



GCSE



C300U10-1

TUESDAY, 1 NOVEMBER 2022 – MORNING

MATHEMATICS – COMPONENT 1

NON – CALCULATOR MATHEMATICS

FOUNDATION TIER

**2 hours 15 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.	7	
2.	4	
3.	2	
4.	5	
5.	5	
6.	5	
7.	4	
8.	4	
9.	6	
10.	10	
11.	2	
12.	4	
13.	4	
14.	4	
15.	3	
16.	3	
17.	4	
18.	4	
19.	5	
20.	7	
21.	4	
22.	5	
23.	3	
24.	6	
25.	3	
26.	7	
Total	120	

(Turn over)

ADDITIONAL MATERIALS

An additional Formulae Booklet.

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

(Turn over)

**ITEMS INCLUDED WITH QUESTION
PAPER**

A separate Formula List.

A separate Diagram Booklet.

Model for Question 20 (b).

**Cut out shapes for Question 18 (a) and
Question 18 (b).**

**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, taking care to number the questions(s) correctly.

(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)

1. (a) Work out 3×19

[1 mark]

continued on the next page . . .

(Turn over)

Question 1 continued

1. (b) Work out $3.162 + 10.57$

[2 marks]

continued on the next page . . .

(Turn over)

Question 1 continued

1. (c) Work out $8 + 6 \div 2$

[1 mark]

continued on the next page . . .

(Turn over)

Question 1 continued

1. (d) Write $\frac{18}{24}$ in its simplest form.

[1 mark]

continued on the next page . . .

(Turn over)

Question 1 continued

1. (e) Write 0.32 as a percentage.

[1 mark]

continued on the next page . . .

(Turn over)

Question 1 continued

- 1. (f) Write down a value that is less than -10**

[1 mark]

(Turn over)

- 2. Look at the diagram for Question 2 in the separate Diagram Booklet. The diagram is an incomplete bar chart.**

The bar chart shows the percentage of households in the UK who owned at least one mobile phone in the years 2000 and 2009.

continued on the next page . . .

(Turn over)

Question 2 continued

- 2. (a) What was the increase in the percentage of households who owned at least one mobile phone from 2000 to 2009?**

[2 marks]

continued on the next page . . .

(Turn over)

Question 2 continued

- 2. (b) In 2018, 95% of households in the UK owned at least one mobile phone.**

Complete the bar chart.

[1 mark]

continued on the next page . . .

(Turn over)

Question 2 continued

- 2. (c) Comment on how mobile phone ownership seems to have changed between 2000 and 2018.**

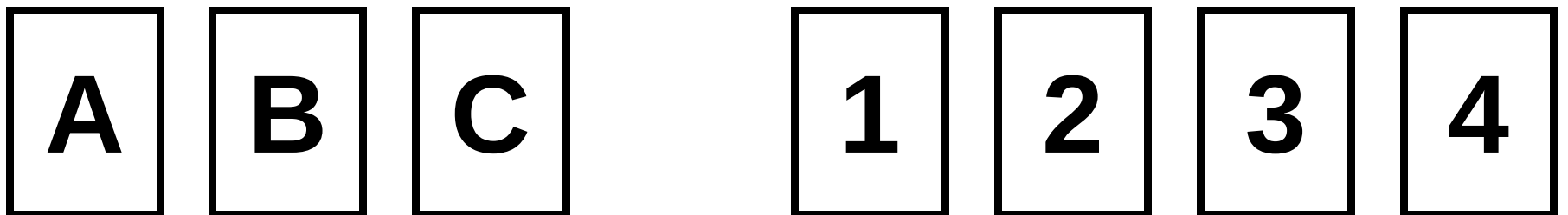
[1 mark]

(Turn over)

3. Sally has two sets of cards.

3 cards have letters on them and

4 cards have numbers on them.



She shuffles each set and chooses one card from each set at random.

Look at the table for Question 3 in the separate Diagram Booklet.

Complete the table to show all the possible pairs of cards.

You may not need all the lines in the table.

[2 marks]

(Turn over)

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

In the diagram, the angles 80° , 65° and w° are shown.

Find the value of w .

(Turn over)

$W =$ _____

[2 marks]

continued on the next page . . .

(Turn over)

Question 4 continued

- 4. (b) Look at the diagram for Question 4 (b) in the separate Diagram Booklet. The diagram is NOT drawn to scale.**

The diagram shows an isosceles triangle.

In the diagram, the angles 70° , x° and y° are shown.

Find the value of x and the value of y .

(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)

$x =$ _____

$y =$ _____

[3 marks]

(Turn over)

5. Matt has 120 music albums.

$\frac{3}{5}$ of his albums are CDs.

15% of his albums are vinyl records.

The rest of his albums are digital downloads.

How many of Matt's albums are digital downloads?

(Turn over)

23

This image shows a single page from a notebook or ledger. It features ten evenly spaced, thin black horizontal lines running across the width of the page. The background is plain white, and there are no margins, text, or other markings present.

[5 marks]
(Turn over)

6. (a) Small oranges cost x pence each.

Large oranges cost twice as much as small oranges.

Write an expression, in terms of x , for the total cost of 4 small oranges and 6 large oranges.

Give your answer in its simplest form.

(Turn over)

[3 marks]

continued on the next page . . .

(Turn over)

Question 6 continued

6. (b) Lemons cost £ y for a bag of 4

**Write an expression, in terms
of y , for the cost in PENCE
of 1 lemon.**

[2 marks]

(Turn over)

7. Tomas owns a take – away food shop.

(a) Here is part of the menu.

One chicken piece	£2.00
Two chicken pieces	£3.20
Three chicken pieces	£4.20

Jean orders 4 chicken pieces.

Tomas charges Jean £6.40

continued on the next page . . .

(Turn over)

Question 7 (a) continued

**7. (a) (i) Show how Tomas has
worked out the cost of
Jean's 4 chicken pieces.**

[1 mark]

(Turn over)

Question 7 (a) continued

7. (a) (ii) Jean says,

**“You have charged me
20p too much”**

**Show how Jean may be
correct.**

(Turn over)

[1 mark]

continued on the next page . . .

(Turn over)

Question 7 continued

**7. (b) Look at the table for
Question 7 (b) in the separate
Diagram Booklet.**

**Tomas orders some food trays.
The table shows his options.**

**Tomas spends exactly £83
on trays. He orders as many
trays as possible.**

**How many trays does Tomas
order?**

(Turn over)

[illegible]

(Turn over)

[2 marks]

(Turn over)

8. (a) Find TWO whole numbers that
- have a difference of 20, and
 - when one is divided by the other, the answer is -9

_____ and _____

[2 marks]

continued on the next page . . .

(Turn over)

Question 8 continued

8. (b) Find THREE whole numbers that

- multiply to give 24, and**
- add to a total of -5**

(Turn over)

_____ and _____ and _____

[2 marks]

9. Alan builds a model of a steam train.

The scale he uses is

1 cm represents 75 cm.

(a) The width of a wheel on Alan's model is 3 cm.

What is the width of a wheel on the steam train?

