



**GCSE**

**3310U50-1**

**FRIDAY, 20 MAY 2022 – MORNING**

**MATHEMATICS – NUMERACY**

**UNIT 1: NON – CALCULATOR**

**HIGHER TIER**

**1 hour 35 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**

<b>Question</b>	<b>Maximum Mark</b>	<b>Mark Awarded</b>
<b>1.</b>	<b>6</b>	
<b>2.</b>	<b>5</b>	
<b>3.</b>	<b>6</b>	
<b>4.</b>	<b>6</b>	
<b>5.</b>	<b>10</b>	
<b>6.</b>	<b>2</b>	
<b>7.</b>	<b>6</b>	
<b>8.</b>	<b>9</b>	
<b>9.</b>	<b>7</b>	
<b>10.</b>	<b>13</b>	
<b>Total</b>	<b>70</b>	

**(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.**

**Models for Question 7, Question 9 (a) and Question 9 (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. Question numbers must be given for the work written on the additional page(s).**

**Take  $\pi$  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 4, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.**

**(Turn over)**

**1. (a) People travel by bus or by train from Hiraddug Station.**

**On Tuesday, 420 people travelled by bus from the station.**

**The ratio of the number of people travelling by bus to the number of people travelling by train was 20 : 17**

**Calculate the number of people who travelled by train from the station on Tuesday.**

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**Question 1 continued**

**1. (b) The price of a ticket to travel by bus to Glaswen Station has increased by 5% in each of the last 2 years.**

**Two years ago, the price of a ticket was £4**

**Calculate the current price of a ticket.**

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**(Turn over)**



**2. (a) Gwyn is making some packs.  
Each pack contains one nut,  
one bolt and one washer.**

**To make up these packs,  
Gwyn buys:**

- **some boxes that contain  
30 nuts each**
- **some boxes that contain  
5 bolts each**
- **some boxes that contain  
25 washers each.**

**continued on the next page . . .**

**(Turn over)**

**Question 2 (a) continued**

**Gwyn wants to buy the LEAST POSSIBLE NUMBER OF BOXES so that, in making up the packs, he uses ALL of the nuts, bolts and washers he has bought.**

**Complete the table provided for Question 2 (a) in the separate Diagram Booklet to show the number of boxes of each item that Gwyn needs to buy. You must show all your working.**

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**(Turn over)**



**Question 2 continued**

**2. (b) Each washer has a thickness of 2 mm, correct to the nearest 0.5 mm.**

**Calculate the greatest possible thickness of a stack of 6 washers.**

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**(Turn over)**

**13**

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**[2 marks]**

**(Turn over)**

**3. OrenVit is a company that produces bottles of orange juice.**

**The company uses only bottles with a capacity of one litre.**

**Each day, the cost of producing bottles of orange juice is as follows:**

<b>Fixed charge for use of equipment</b>	<b>£10</b>
<b>Cost of ingredients</b>	<b>80p per bottle</b>
<b>Cost of empty bottles with labels</b>	<b>20p per bottle</b>

**continued on the next page . . .**

**(Turn over)**

**Question 3 continued**

**3. (a) Look at the diagram for Question 3 (a) in the separate Diagram Booklet.**

**On the graph paper, draw a graph to show the total daily cost of producing between 0 and 100 bottles of orange juice.**

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**[3 marks]**

**continued on the next page . . .**

**(Turn over)**

**Question 3 continued**

**3. (b) One day, OrenVit produces  
1750 PINTS of orange juice  
in one – litre bottles.**

**Calculate the cost of producing  
this quantity of orange juice.**

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**[3 marks]**

**(Turn over)**

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

**Rectangular stickers with warnings written on them are often placed near water taps.**

**Look at Diagram 1 and Diagram 2 for Question 4 in the separate Diagram Booklet. The diagrams are NOT drawn to scale.**

**continued on the next page . . .**

**(Turn over)**

**Question 4 continued**

**The rectangular sticker shown in Diagram 1 warns of hot water.**

**It has a length of 14 cm and an area of  $42 \text{ cm}^2$**

**Diagram 2 is mathematically similar to the first sticker.**

**It is an enlargement of the first sticker, with scale factor 4**

**Calculate the length and the width of the larger sticker (Diagram 2).**

**You must show all your working.**

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**20**

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**[4 marks + 2 marks OCW]**

**(Turn over)**

**5. (a) Look at the diagram for Question 5 (a) in the separate Diagram Booklet. The diagram is a cumulative frequency graph.**

**An aquarium has 35 ray fish.**

**The cumulative frequency graph shows information about the lengths of these ray fish.**

**Use the cumulative frequency diagram to give the best estimates for the answers to the following questions.**

**continued on the next page . . .**

**(Turn over)**

**Question 5 (a) continued**

**5. (a) (i) What is the median length  
of these ray fish?**

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\_\_\_\_\_ **cm**

**[1 mark]**

**continued on the next page . . .**

**(Turn over)**

**Question 5 (a) continued**

**5. (a) (ii) How many of these ray fish  
have lengths greater than  
72 cm?**

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**[1 mark]**

**continued on the next page . . .**

**(Turn over)**

**Question 5 continued**

- 5. (b) The aquarium also has guppies. The table below shows information about the length of the guppies in a sample of 60 guppies.**

<b>Minimum</b>	<b>1.5 cm</b>
<b>Range</b>	<b>5.0 cm</b>
<b>Median</b>	<b>3.0 cm</b>
<b>Lower quartile</b>	<b>2.5 cm</b>
<b>Interquartile range</b>	<b>3.5 cm</b>

**continued on the next page . . .**

**(Turn over)**

**Question 5 (b) continued**

**5. (b) (i) On the grid provided for Question 5 (b) (i) in the separate Diagram Booklet, draw a box – and – whisker plot of the data from the table on the previous page.**

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**[4 marks]**

**continued on the next page . . .**

**(Turn over)**

**Question 5 (b) continued**

**5. (b) (ii) How many of the sample of 60 guppies have a length greater than or equal to 2.5 cm?**

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**[2 marks]**

**continued on the next page . . .**

**(Turn over)**

**Question 5 continued**

**5. (c) A carp was weighed in  
November 2021.**

**It was weighed again in  
April 2022.**

**The carp had a mass of 9.9 kg  
in April 2022.**

**Between these dates, the mass  
of the carp increased by 10%**

**Calculate the mass of the carp  
in November 2021.**

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**(Turn over)**

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**[2 marks]**

**(Turn over)**

6. The surface area of the Earth is  
510 million km<sup>2</sup>

Write this area in standard form.

