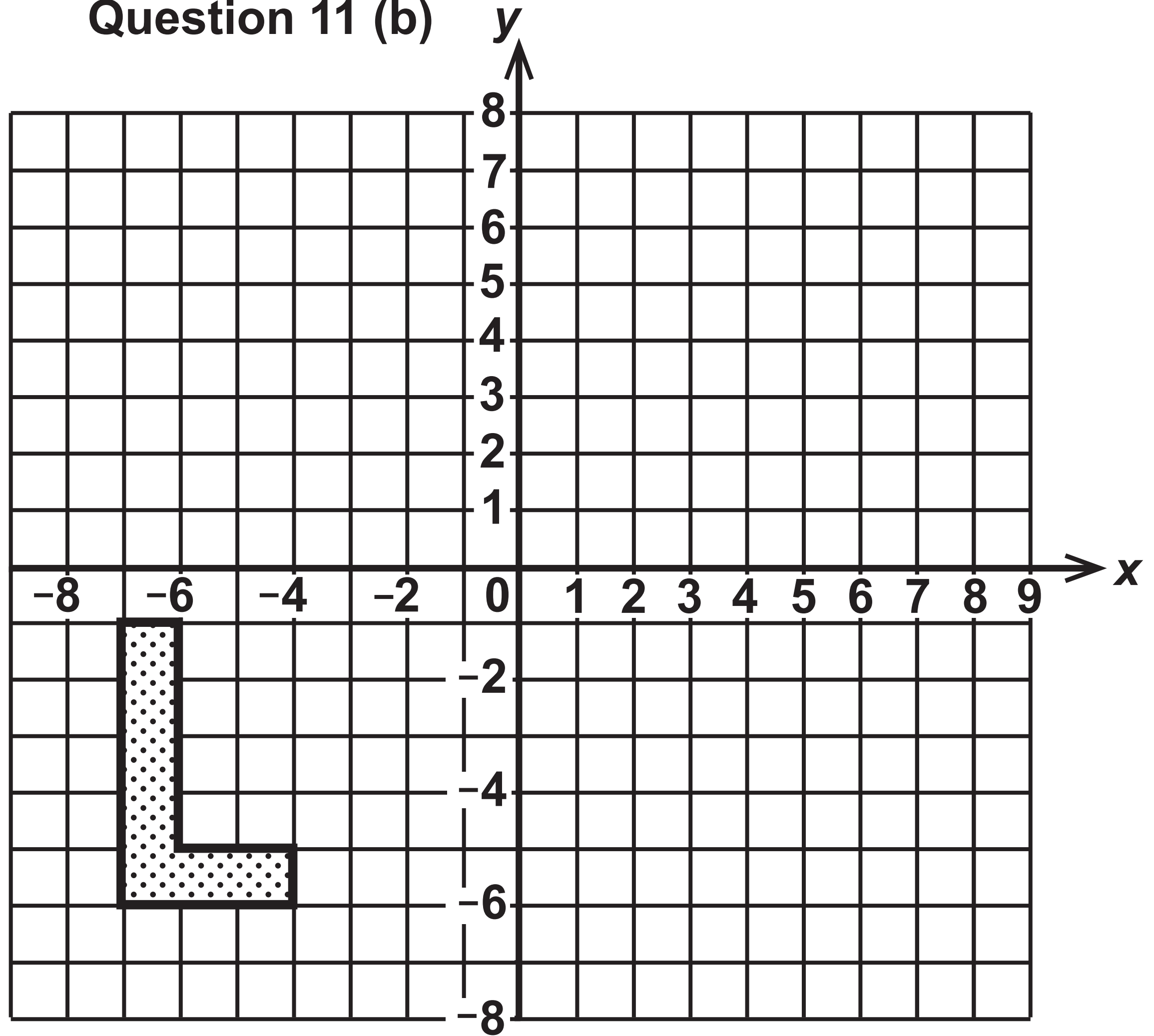
Number machine



Question 11 (a)



Question 11 (b)



Question 14 (a)

A |—————| ***B***

Question 14 (b)