(Turn over)

[2 marks]

9. (b) The length of the whistle on the steam train is 375 millimetres.

What is the length of the whistle on Alan's model train?
Give your answer in centimetres.

(Turn over)

[3 marks]

continued on the next page . . .

(Turn over)

Question 9 continued

9. (c) Alan's model train has 6 wheels.

Alan's friend Mandy says,

"The steam train has

$6 \times 75 = 450$ wheels"

Explain why Mandy is

not correct.

[1 mark]

(Turn over)

10. Nico's normal pay rate was £20 for each hour he worked.

Nico normally worked 35 hours each week.

Any extra hours Nico worked were hours of overtime.

Nico's pay rate for each hour of overtime was 1.5 times his normal pay rate.

continued on the next page . . .

(Turn over)

Question 10 continued

**10. (a) Show that Nico earns £700
in a week when he does not
work any hours of overtime.**

[1 mark]

continued on the next page . . .

(Turn over)

Question 10 continued

**10. (b) (i) One week, Nico worked
for 38 hours.**

**Calculate Nico's pay for
this week.**

(Turn over)

[2 marks]

continued on the next page . . .

(Turn over)

Question 10 (b) continued

**10. (b) (ii) The next week, Nico earned
£1060**

**How many hours of overtime
did Nico work?**

**You must show all your
working.**

(Turn over)

[illegible]

(Turn over)

[4 marks]

continued on the next page . . .

(Turn over)

Question 10 continued

10. (c) The following week, Nico's normal pay rate increased. He did not work any hours of overtime. He earned £735 for that week.

(i) Show that Nico had a pay increase of less than 6%.

(Turn over)

[2 marks]

continued on the next page . . .

(Turn over)

Question 10 (c) continued

10. (c) (ii) Dana works with Nico and they work the same number of hours. Dana had a pay increase of 6%.

She says,

“My pay went up by a greater percentage so I earn more than Nico now.”

Explain why Dana may not be correct.

52

[1 mark]

(Turn over)

11. Ari has a BIASED spinner.

The numbers on the spinner are

1 2 3 4 5 6 7 8 9

The table below shows the relative frequencies of some events using Ari's spinner.

Event	Relative frequency
Number less than 5	0.75
5	0.1
Number more than 5	

continued on the next page . . .

(Turn over)

Question 11 continued

**What is the relative frequency of
spinning a number more than 5?**

[2 marks]

(Turn over)

12. The table below shows some of the values of $y = 4x - 1$ for $-1 \leq x \leq 1$

x	$y = 4x - 1$
-1	-5
-0.5	
0	
0.5	1
1	3

- (a) Complete the table above.

(Turn over)

[2 marks]

**12. (b) Look at the diagram for
Question 12 (b) in the separate
Diagram Booklet.**

The diagram is a grid.

**On the grid, draw the graph
of $y = 4x - 1$ for $-1 \leq x \leq 1$**

[2 marks]

(Turn over)

13. Look at the diagram for Question 13 in the separate Diagram Booklet.

The diagram is a map.

The scale of the map is

1 cm represents 10 m.

Kit paddles a canoe out to sea from the point marked S.

He stops when he is:

- **on a bearing of 160° from S**
- **120 m from S.**

continued on the next page . . .

(Turn over)

Question 13 continued

**Use the scale diagram to find
Kit's distance and bearing
from *T* when he stops.**

(Turn over)

Distance from T _____ m

Bearing from T _____ °

[4 marks]

(Turn over)

60

14. (a) Calculate $\frac{9}{14} - \frac{2}{7}$

[2 marks]

continued on the next page . . .

(Turn over)

Question 14 continued

14. (b) Calculate $\frac{10}{13} \times \frac{1}{5}$

**Give your answer in its
simplest form.**

(Turn over)

62

[2 marks]

(Turn over)

15. Sarah borrows £4200 from her friend at a rate of 2% simple interest per year.

She agrees to pay back the £4200 PLUS the interest in one payment at the end of 5 years.

How much should Sarah give her friend at the end of the 5 years?

(Turn over)

£ _____

[3 marks]

(Turn over)

16. Calculate the size of an interior angle of a regular 10 – sided shape (decagon).

(Turn over)

[3 marks]

(Turn over)

17. One summer, Shaun grew runner beans.

Each week he recorded, in kilograms, the total mass of the runner beans he picked.

The results for the first 4 weeks are given below.

3.6 3.4 2.9 5.1

For the first 5 weeks, the mean mass of the runner beans Shaun picked was 4.2 kg per week.

continued on the next page . . .

(Turn over)

Question 17 continued

**How many kilograms of runner
beans did Shaun pick in week 5?**

You must show all your working.

(Turn over)

Week 5 = _____ kg

[4 marks]

(Turn over)

18. Look at the diagram for Question 18 in the separate Diagram Booklet. The diagram shows triangle *A* on a coordinate grid.

(a) Reflect TRIANGLE *A* in the line $y = 4$

Label your answer *B*.

A cut out triangle *B* is available for this question.

[2 marks]

continued on the next page . . .

(Turn over)

Question 18 continued

18. (b) Translate TRIANGLE *A* using

the vector $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$

Label your answer *C*.

**A cut out triangle *C* is available
for this question.**

[2 marks]

(Turn over)

19. Bryn lives in Canada.

When he bought a book from the UK for £240, the exchange rate was

£1 = 2.50 Canadian dollars.

When he sold the same book to a person in Japan for 162 000 Japanese yen, the exchange rate was

1 Canadian dollar = 81 Japanese yen.

Show that Bryn made more than 1000 Canadian dollars buying and selling this book.

(Turn over)

(Turn over)

74

[5 marks]

(Turn over)

- 20. (a) Look at the statements for Question 20 (a) in the separate Diagram Booklet.**

Tick (✓) the TWO correct statements about

$$3xy(y + 2) \equiv 3xy^2 + 6xy$$

[2 marks]

continued on the next page . . .

(Turn over)

Question 20 continued

20. (b) In this part of the question all lengths are in centimetres.

**Ask for the model for
Question 20 (b). The model
is NOT made to scale.
The model represents a prism.**

**Look at the diagram for
Question 20 (b) in the separate
Diagram Booklet. The diagram
is NOT drawn to scale.
The diagram shows the
cross – section of the model.**

continued on the next page . . .

(Turn over)

Question 20 (b) continued

The cross – section of the prism is a triangle with height x and base $3x$.

The length of the prism is 4 cm.

The volume of the prism is 216 cm^3

Use an algebraic method to find the height of the triangle.

(Turn over)

78

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)

21. (a) Mary and Paul run 100 metres.

**Mary's time is between
14 and 15 seconds inclusive.**

**Paul's time is between
12 and 13 seconds inclusive.**

**Complete the inequality to show
the least and greatest possible
difference between the times
of these two runners.**

_____ $\leq$ time difference $\leq$ _____

(Turn over)

[2 marks]

continued on the next page . . .

(Turn over)

Question 21 continued

21. (b) Peter wants to go by ferry to France. He is taking a van and a small trailer.