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\_\_\_\_\_ km<sup>2</sup>

[2 marks]

(Turn over)

**7. Ask for the models for Question 7.  
The models are NOT made to scale.  
There are two models,  
Model 1 and Model 2.**

**Tregareth Zoo has a large glass  
enclosure for reptiles.**

**Model 1 represents the large glass  
enclosure for the reptiles.**

**The enclosure consists of a hollow  
rectangular – based pyramid sitting  
on top of a cuboid.**

**continued on the next page . . .**

**(Turn over)**

**Question 7 continued**

**The enclosure is to be modified by placing a wooden cuboid onto the base. This cuboid will reduce the capacity of the enclosure.**

**This is shown in Model 2.**

**Model 2 has a length of 8 m, a width of 5 m and a height of 3 m.**

**Look at the diagram for Question 7 in the separate Diagram Booklet.**

**The diagram is NOT drawn to scale.**

**The diagram shows the front view of the modified enclosure.**

**continued on the next page . . .**

**(Turn over)**

**Question 7 continued**

**The pyramid has a vertical height of 1.5 m. The inserted wooden cuboid has dimensions 4 m by 3.5 m by 0.5 m.**

**Calculate the capacity of this modified enclosure as a percentage of the capacity of the original enclosure.**

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**(Turn over)**





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**Capacity of the modified enclosure is**

**\_\_\_\_\_ % of the capacity of the**

**original enclosure**

**[6 marks]**

**(Turn over)**

**8. Look at the diagram for Question 8 in the separate Diagram Booklet. The diagram is a histogram.**

**Robert's Plants is a company that grows ornamental trees to sell in its nursery.**

**The histogram shows the heights of the 80 trees in the nursery.**

**(a) Trees that can be sold are at least 50 cm tall.**

**How many trees are**

**TOO SHORT to be sold?**

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**(Turn over)**

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**[2 marks]**

**continued on the next page . . .**

**(Turn over)**

**Question 8 continued**

**8. (b) Use the histogram to give the best estimates for the answers to the following questions.**

**(i) What is the median height of the 80 trees?**

**Circle your answer.**

<b>47.5 cm</b>	<b>48 cm</b>	<b>50 cm</b>	<b>55 cm</b>	<b>60 cm</b>
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**[1 mark]**

**(Turn over)**







9. (a) Ask for the model for Question 9 (a). The model is NOT made to scale.

Medi – Cap is a company that makes hollow spherical capsules for medicine.

One of its spherical capsules has a volume of  $128 \pi \text{ mm}^3$

Calculate the radius of this capsule.

continued on the next page . . .

(Turn over)





**Question 9 continued**

- 9. (b) Ask for the model for Question 9 (b). The model is NOT made to scale.**

**Medi – Cap also makes another shape of capsule, called a Bullet capsule.**

**These capsules are in the shape of two hollow hemispheres attached to each end of a hollow cylinder, as shown on the model. The diameter of the cylinder, and of each hemisphere, is 8 mm.**

**continued on the next page . . .**

**(Turn over)**

**Question 9 (b) continued**

**To make a capsule easier to swallow, the exterior surface is coated with a glaze.**

**Calculate the surface area that is covered by the glaze.**

**Give your answer in terms of  $\pi$  in its simplest form.**

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**(Turn over)**



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

**The diagram is a speed–time graph.**

**Eliska competed in an indoor cycle race. The speed–time graph shows Eliska’s speed during the first 8 seconds of her race.**

**(a) Estimate the greatest acceleration that Eliska achieved during the first 8 seconds of her race.**

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

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**(Turn over)**

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**[4 marks]**

**continued on the next page . . .**

**(Turn over)**

**Question 10 continued****10. (b) Eliska's initial acceleration****was  $0.\dot{7}\dot{2}$  m/s<sup>2</sup>****Write  $0.\dot{7}\dot{2}$  as a fraction.**

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**(Turn over)**

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**[2 marks]**

**continued on the next page . . .**

**(Turn over)**

**Question 10 continued**

**10. (c) Use the trapezium rule with exactly 4 STRIPS of equal width to estimate the distance Eliska travelled during the first 8 seconds of the race.**

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**(Turn over)**

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**[3 marks]**

**continued on the next page . . .**

**(Turn over)**

**Question 10 continued**

- 10. (d) Look at the diagram for Question 10 (d) in the separate Diagram Booklet. The diagram is NOT drawn to scale. The diagram is a speed – time graph.**
- The speed – time graph shows Eliska’s speed from  $t = 8$  seconds to  $t = 48$  seconds. The graph shows that her speed increased at a constant rate from  $t = 8$  to  $t = 16$ , and at a different constant rate from  $t = 16$  to  $t = 48$**

**continued on the next page . . .**

**(Turn over)**

Question 10 (d) continued

Eliska's speed at  $t = 48$  was  
1 m/s faster than her speed  
at  $t = 16$

From  $t = 8$  to  $t = 48$ ,  
Eliska travelled 550 m.

Form and solve an equation  
to calculate Eliska's speed at  
time  $t = 16$  seconds.

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(Turn over)



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**Eliska's speed at time  $t = 16$  seconds**

**is \_\_\_\_\_ m/s**

**[4 marks]**

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**END OF PAPER**

**TOTAL 70 MARKS**

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**(Turn over)**









**GCSE**

**3310U50-1**

**FRIDAY, 20 MAY 2022 – MORNING**

**MATHEMATICS – NUMERACY  
UNIT 1: NON – CALCULATOR  
HIGHER 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 \_\_\_\_\_