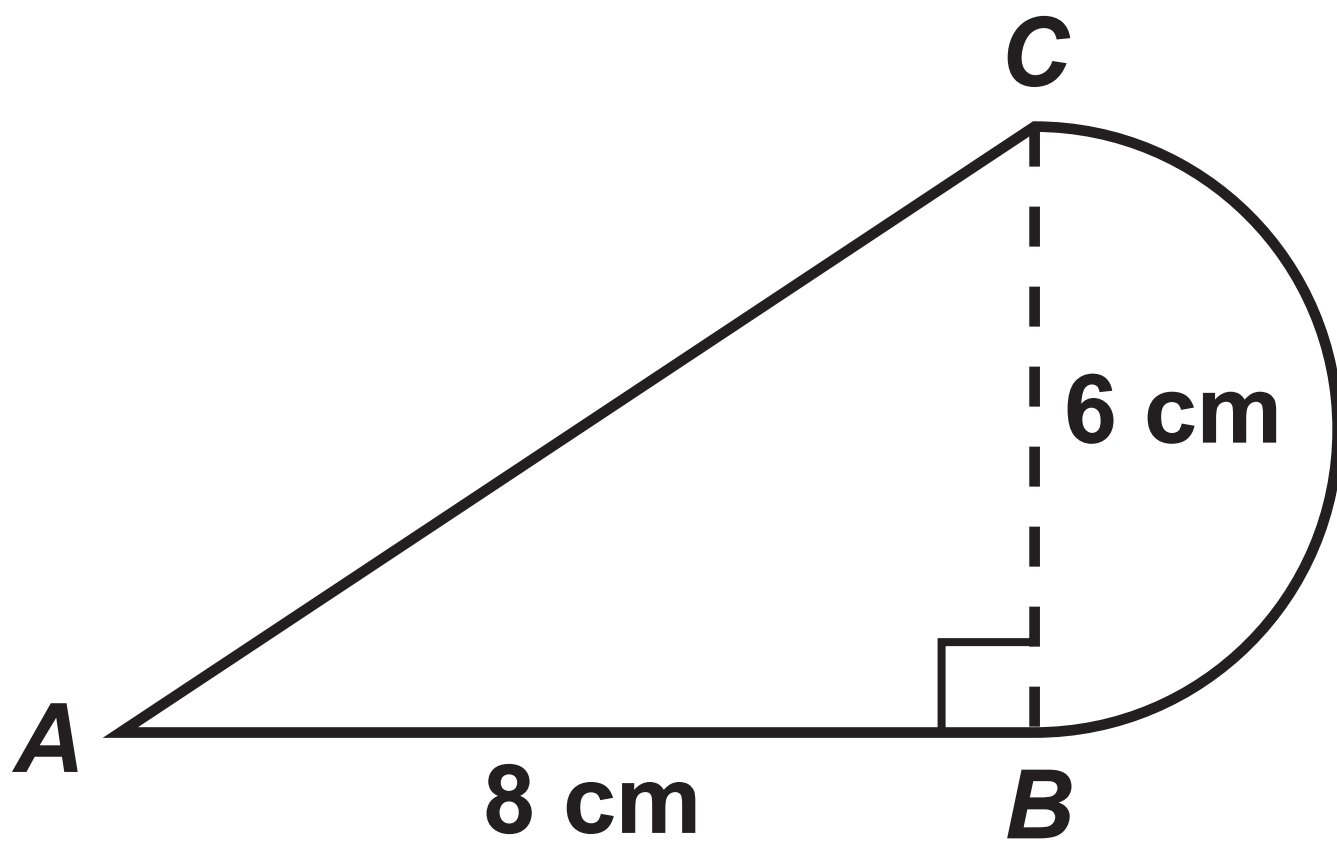


Question 14 (c)