He knows:

- **the van is 590 centimetres long, correct to the nearest 10 cm**
- **the trailer is 200 centimetres long, correct to the nearest 10 cm.**

continued on the next page . . .

(Turn over)

Question 21 (b) continued

Look at the diagram for Question 21 (b) in the separate Diagram Booklet. The diagram is NOT drawn to scale.

The ferry company uses the following rules for the length of vehicles.

Small trailer: maximum length 2 m
Van: maximum length 6 m

Peter thinks that the length of his van and the length of his trailer will BOTH fit the rules.

continued on the next page . . .

(Turn over)

Question 21 (b) continued

Use lengths to give one example to show how Peter MAY be correct, and one example to show how Peter MAY NOT be correct.

MAY be correct

(Turn over)

MAY NOT be correct

[2 marks]

(Turn over)

22. (a) Work out $(6 \times 10^5) \div 20$

Give your answer in standard form.

[2 marks]

continued on the next page . . .

(Turn over)

Question 22 continued

- 22. (b) At midday, the volume of water flowing over a waterfall is 3×10^8 litres per minute.**

**At midday, what is the volume of water flowing over the waterfall in litres per hour?
Give your answer in standard form.**

(Turn over)

87

[3 marks]

(Turn over)

23. (a) Find the next term of the following Fibonacci – type sequence.

2 3 5 8 13 21 34 _____

[1 mark]

(Turn over)

Question 23 continued

23. (b) Find the n th term of the following sequence.

4, 9, 14, 19, 24, ...

[2 marks]
(Turn over)

24. (a) Look at the diagram for Question 24 (a) in the separate Diagram Booklet. The diagram is NOT drawn to scale.

A glass of water is placed on a small table.

The table stands on horizontal ground. This is represented in the diagram.

The total mass of the table and the glass of water is 9.6 kg.

continued on the next page . . .

(Turn over)

Question 24 (a) continued

You are given the ratios,

mass of table : mass of glass of water

= 11 : 1

mass of empty glass : mass of water

= 3 : 5

What is the mass of the
empty glass?

(Turn over)

[3 marks]

continued on the next page . . .

(Turn over)

Question 24 continued

24. (b) Look at the diagram for Question 24 (b) in the separate Diagram Booklet. The diagram is NOT drawn to scale.

$$\text{Use: Pressure} = \frac{\text{Force (N)}}{\text{Area (cm}^2\text{)}}$$

The base of the table has an area of 1600 cm²

Some books are also placed on the table. This is represented in the diagram.

continued on the next page . . .

(Turn over)

Question 24 (b) continued

**The books, glass of water
and table exert a pressure
of 0.1 N/cm^2 on the ground.**

**Calculate the force exerted
on the ground by the books,
glass of water and table.**

**Assume that the whole of the
base of the table is in contact
with the ground.**

(Turn over)

[2 marks]

continued on the next page . . .

(Turn over)

Question 24 continued

24. (c) In fact, the assumption made in part (b) is incorrect. Part of the base of the table is not in contact with the ground.

Describe how this changes your answer to part (b).

[1 mark]

(Turn over)

25. In a sale, jewellery is reduced in price by 40%.

The price of a ring is reduced to £1008 in the sale.

What was the price of the ring before the sale?

[illegible]

(Turn over)

[3 marks]

(Turn over)

26. (a) Expand and simplify

$$(3x - 4)(5x + 7)$$

[3 marks]

continued on the next page . . .

(Turn over)

Question 26 continued

26. (b) Factorise each of the following.

(i) $2x^2y + 12xy^2$

[3 marks]

continued on the next page . . .

(Turn over)

Question 26 (b) continued

26. (b) (ii) $x^2 - 64$

[1 mark]

END OF PAPER

TOTAL 120 MARKS

(Turn over)

[illegible]

(Turn over)

[illegible]

(Turn over)

[illegible]

(Turn over)