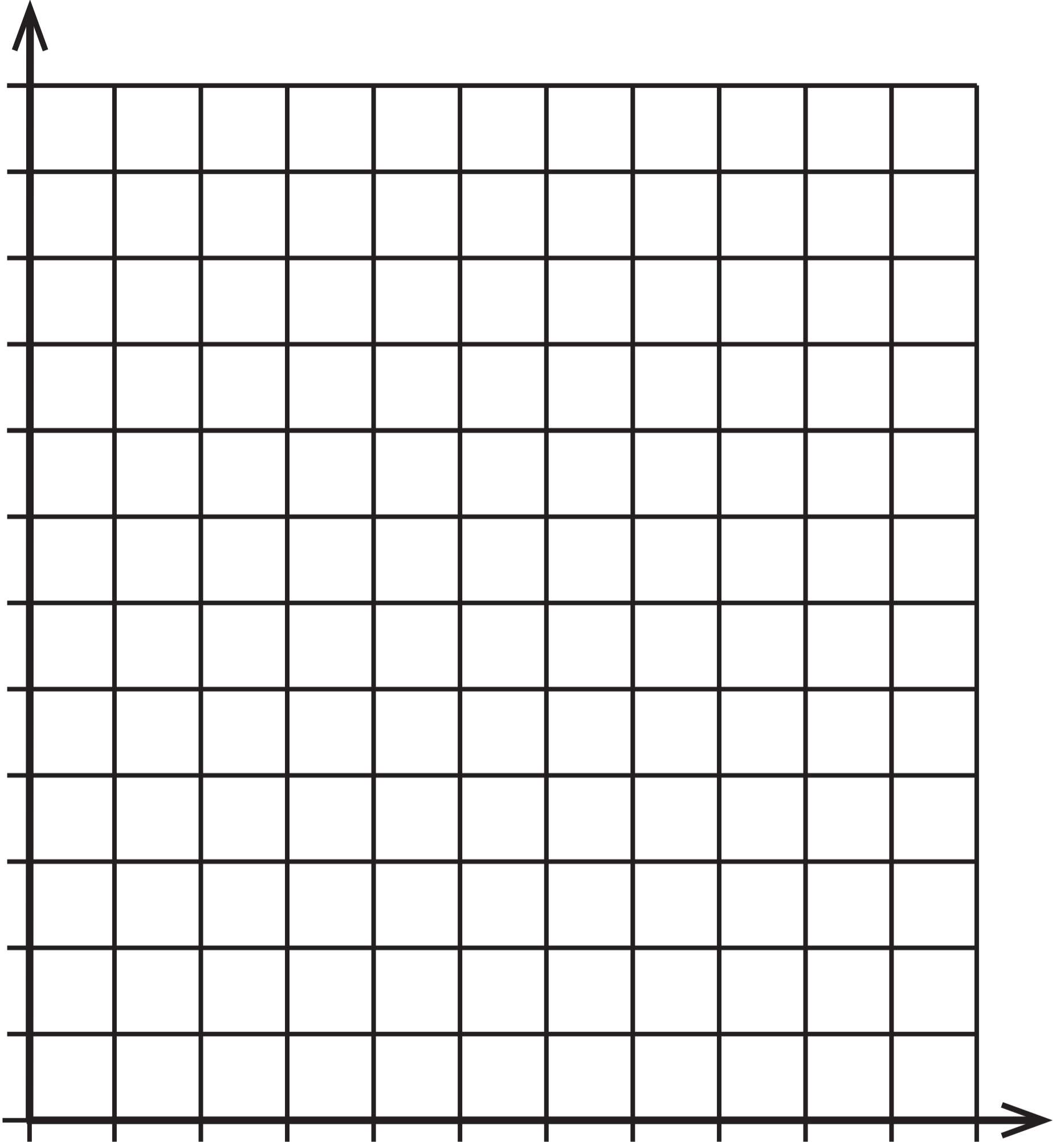
## Question 2 (a)

### Table

	<b>Number of boxes needed</b>
<b>Nuts (30 in each box)</b>	_____ <b>boxes</b>
<b>Bolts (5 in each box)</b>	_____ <b>boxes</b>
<b>Washers (25 in each box)</b>	_____ <b>boxes</b>