Question 15

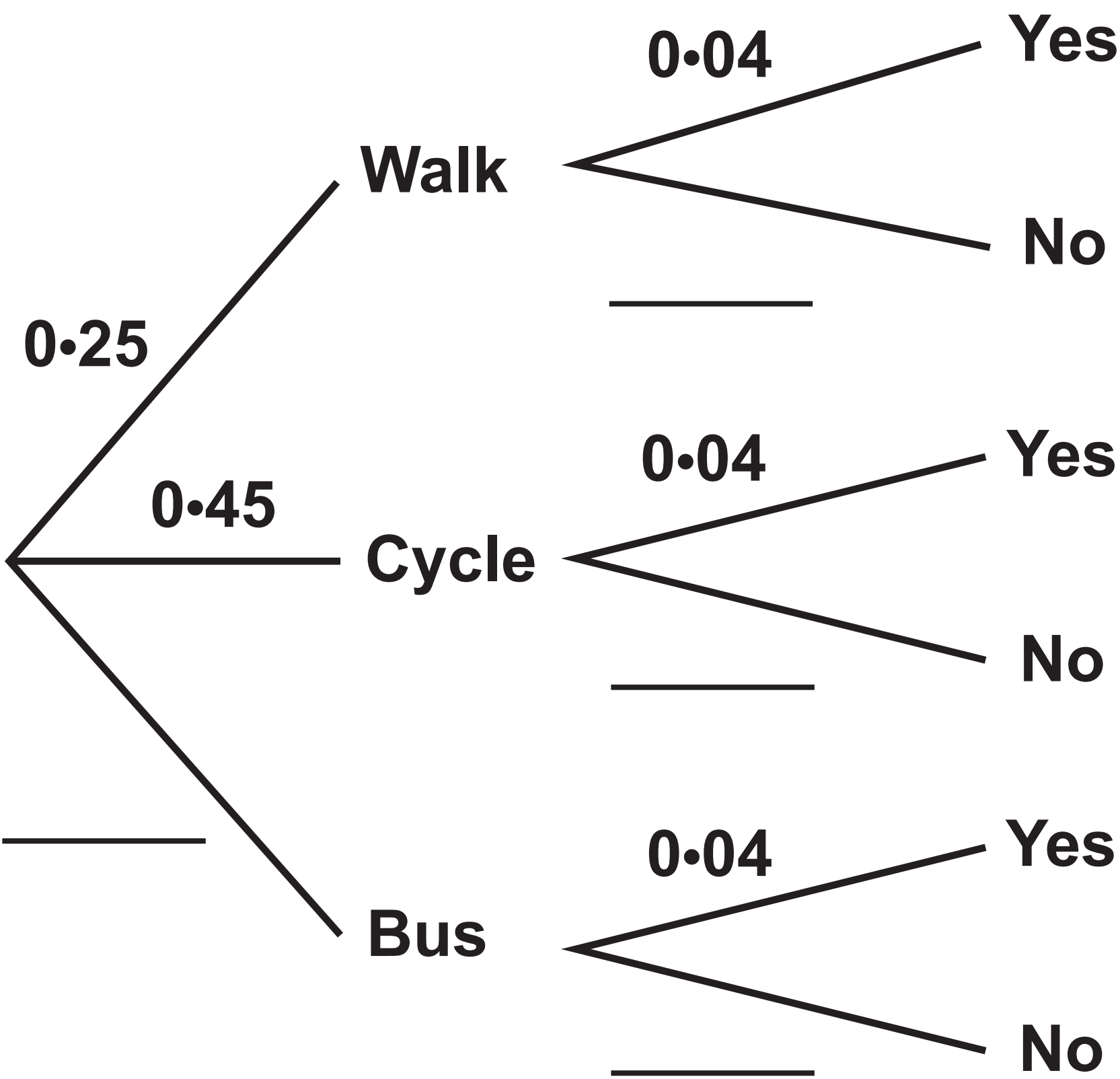
Diagram NOT drawn to scale



Question 17 (a)

