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	

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.

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 $3{\cdot}14$

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.

1. Write $\frac{2}{5}$, 9% and 0·3 in ascending order.

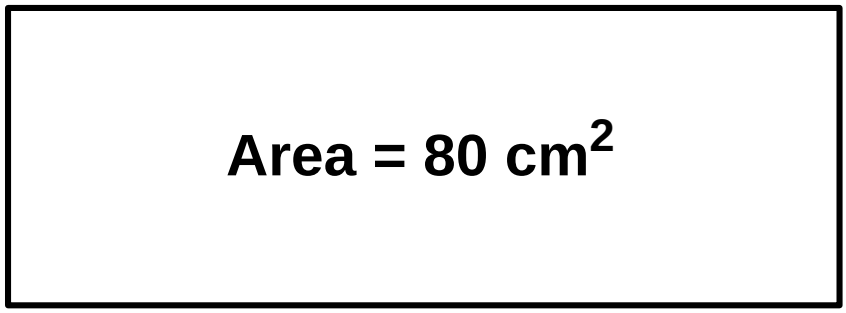
You must show all your working.

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 $80\ cm^2$

The length of the rectangle is 5 times its width.

Calculate the length and width of the rectangle.

_____

_____

_____

Length = _____ cm

Width = _____ cm

[2 marks]

3. (a) Solve the following equations.

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

[1 mark]

(ii) $3x - 10 = 17$

[2 marks]

continued on the next page . . .

Question 3 continued

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

[2 marks]

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 . . .

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]

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]

6. The mean of four numbers is 7

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

_____

_____

_____

[1 mark]

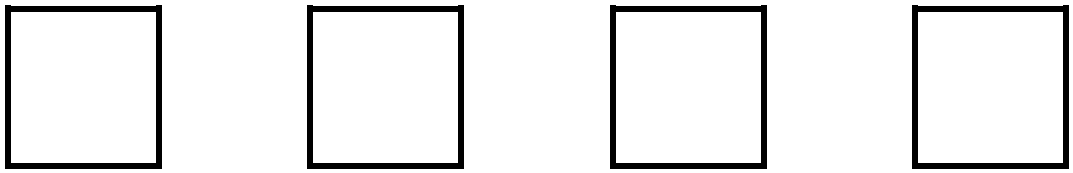
continued on the next page . . .

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 below.



[2 marks]

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]

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

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.
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.

_____

_____

_____

[5 marks + 2 marks OCW]

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

[2 marks]

continued on the next page . . .

Question 9 continued

9. (b) Share £45 in the ratio 8 : 1

£ _____ and

£ _____

[2 marks]

continued on the next page . . .

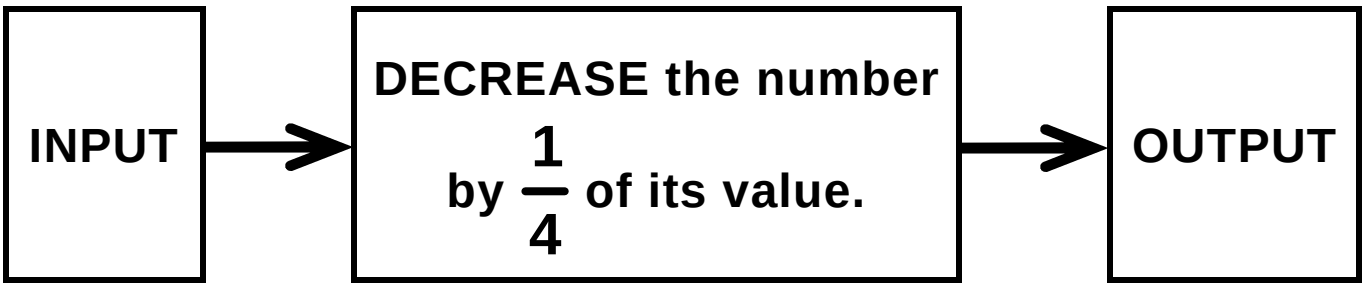
Question 9 continued

9. (c) Express $1 - \frac{1}{2^3}$ as a single fraction in the form $\frac{a}{b}$, where a and b are integers.

Answer = _____

[2 marks]

10. A number machine is shown below.



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.

The first INPUT number is 512
What will be the first OUTPUT number that is less than 300 ?

First OUTPUT number that is less than 300

= _____

[4 marks]

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 . . .