# Question 3 (a)

**Cost (£)**



**Number of 1 - litre bottles**

## Question 4

### Diagram 1

Diagram NOT drawn to scale

This water is hot

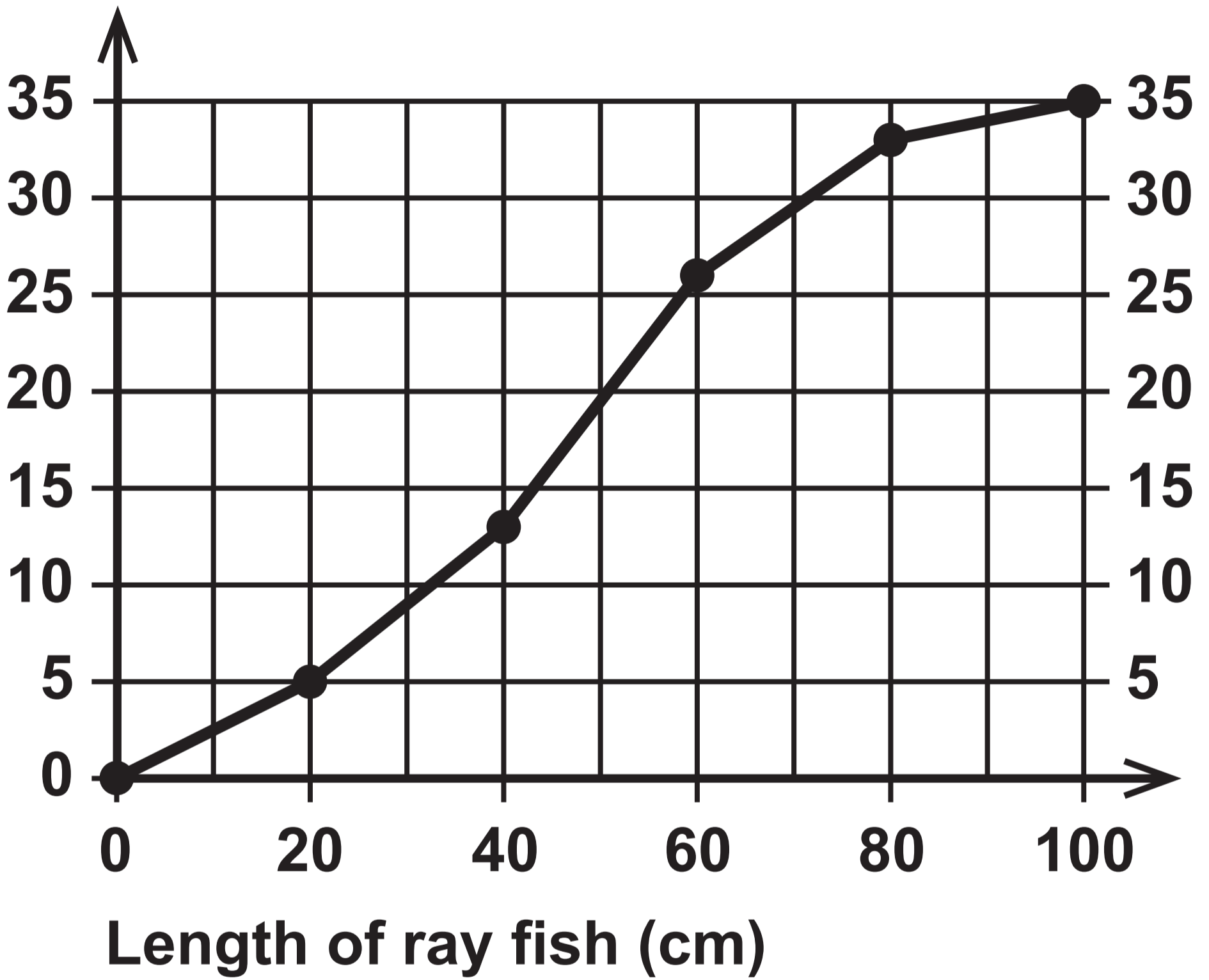
### Diagram 2

Diagram NOT drawn to scale

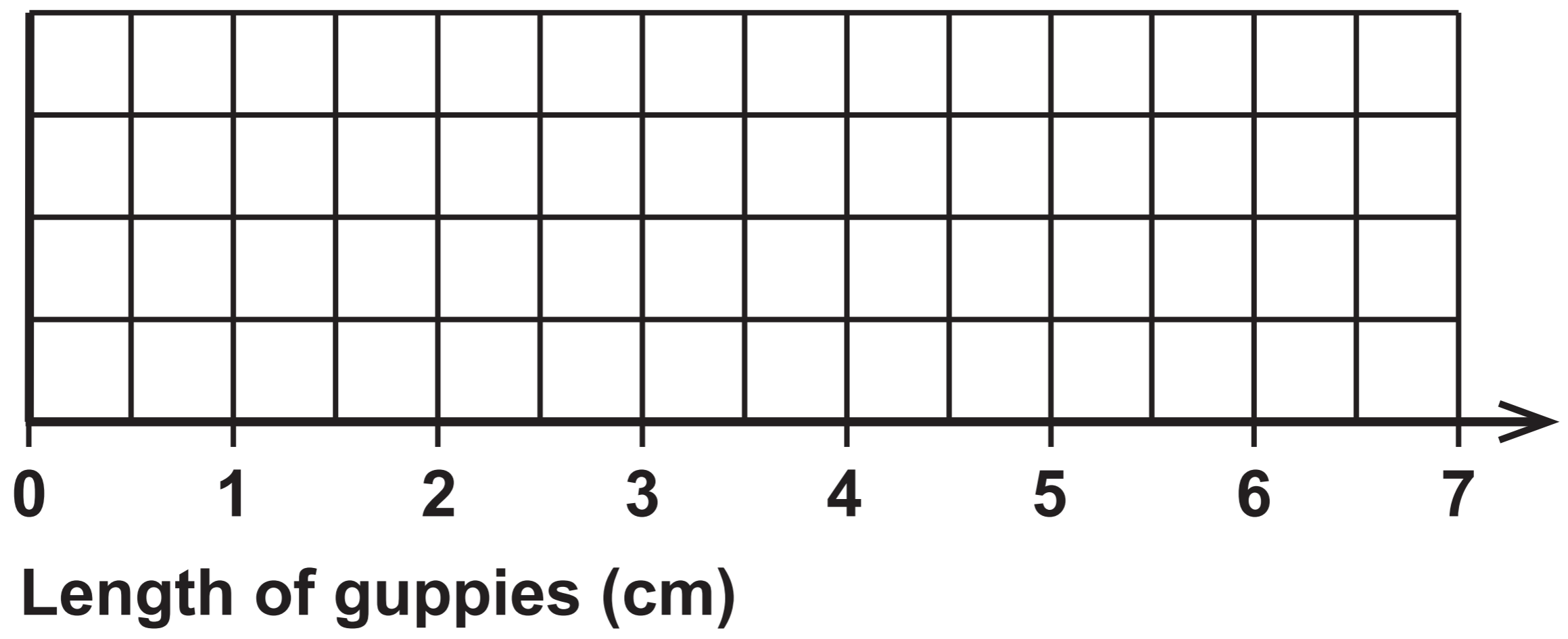
This water is hot

# Question 5 (a)

Cumulative frequency



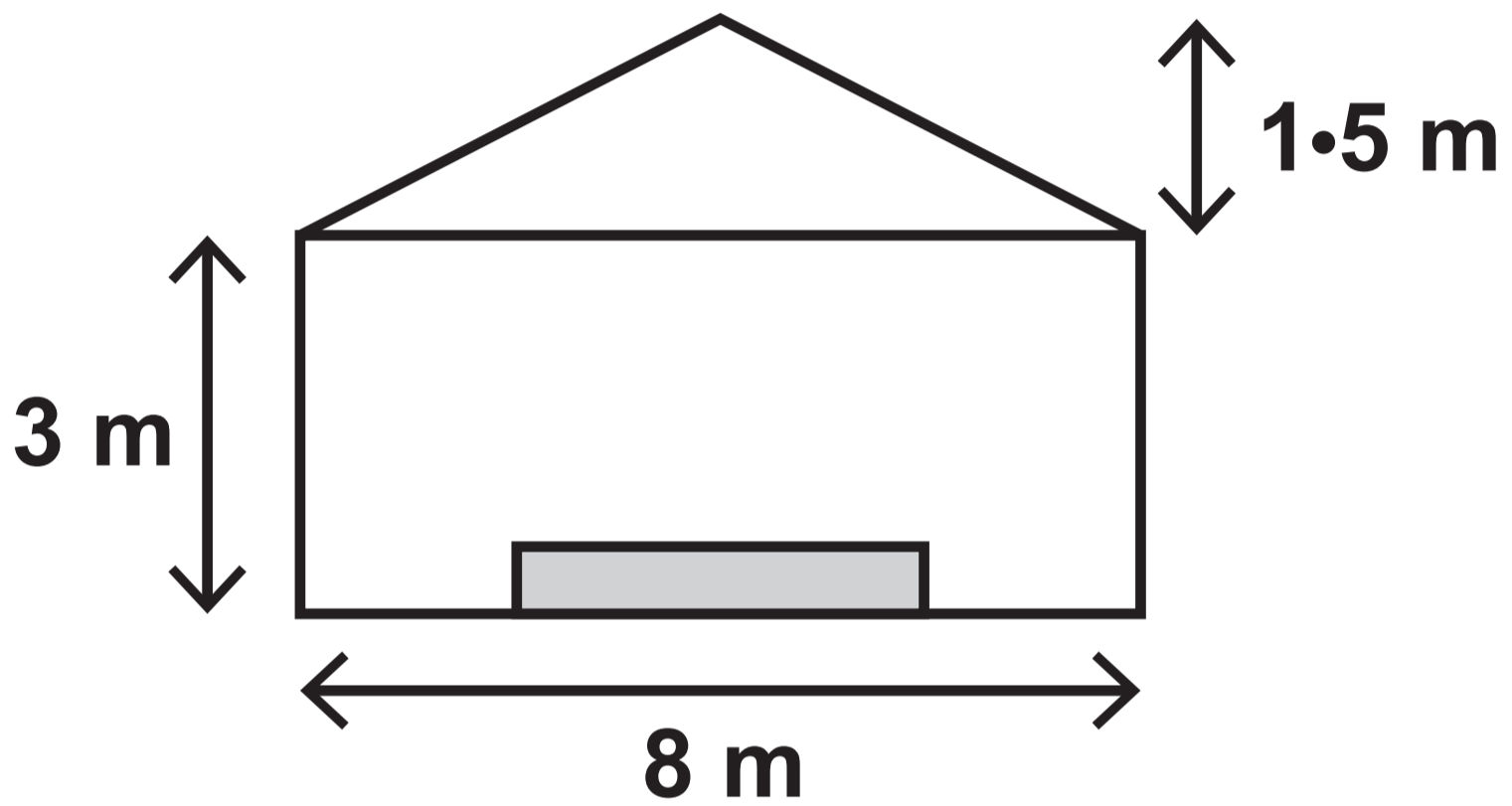
# Question 5 (b) (i)