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

C300U10-1

TUESDAY, 1 NOVEMBER 2022 – MORNING

**MATHEMATICS – COMPONENT 1
NON – CALCULATOR MATHEMATICS
FOUNDATION TIER**

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

Diagram Booklet

Surname: _____

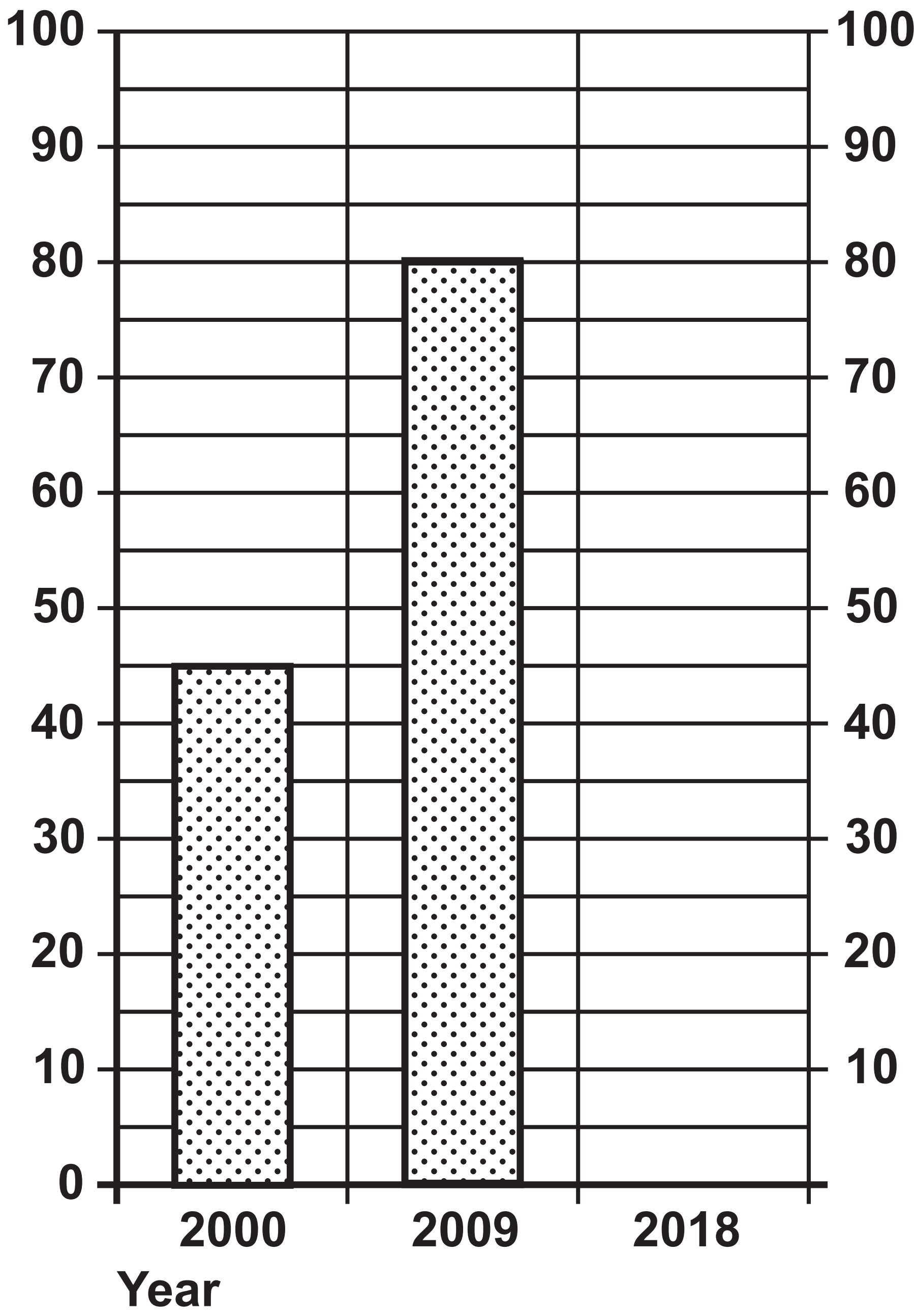
First name(s): _____

Centre Number: _____

Candidate Number: 0 _____

Question 2

Percentage of households



Question 3

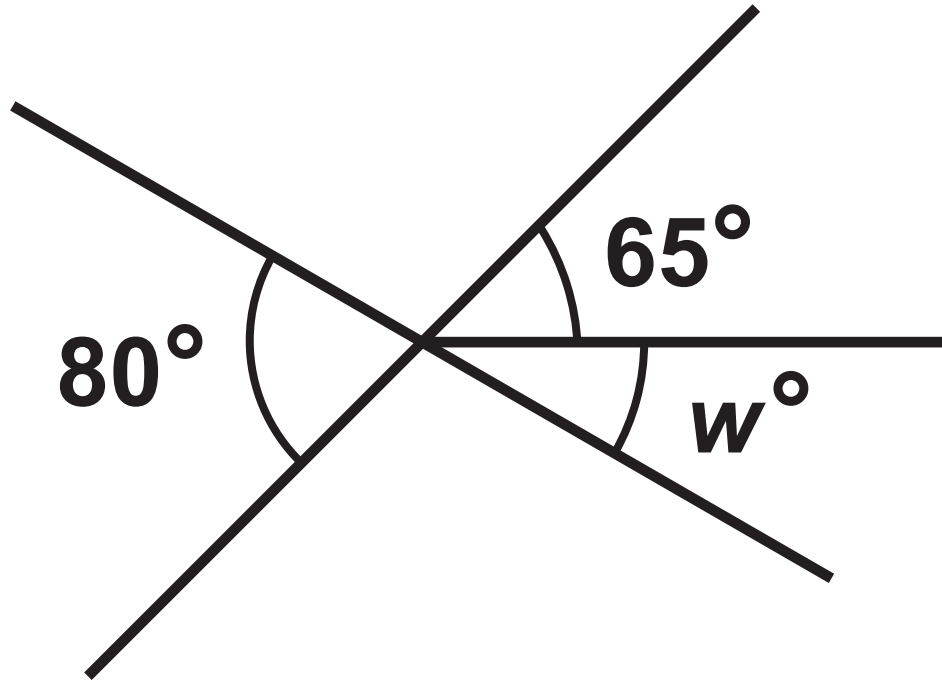
Table

You may not need all the lines in the table.

[illegible]

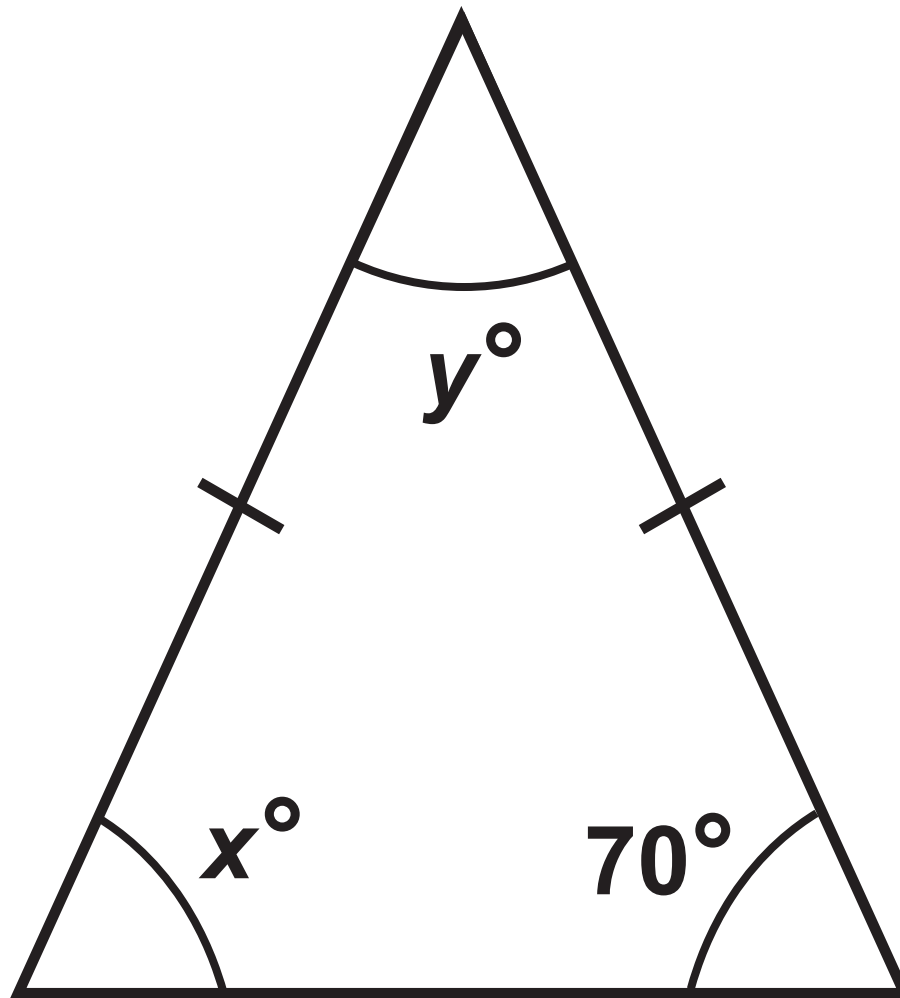
Question 4 (a)

Diagram NOT drawn to scale



Question 4 (b)