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]

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

_____

_____

[1 mark]

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

[3 marks]

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?

Smallest whole number is _____

[1 mark]

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}	$7m$	$12m$

[1 mark]

(ii) $\dfrac{m^{15}}{m^5} =$

m^{75}	$\dfrac{1}{m^3}$	m^3	m^{10}	$\dfrac{1}{m^{10}}$

[1 mark]

continued on the next page . . .

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 . . .

Question 13 continued

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

$$13 < 2n < 19$$

Integers are _____

[2 marks]

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]

(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 . . .

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]

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 $ABC = 90^\circ$

$AB = 8$ cm

$BC = 6$ cm

BC is the diameter of the semicircle.

Calculate the perimeter of the shape.

Use $\pi = 3{\cdot}14$

You must show all your working.

[5 marks]

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.

Answer = _____ hours _____ minutes

[3 marks]

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 . . .

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]

continued on the next page . . .

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]

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]

19. (a) Express $0{\cdot}0076$ in standard form.

_____

_____

[1 mark]

(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 . . .

Question 19 continued

19. (c) Calculate the value of

$$(2{\cdot}3 \times 10^4) + (5 \times 10^3)$$

Give your answer in standard form.

[2 marks]

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.

[3 marks]

continued on the next page . . .

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

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

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TUESDAY, 23 MAY 2023 – MORNING