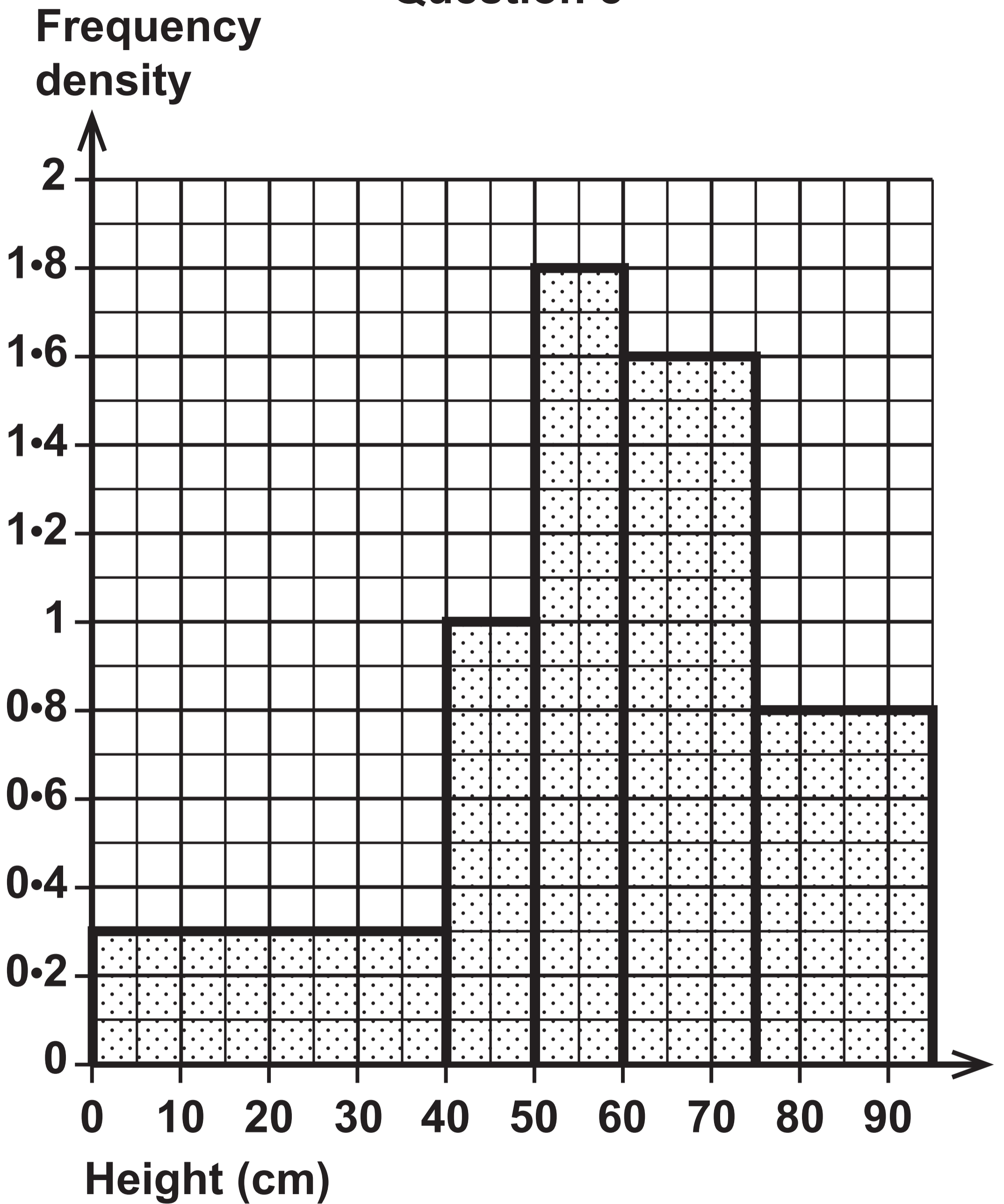
## Question 7

Diagram NOT drawn to scale

Front view

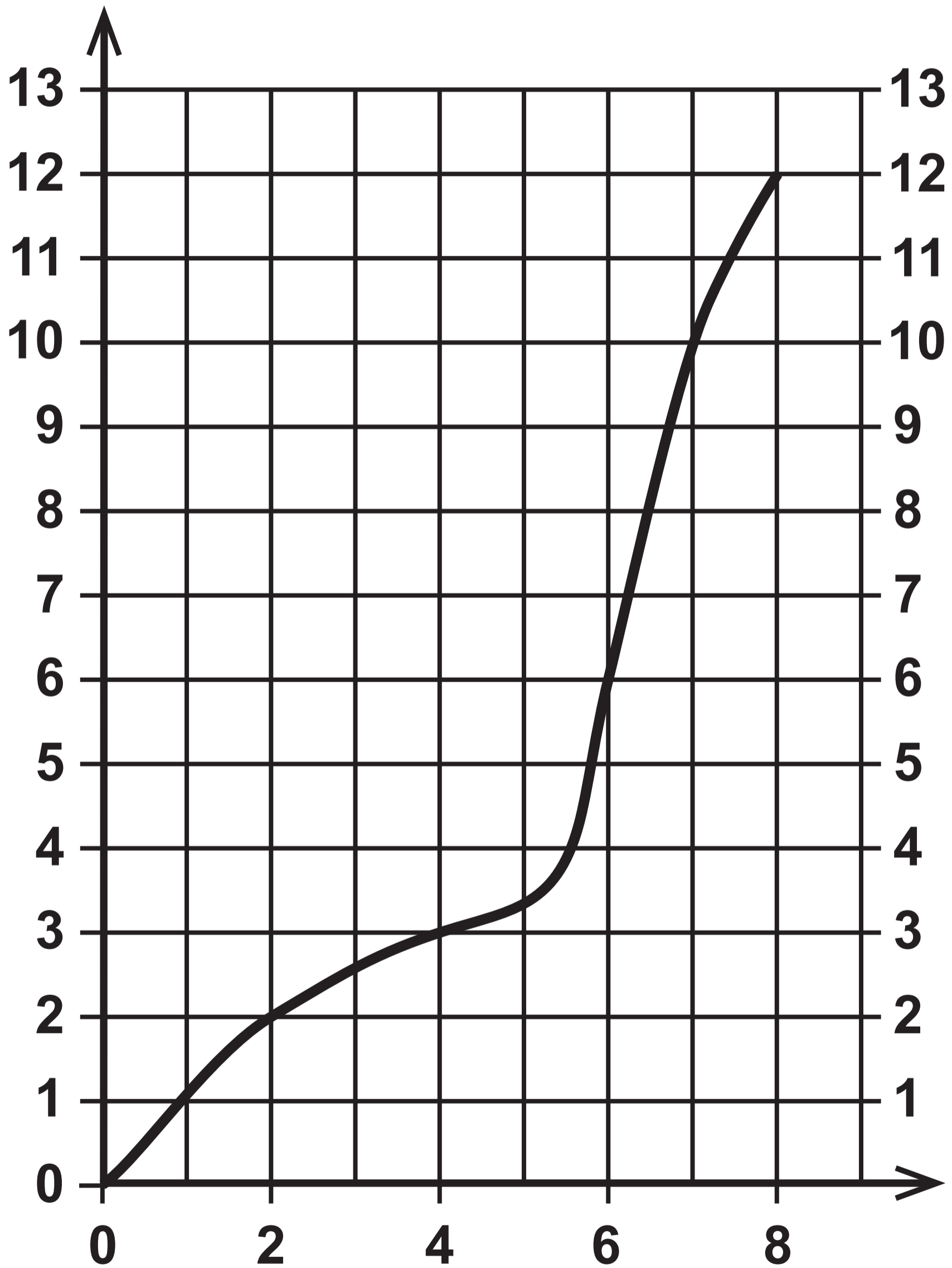