Diagram NOT drawn to scale

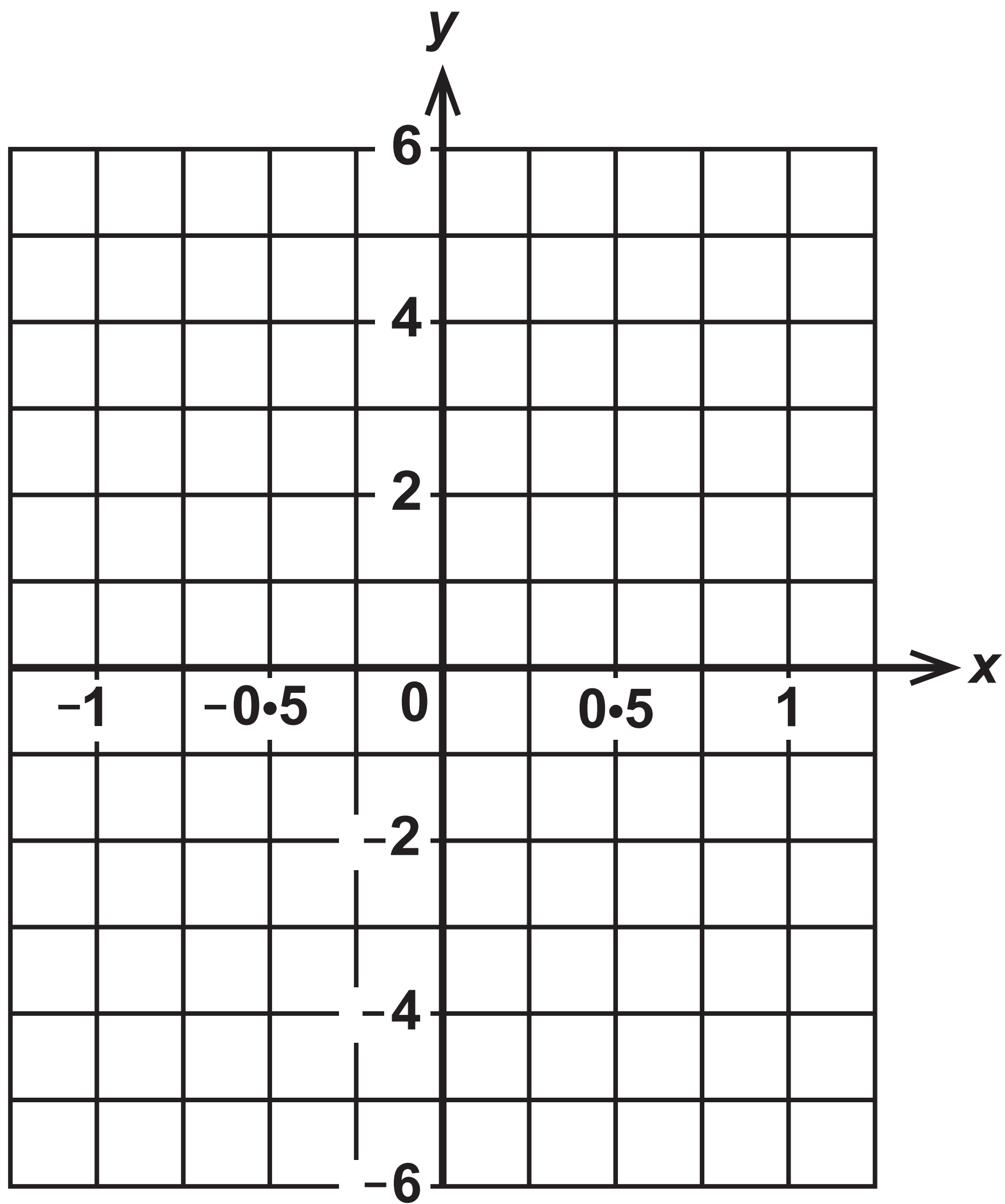


Question 7 (b)

Table

Number of trays	Cost
25	£5
50	£9
100	£17
250	£33
1000	£99

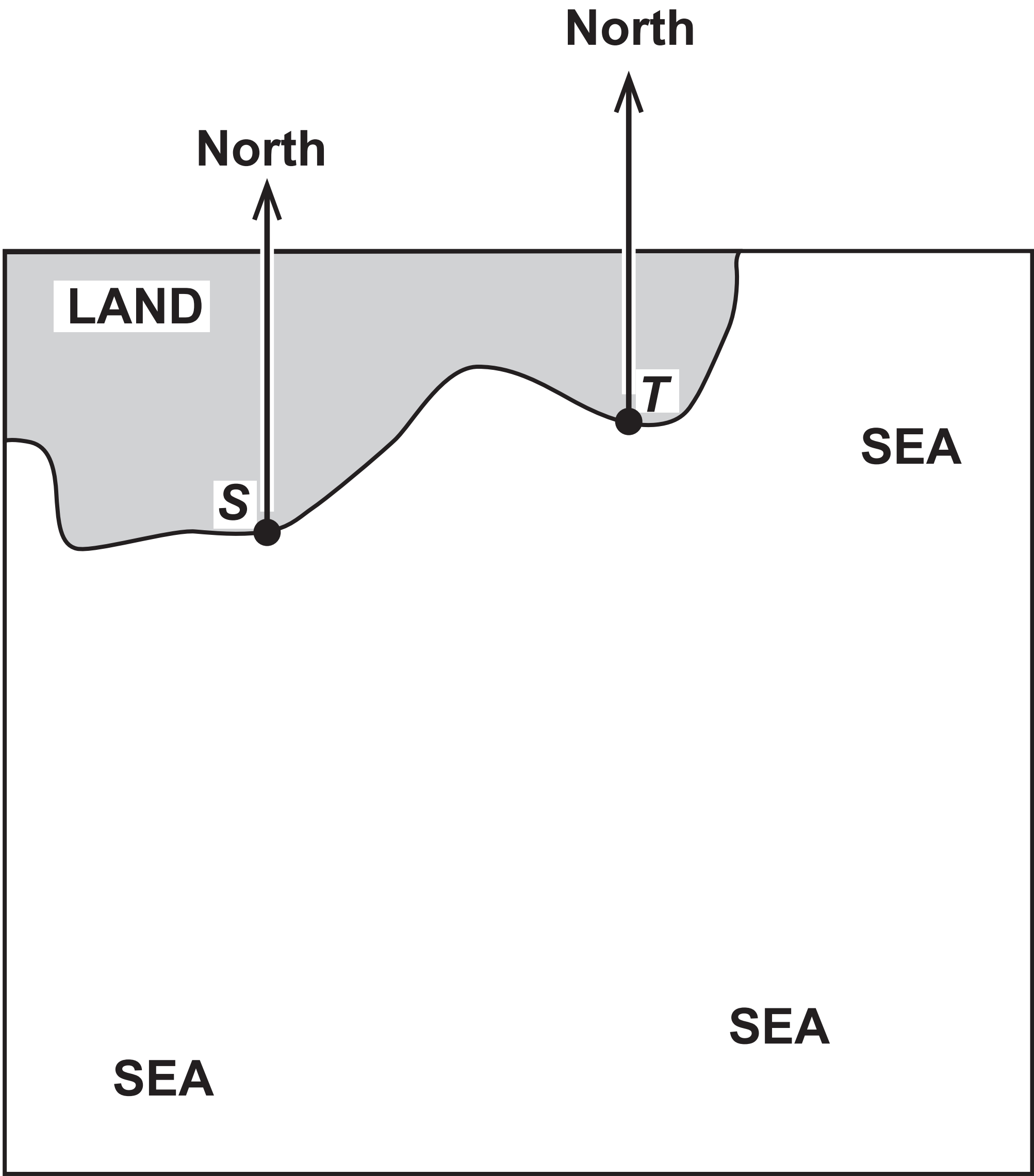
Question 12 (b)