MATHEMATICS

UNIT 1: NON – CALCULATOR

INTERMEDIATE TIER

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

Diagram Booklet

Surname: _____

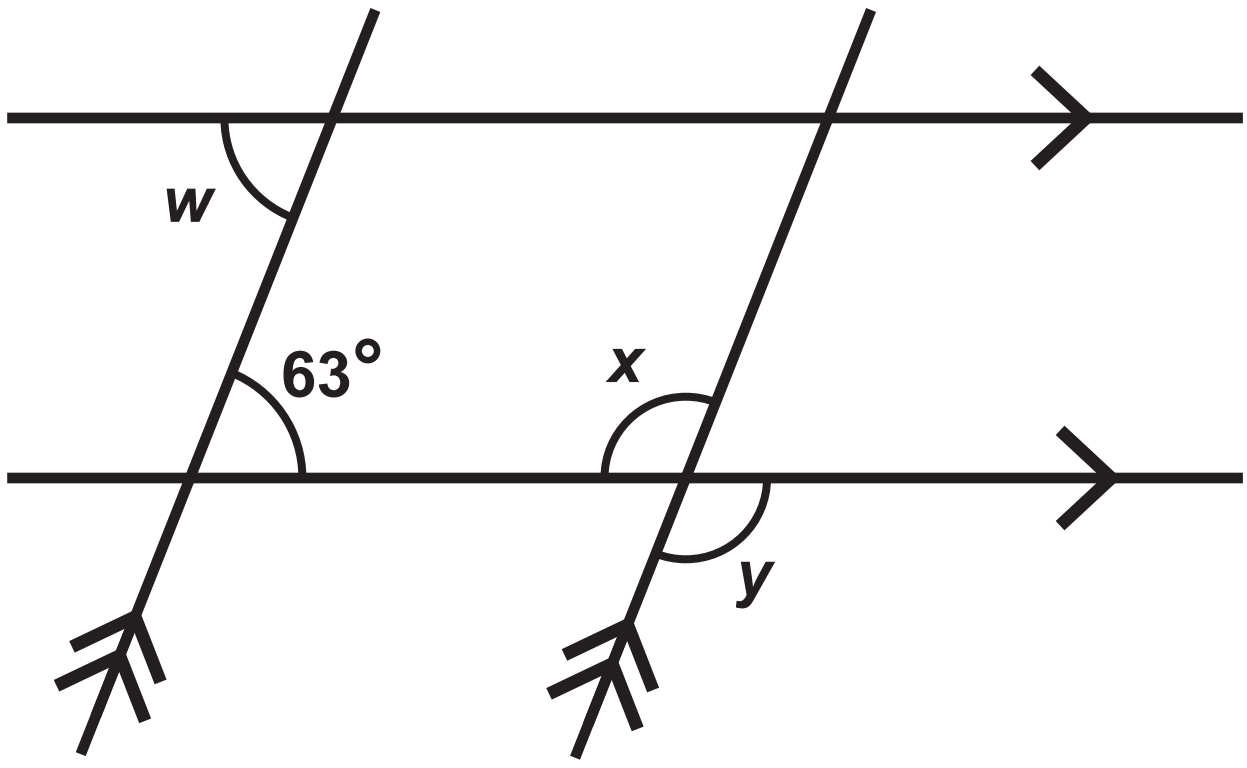