# Question 8



# Question 10

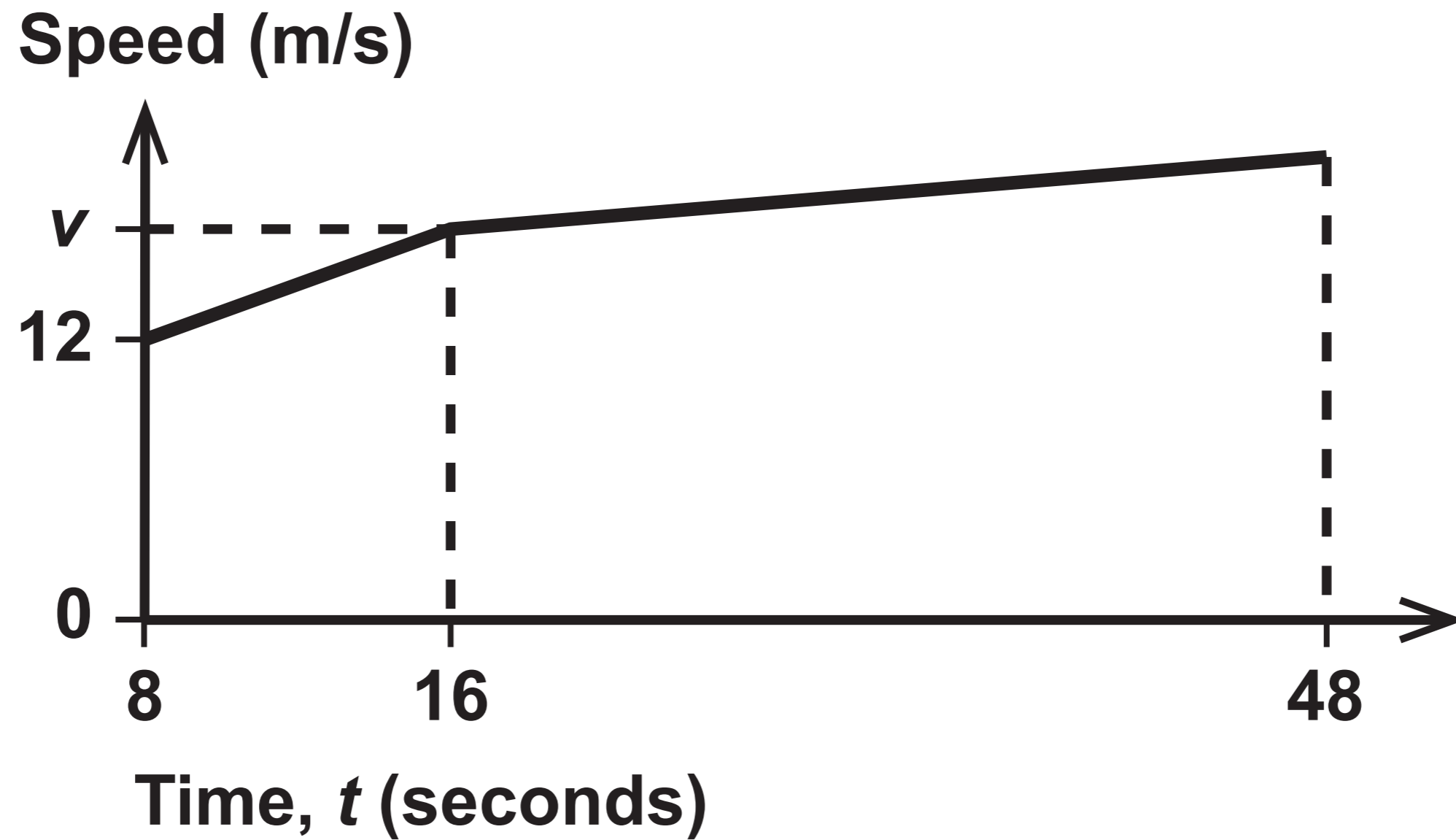
Speed (m/s)



Time,  $t$  (seconds)