Travel to work

Fire Drill



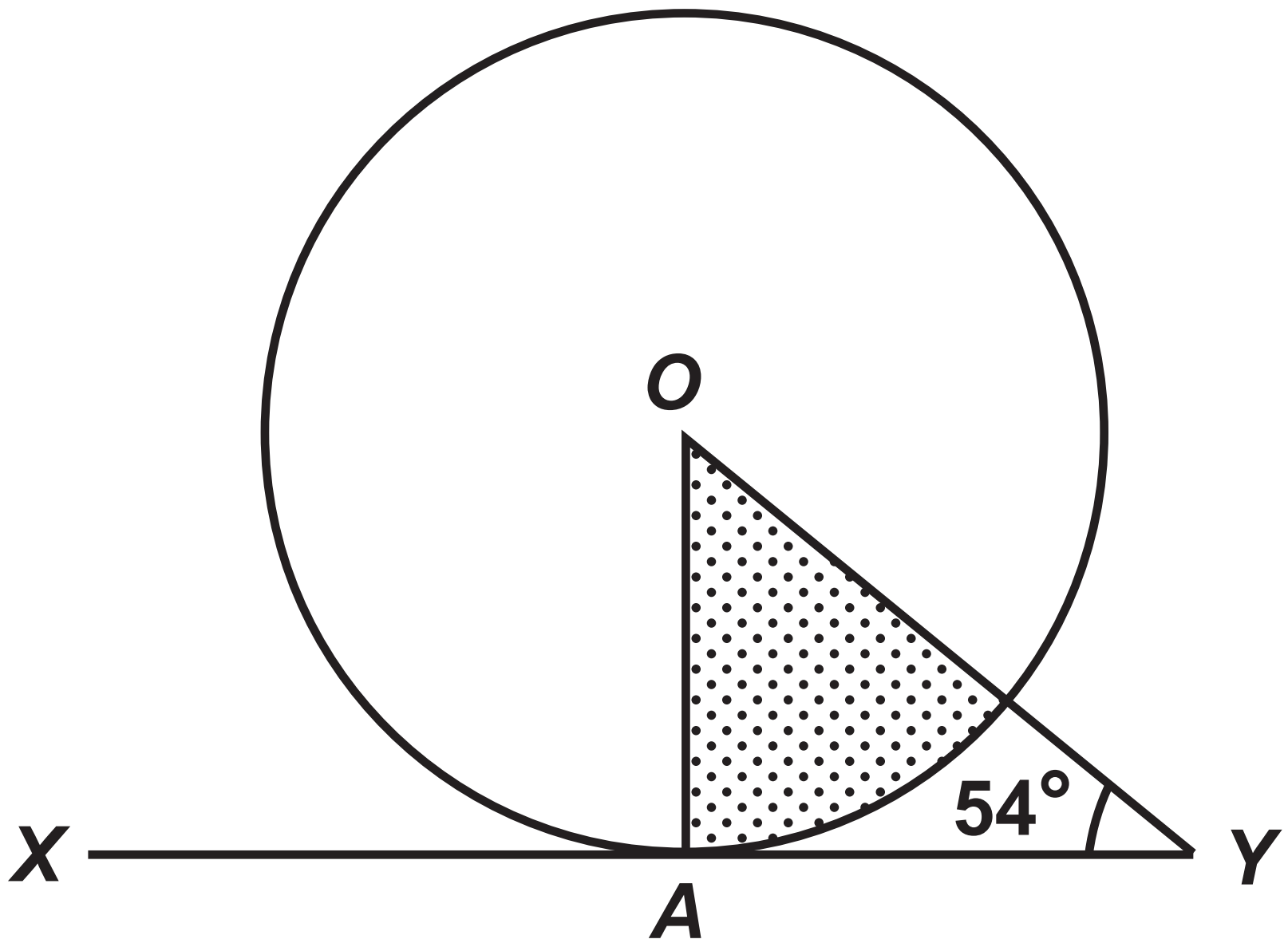
Question 18

Table

FORMULA	FORMULA COULD BE FOR
$4d + r - 2w$	length
$w(x + b + h)$	
$d^3 + 3.14r$	
$\frac{w^3}{d^2}$	
$3.14r^3 - xbh$	
$\frac{4w^2}{d}$	

Question 20

Diagram NOT drawn to scale



**GCSE
MATHEMATICS
and
NUMERACY**



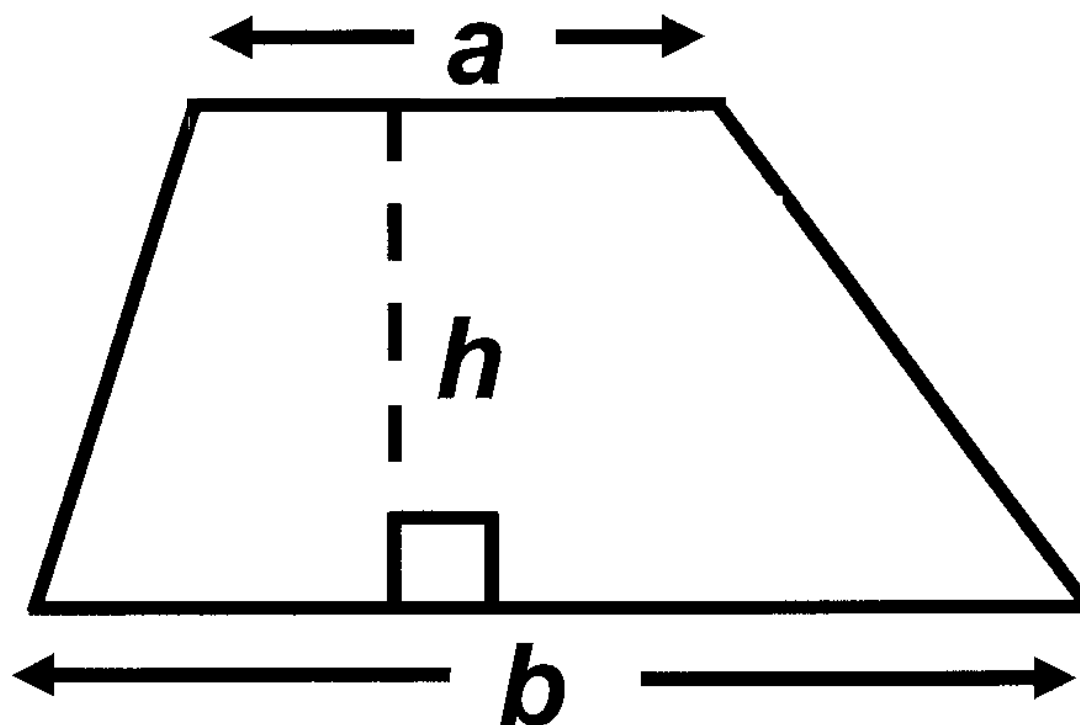
**FORMULA LIST
INTERMEDIATE TIER
GCSE**

You must not write on these formula pages.

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

Formula List – Intermediate Tier

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



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