First name(s): _____

Centre Number: _____

Candidate Number: 0 _____

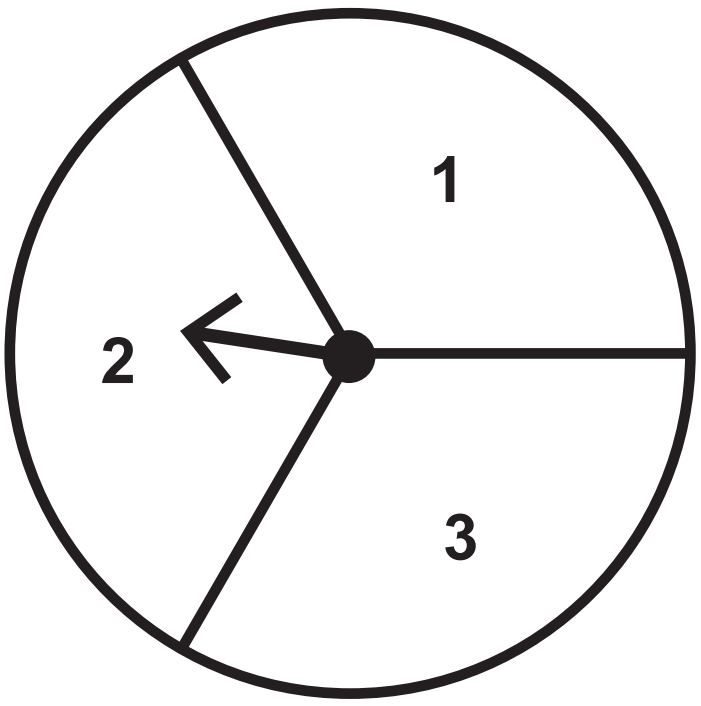
Question 7

Diagram NOT drawn to scale