# Question 10 (d)

Diagram NOT drawn to scale



**GCSE  
MATHEMATICS  
and  
NUMERACY**

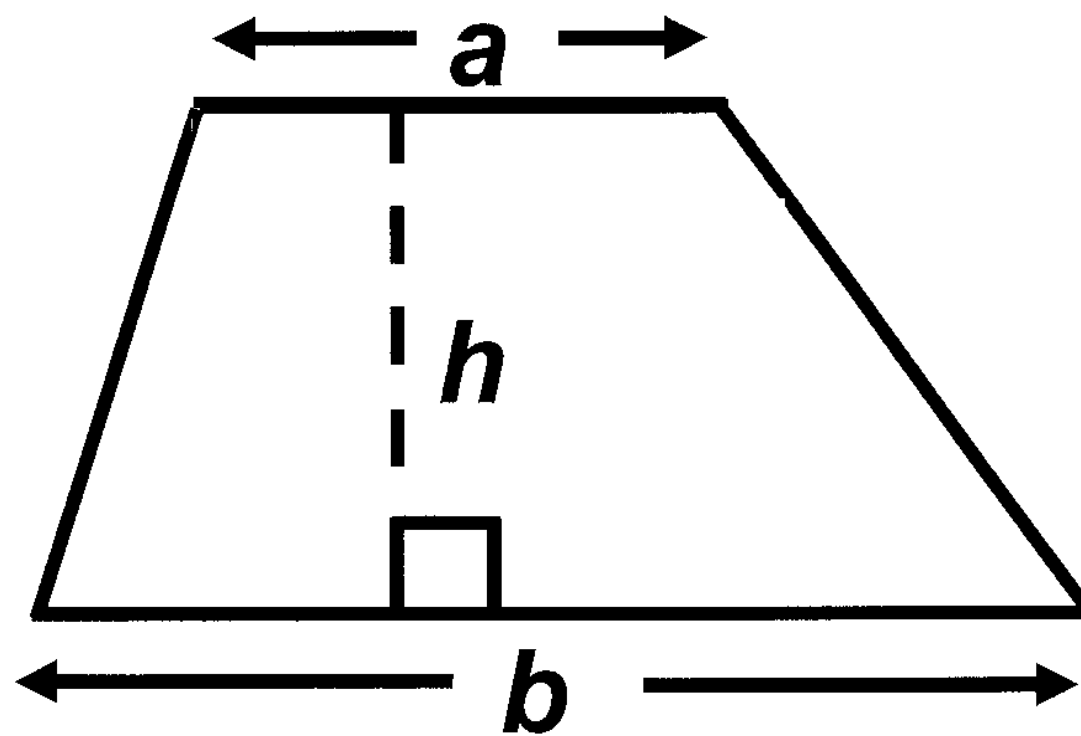
**FORMULA LIST  
HIGHER TIER  
GCSE**

**You must not write on these formula pages.**

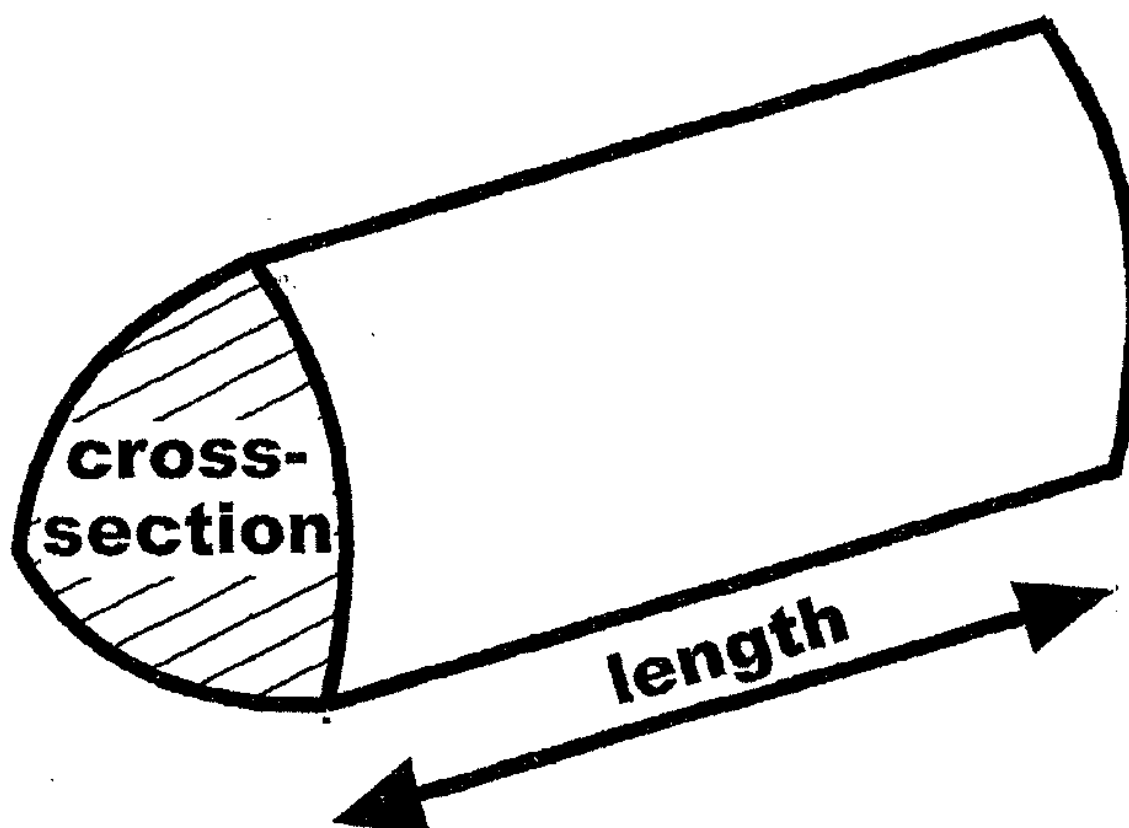
**Anything you write on these formula pages will gain NO credit.**