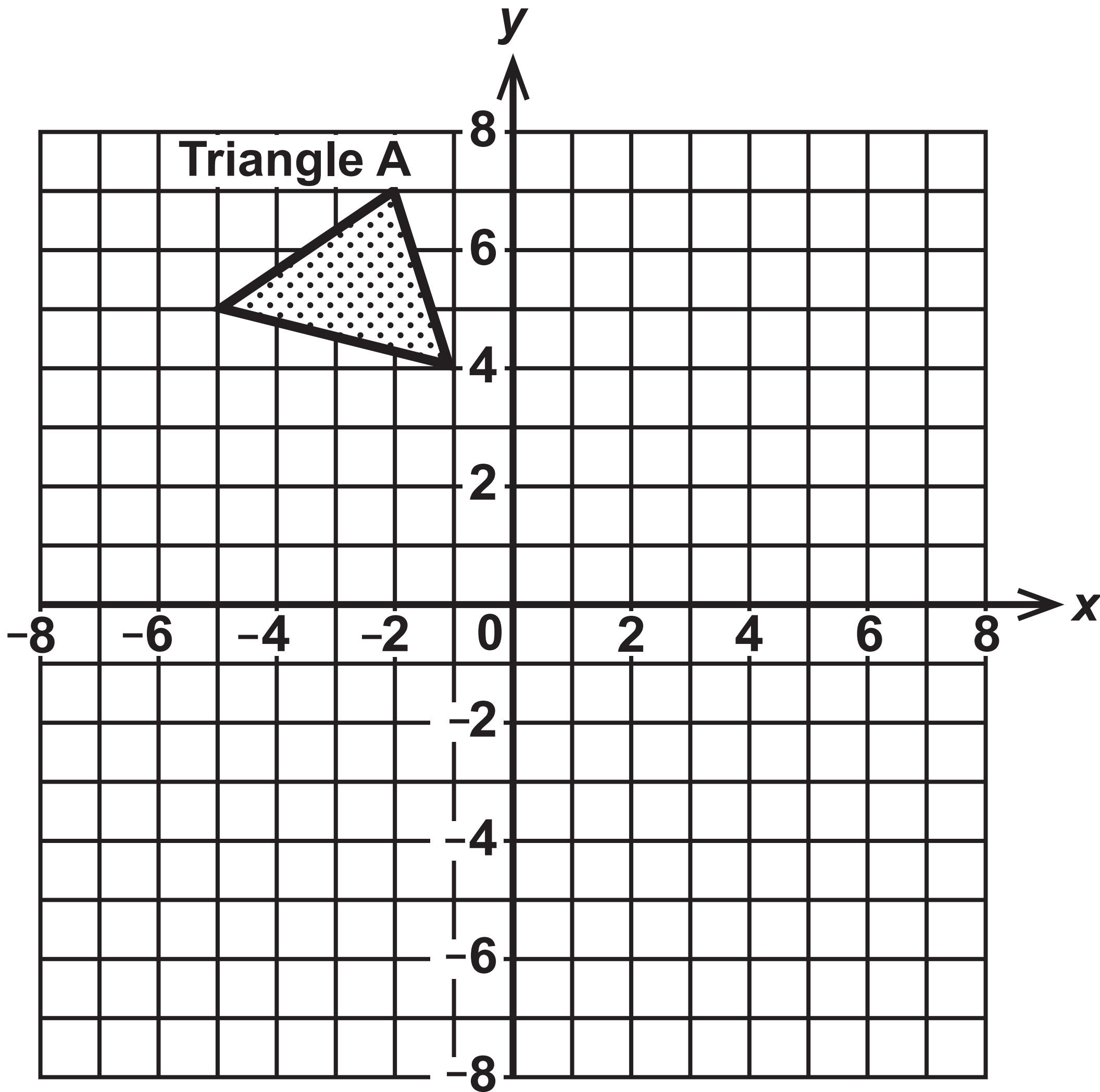
Question 13

Diagram IS drawn to scale

Scale: 1 cm represents 10 m



Question 18



Question 20 (a)

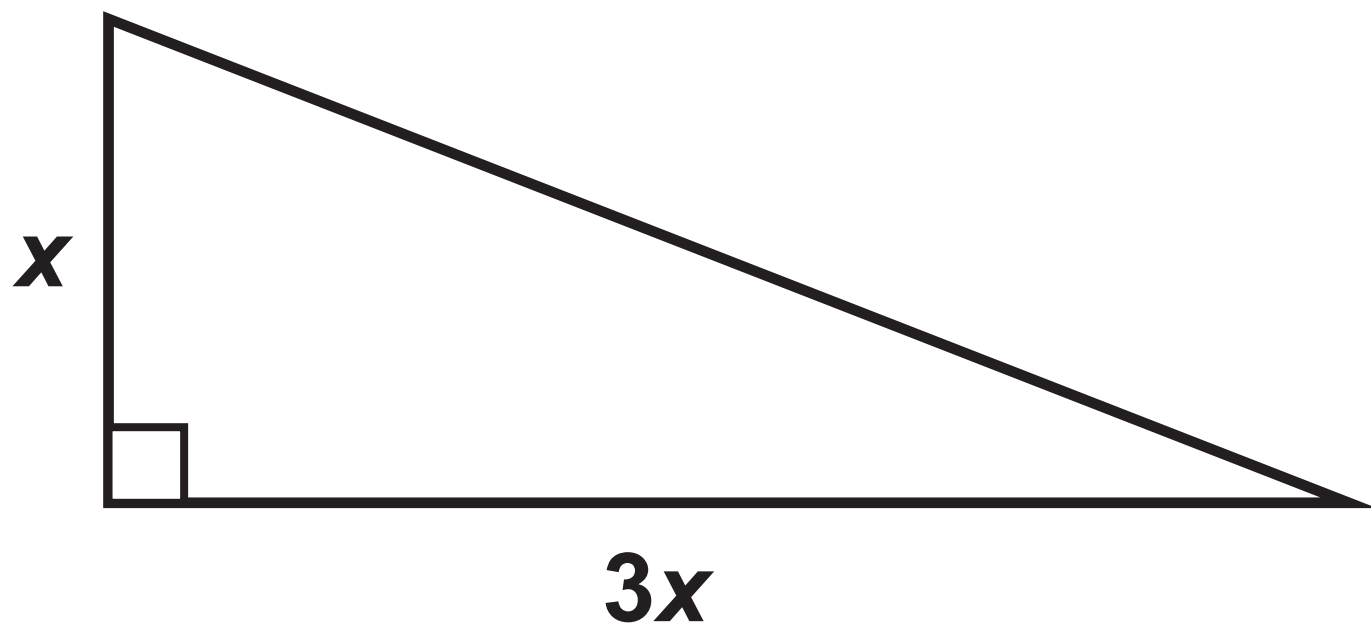
Statements

It is an equation.	
It is true for all values of x and y.	
It is an identity.	
It is only true for certain values of x and y.	
It is an inequality.	
It is true for only one value of x and one value of y.	