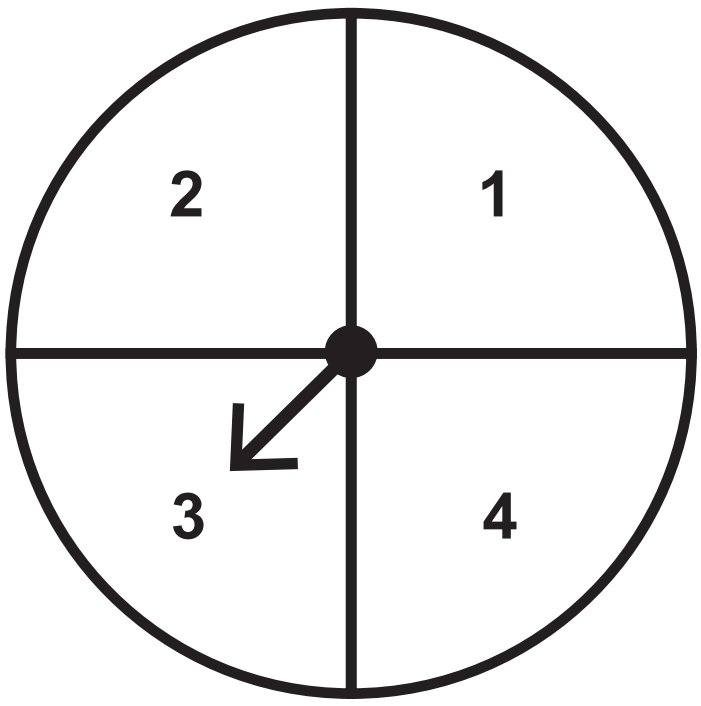


Question 8

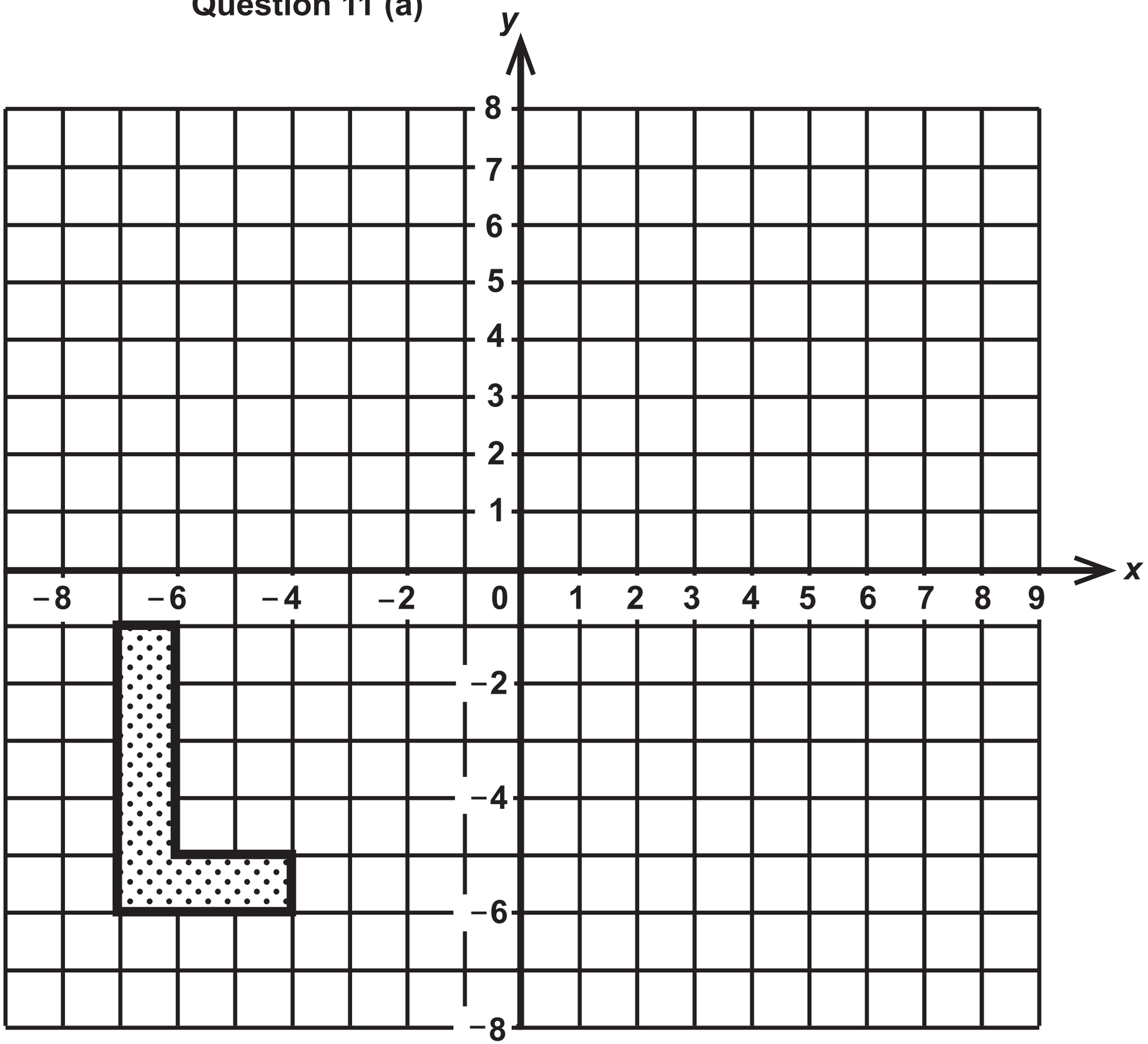
SPINNER A



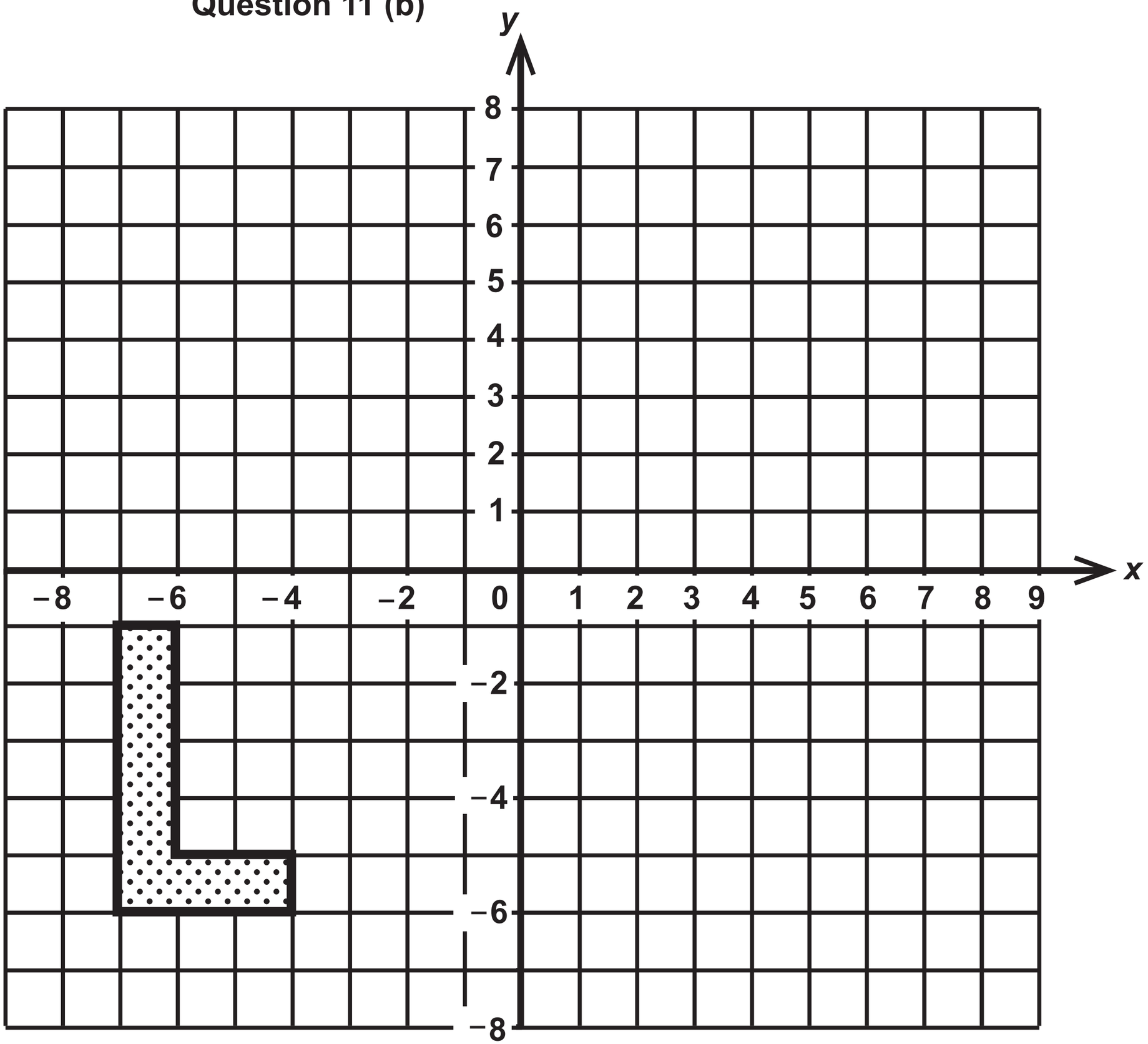
SPINNER B



Question 11 (a)



Question 11 (b)