## Formula List – Higher Tier

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

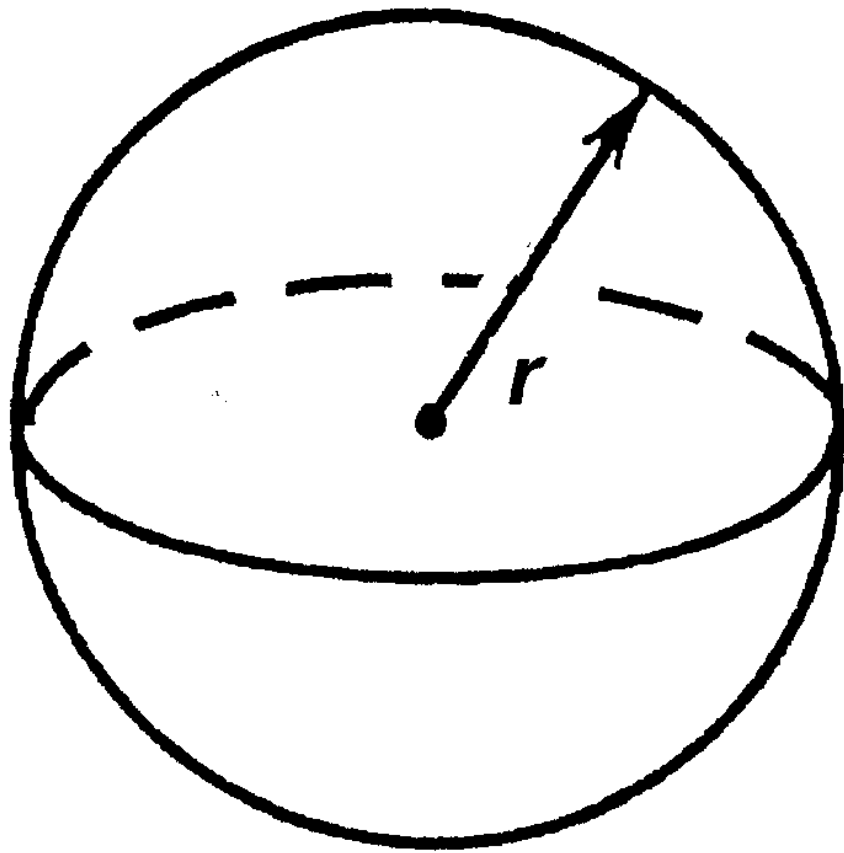


Volume of prism =  
area of cross – section  $\times$  length



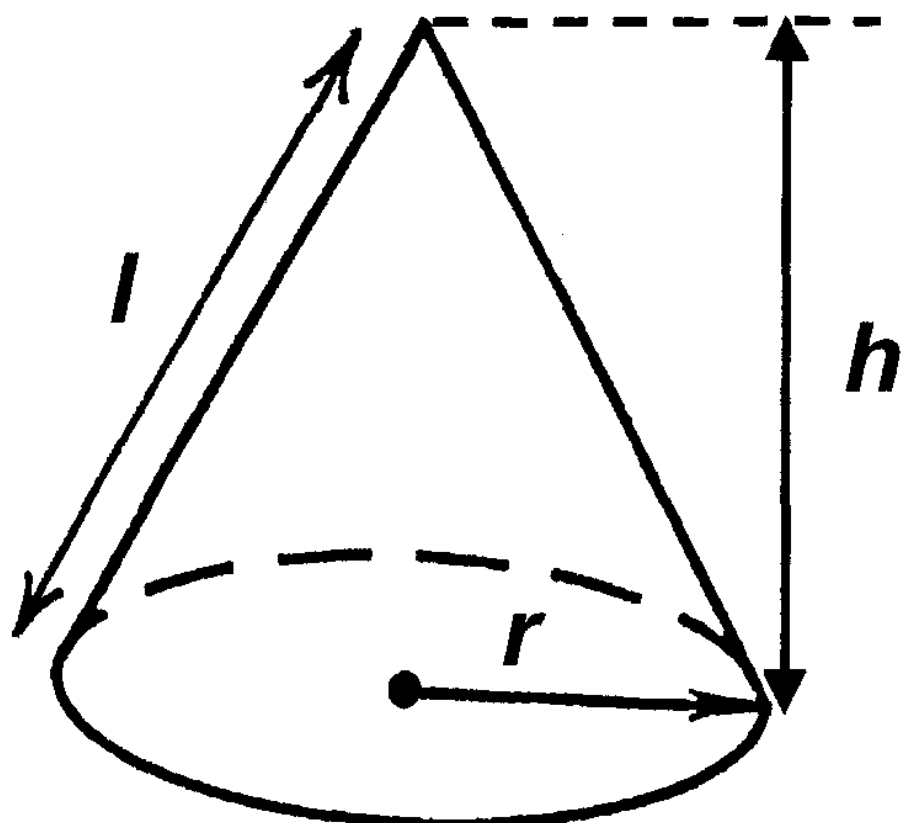
**Volume of sphere =  $\frac{4}{3}\pi r^3$**

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

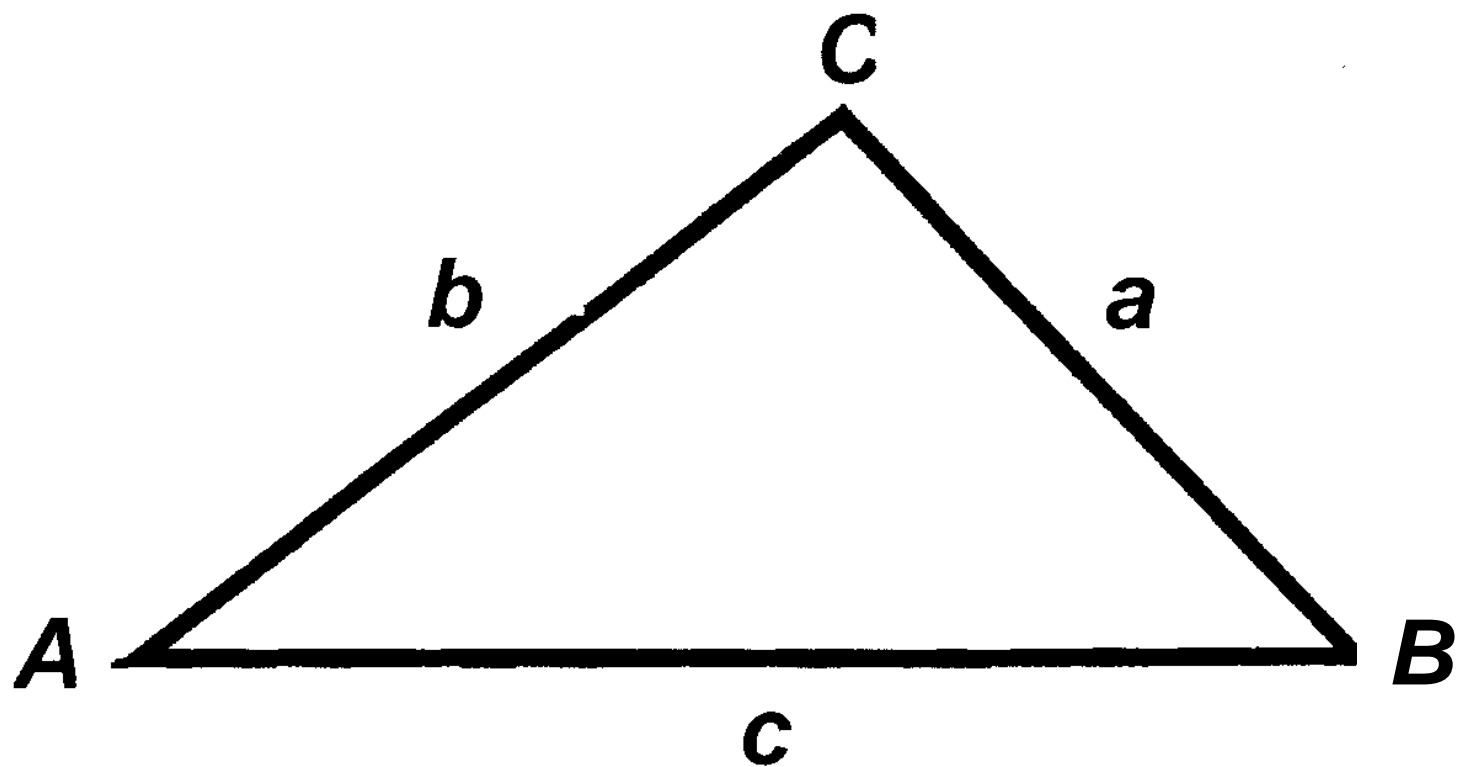


**Volume of cone =  $\frac{1}{3}\pi r^2 h$**

**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.