Question 20 (b)

Diagram NOT drawn to scale

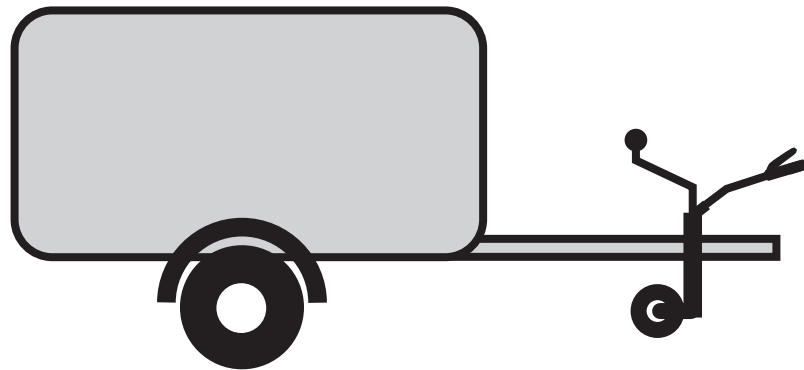
Cross – section of prism



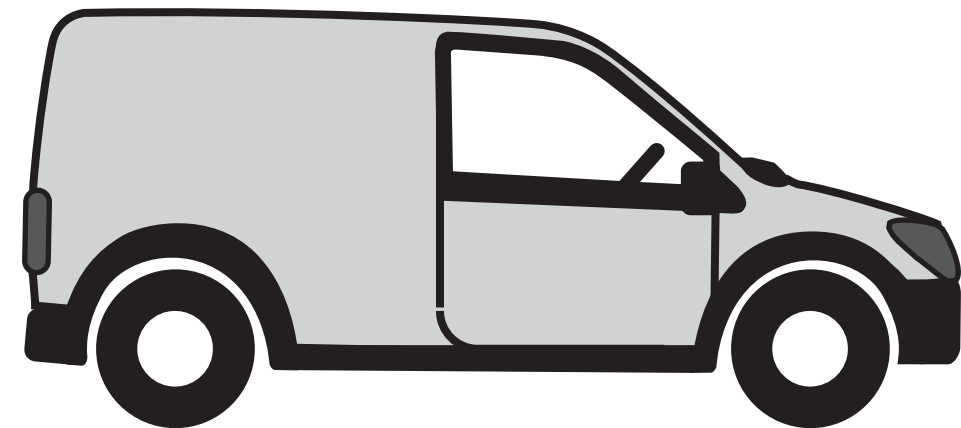
Question 21 (b)