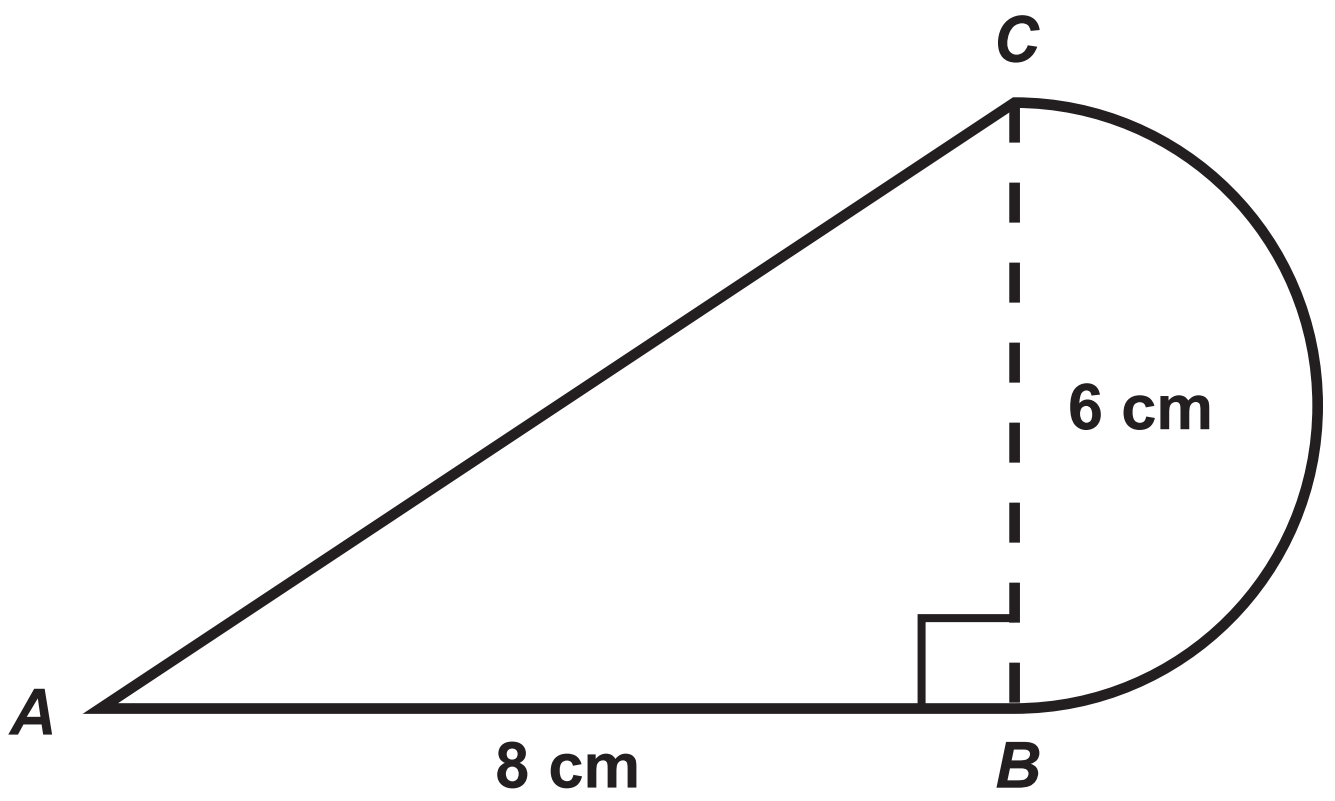
Question 14 (a)

Question 14 (b)

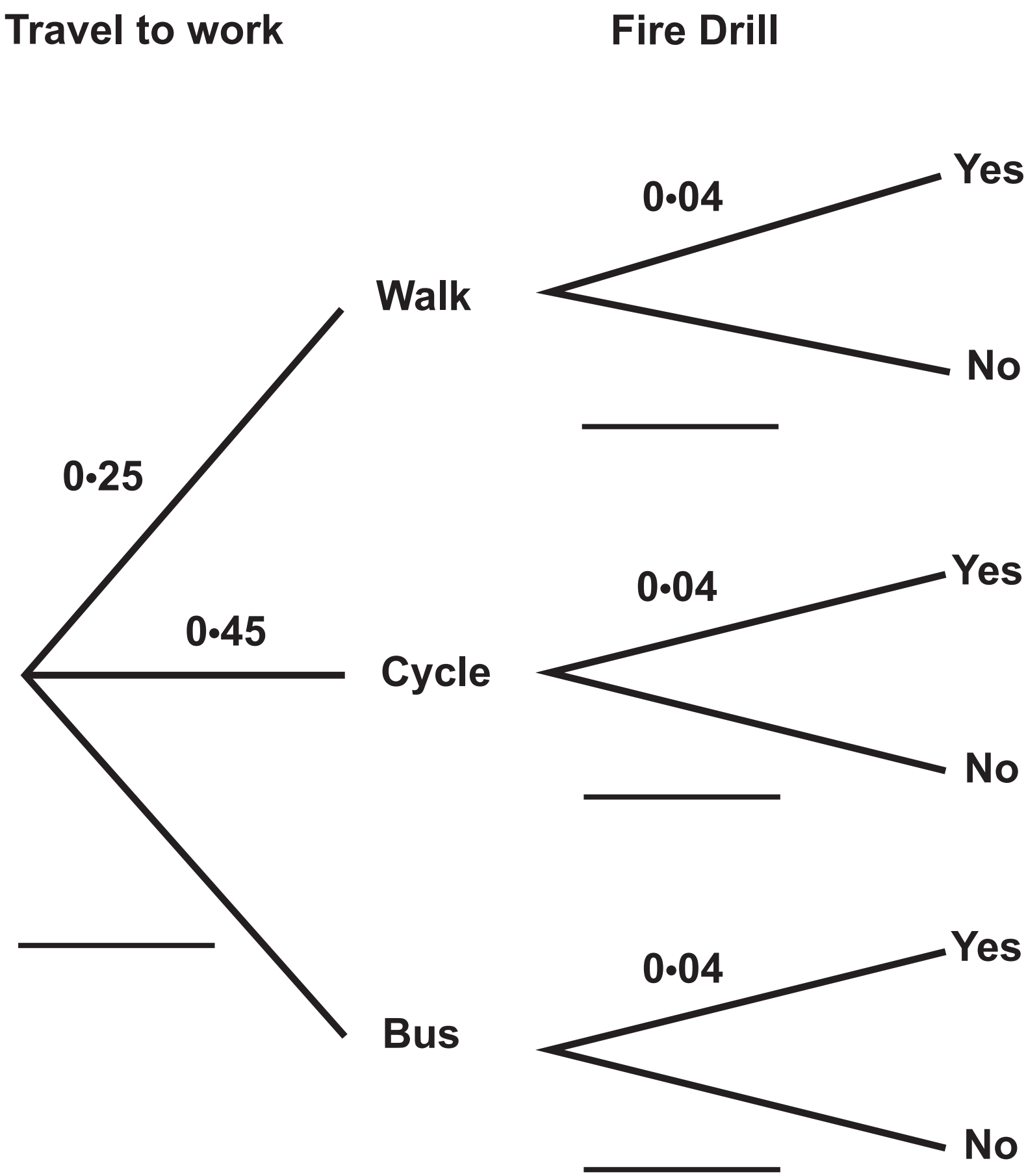
Question 14 (c)