Diagram NOT drawn to scale

Small trailer:
maximum length 2 m

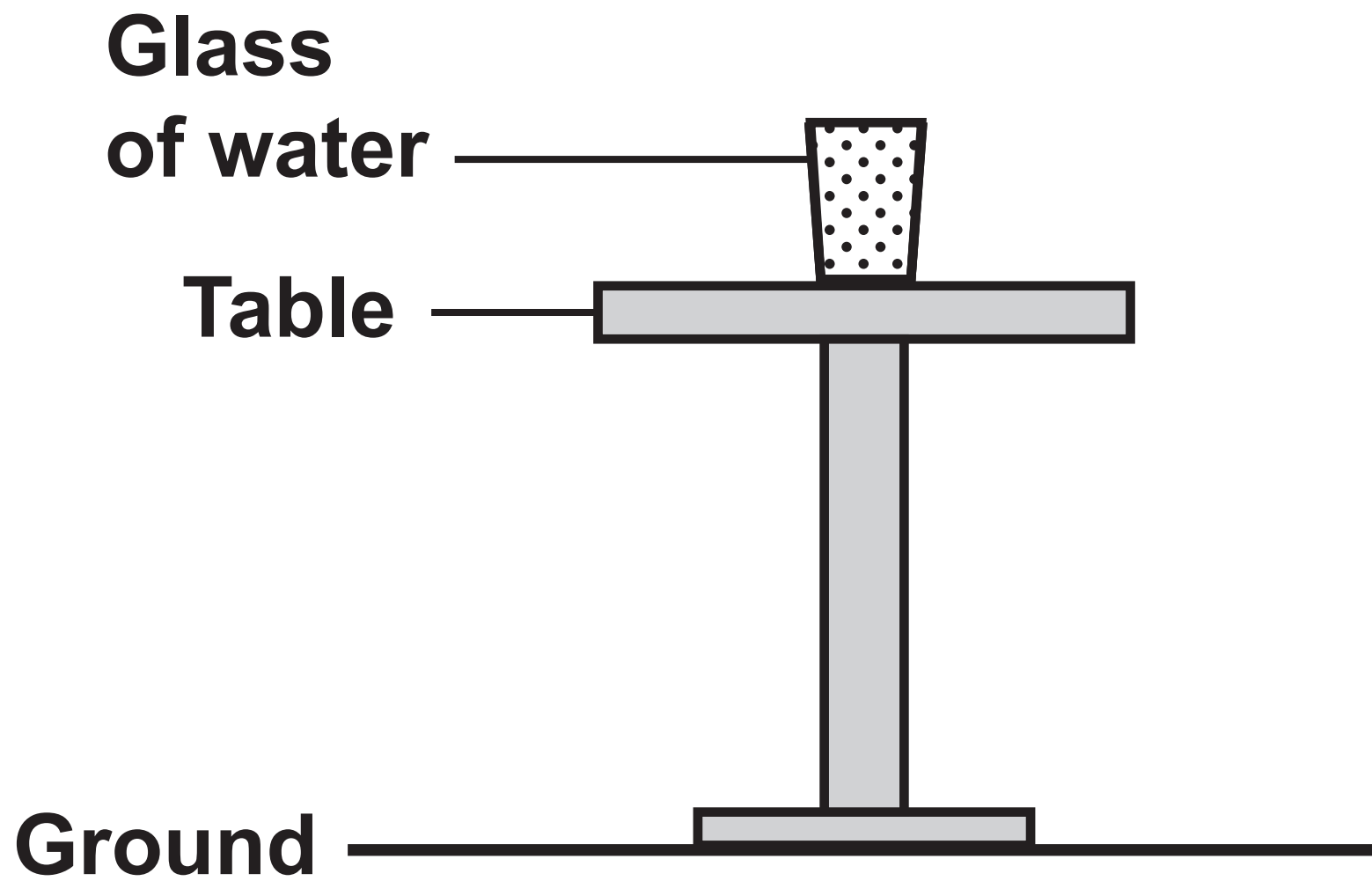


Van:
maximum length 6 m



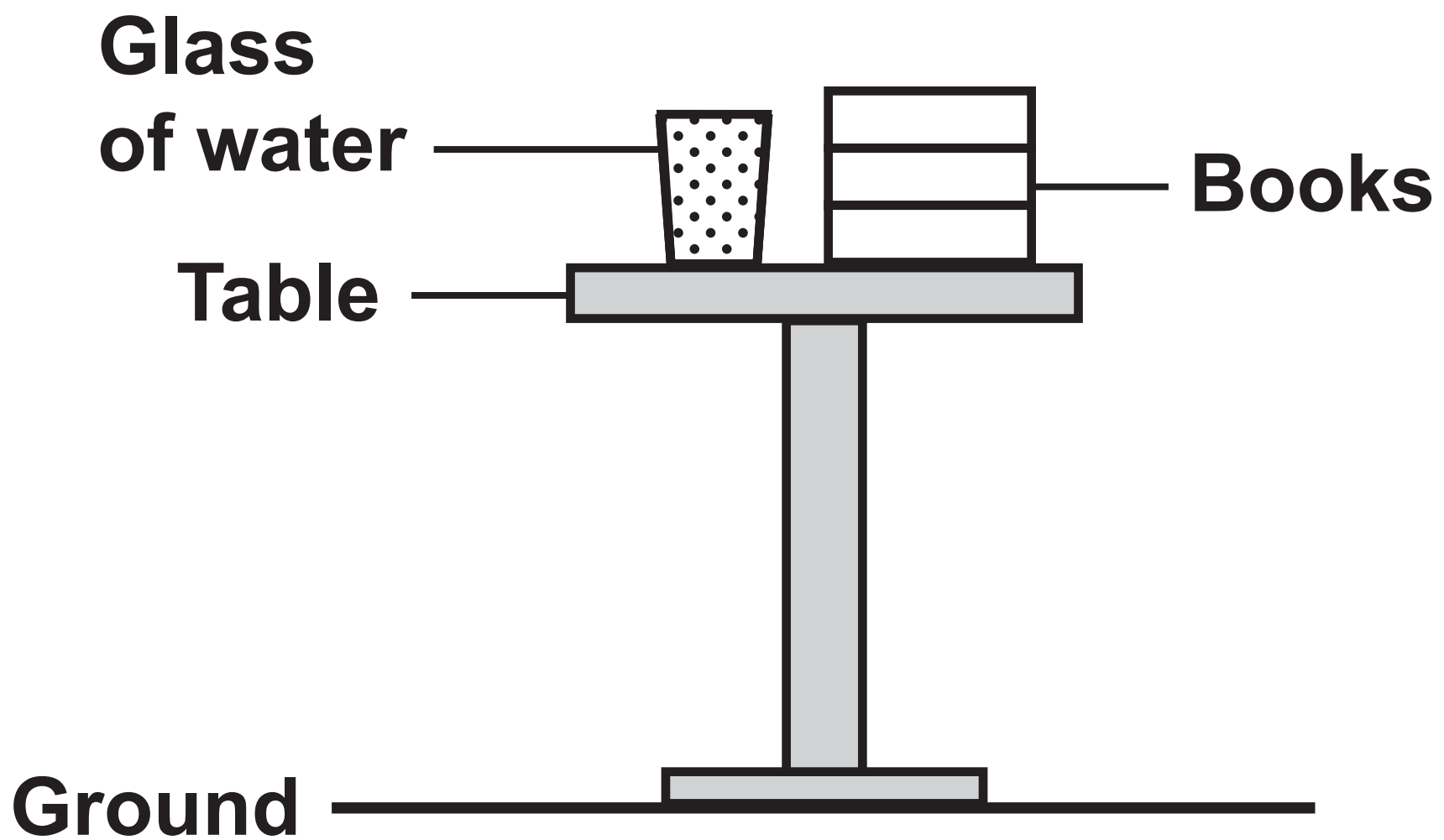
Question 24 (a)

Diagram NOT drawn to scale



Question 24 (b)

Diagram NOT drawn to scale



**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:

$$v = u + at$$

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

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

C300U10-1A

TUESDAY, 1 NOVEMBER 2022 – MORNING

MATHEMATICS

FOUNDATION TIER

Additional Formulae

PERIMETER, AREA AND VOLUME

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

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

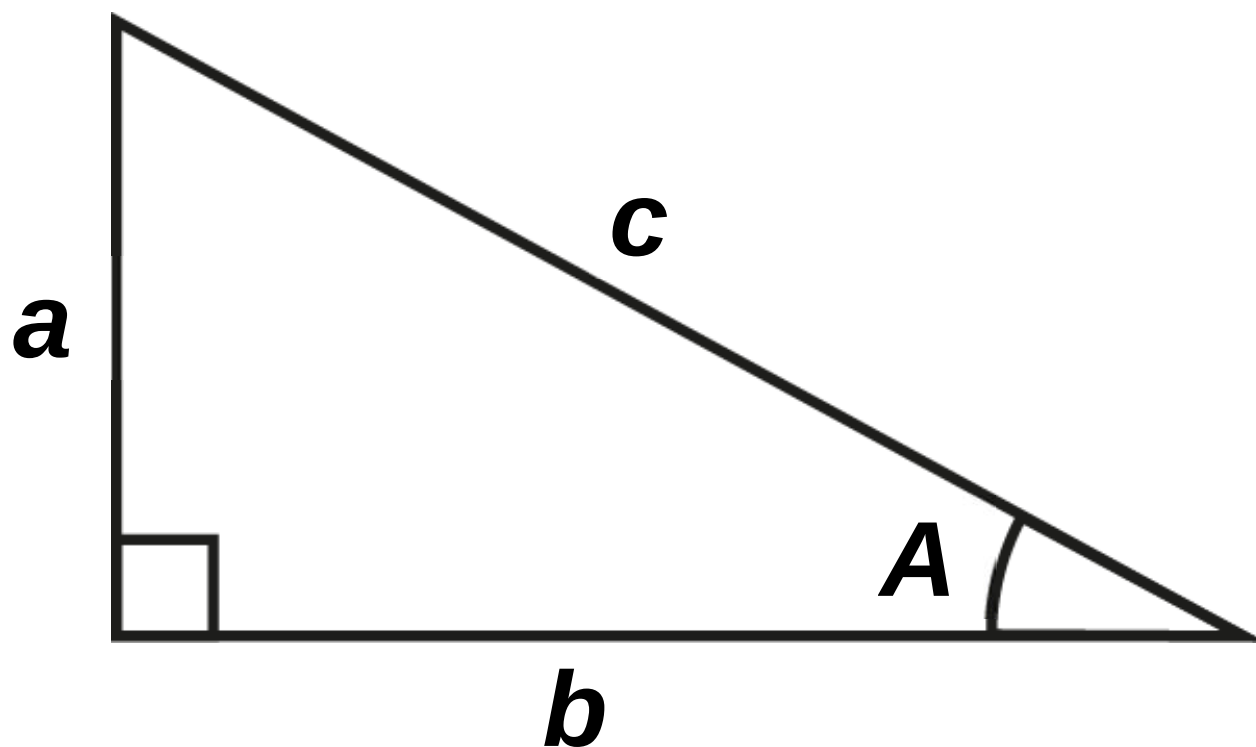
Volume of a prism =
area of cross section $\times$ length

Where r is the radius and
 d is the diameter:

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

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

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:

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

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 :

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