Question 15

Diagram NOT drawn to scale



Question 17 (a)



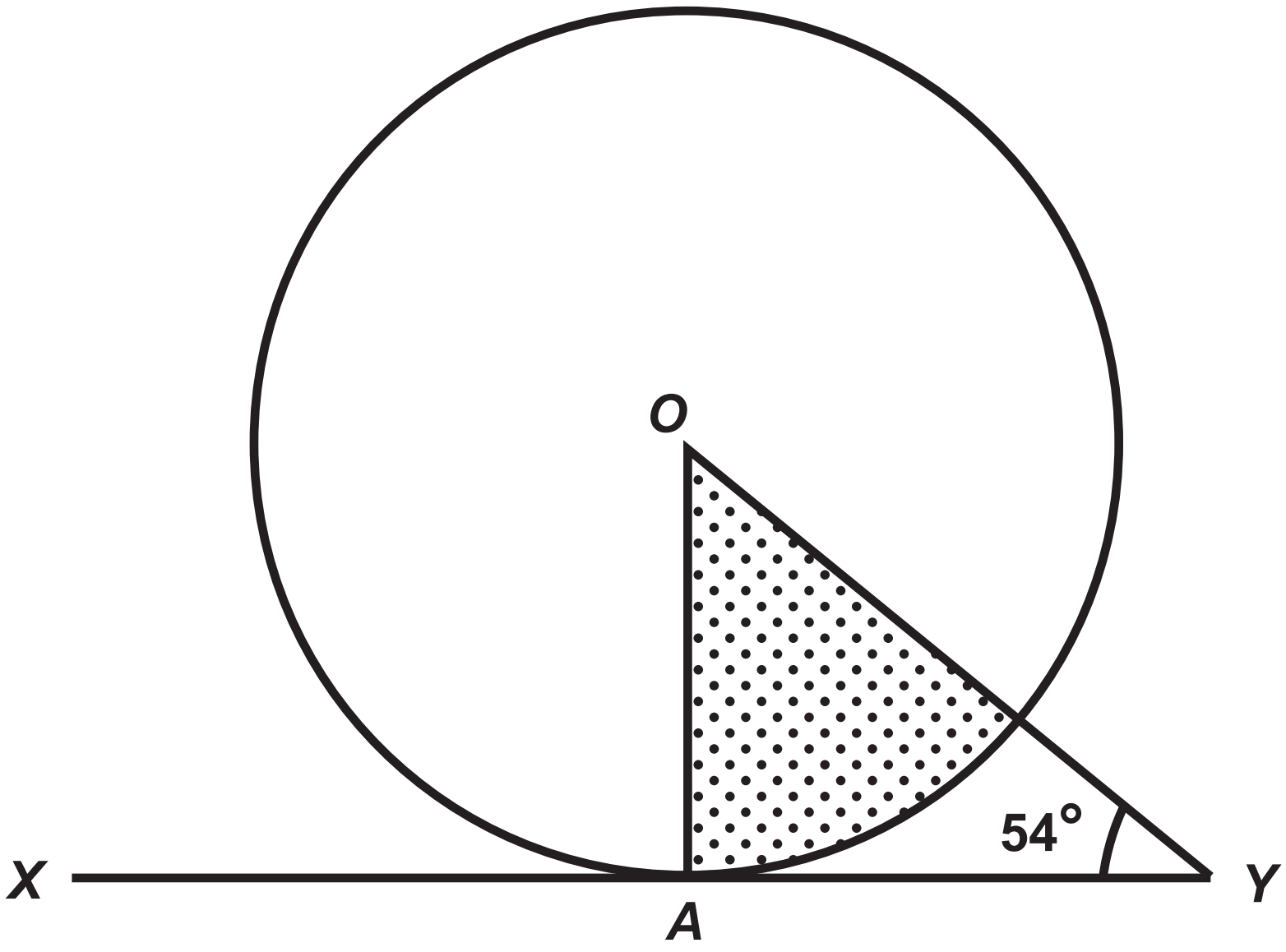
Question 18

Table

FORMULA	FORMULA COULD BE FOR
$4d + r - 2w$	length
$w(x + b + h)$	
$d^3 + 3{\cdot}14r$	
$\frac{w^3}{d^2}$	
$3{\cdot}14r^3 - xbh$	
$\frac{4w^2}{d}$	

Question 20

Diagram NOT drawn to scale



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and
NUMERACY

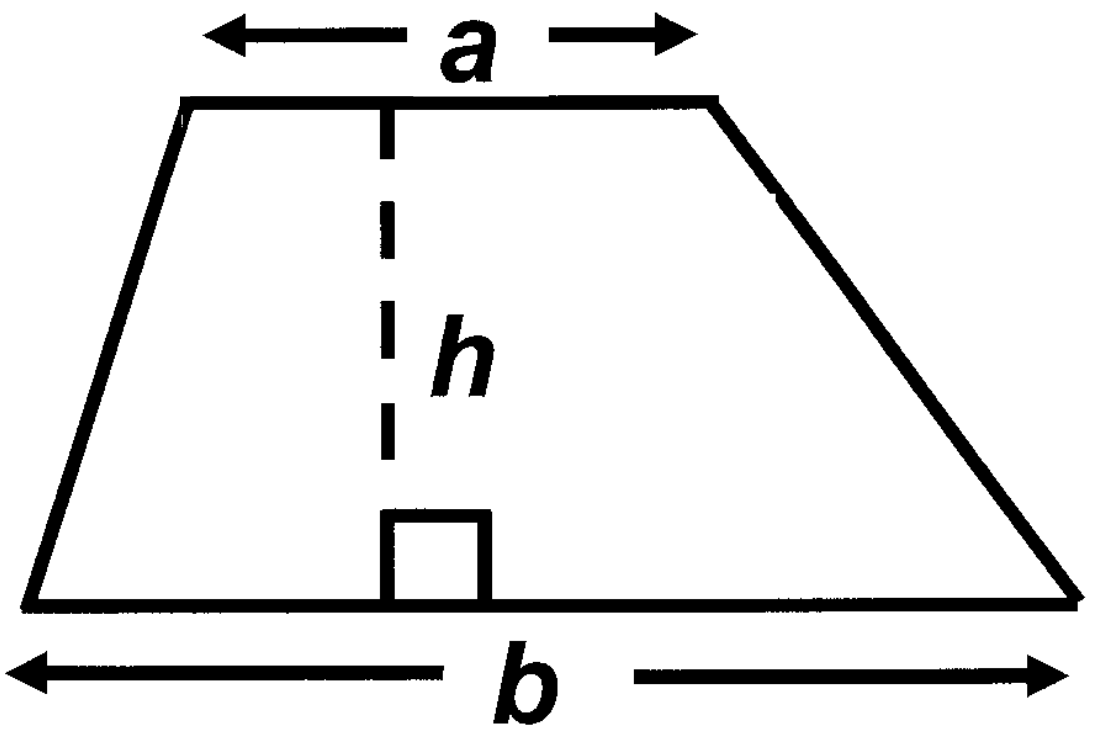
FORMULA LIST
INTERMEDIATE TIER
GCSE

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 × length