



GCSE

3310U60–1

MONDAY, 3 JUNE 2024 – MORNING

MATHEMATICS – NUMERACY

UNIT 2: CALCULATOR – ALLOWED

HIGHER TIER

**1 hour 45 minutes plus your additional
time allowance**

**A CALCULATOR WILL BE REQUIRED
FOR THIS PAPER**

Surname: _____

First name(s): _____

Centre Number: _____

Candidate Number: 0 _____

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	7	
2.	10	
3.	12	
4.	13	
5.	7	
6.	8	
7.	17	
8.	6	
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 Booklet.

A separate Diagram Booklet.

Models for Question 3 (c) and Question 6 (a).

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 $3 \cdot 14$ 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.

In question 2 (a), the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

(Turn over)

- 1. (a) Look at the diagram for Question 1 (a) in the separate Diagram Booklet.**

The diagram is a frequency polygon.

A survey was carried out to find the total time people took to read the book

‘Wales is a Celtic Country’.

The results are shown in the frequency polygon.

continued on the next page . . .

(Turn over)

Question 1 (a) continued

- 1. (a) (i) Which is the modal group?
Circle your answer.**

18 to 24 hours
21 hours
12 to 18 hours
34 hours
30 to 36 hours

[1 mark]

continued on the next page . . .

(Turn over)

Question 1 (a) continued

1. (a) (ii) How many people took part in the survey?

Circle your answer.

35	30	65	100	108
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[1 mark]

continued on the next page . . .

(Turn over)

Question 1 (a) continued

1. (a) (iii) How many people in the survey took **24 hours or more** to read this book?

Circle your answer.

15	35	50	25	85
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[1 mark]

continued on the next page . . .

(Turn over)

Question 1 (a) continued

1. (a) (iv) Did any of the people in the survey take less than 6 hours to read this book?

Yes **No** **Can't tell**

You must give a reason for your answer.

(Turn over)

[1 mark]

continued on the next page . . .

(Turn over)

Question 1 continued

- 1. (b) Four books are placed in a stack.**

The thickness of each of the books is as follows:

22 mm 25 mm 29 mm 31 mm

The thickness of each book is measured CORRECT TO THE NEAREST mm.

continued on the next page . . .

(Turn over)

Question 1 (b) continued

Show that the total height of the stack of these four books cannot be more than 109 mm.

(Turn over)

13

[3 marks]

(Turn over)

- 2. (a) IN THIS PART OF THE QUESTION, YOU WILL BE ASSESSED ON THE QUALITY OF YOUR ORGANISATION, COMMUNICATION AND ACCURACY IN WRITING.**

Remember:

1 kilowatt (kW) = 1000 watts (W)

There are 8 street lights in Ffordd Alwyn.

Each light is fitted with an 80 watt light bulb.

continued on the next page . . .

(Turn over)

Question 2 (a) continued

**Each of the 8 street lights
is usually on from
6 p.m. to 6 a.m.**

**It costs 32.4p per hour for each
KILOWATT of electricity used.**

**How much would be saved
PER WEEK if the 8 street lights
were only on from
7 p.m. to 5 a.m.?**

continued on the next page . . .

(Turn over)

Question 2 (a) continued

**Give your answer in pounds,
correct to the nearest penny.**

**You must show all
your working.**

(Turn over)

[5 marks + 2 marks OCW]

continued on the next page . . .

(Turn over)

Question 2 continued

- 2. (b) Look at the diagram for Question 2 (b) in the separate Diagram Booklet.**

The diagram is NOT drawn to scale.

A lamp post is vertical and stands on horizontal ground as shown in the diagram.

The angle of elevation of the top of the lamp post is 68° when measured from a point 3.3 m from the base of the lamp post.

continued on the next page . . .

(Turn over)

21

[3 marks]

(Turn over)

3. (a) 50 people living by the sea were asked how often they went for a walk along the sea wall each week.

The results were as follows:

Number of walks each week	Frequency
0 to 2	8
3 to 5	12
6 to 8	20
9 to 13	4
14 to 18	6

continued on the next page . . .

(Turn over)

[4 marks]

continued on the next page . . .

(Turn over)

Question 3 continued

3. (b) High tide in the morning is, on average, 35 minutes later each day.

The morning high tide on 3rd March was at 08:03

At what time was the morning high tide on 1st March?

(Turn over)

[1 mark]

continued on the next page . . .

(Turn over)

Question 3 continued

- 3. (c) Ask for the model for Question 3 (c).**

The model is NOT made to scale.

A new concrete sea–defence wall is to be built.

The sea–defence wall will have a uniform cross–section.

The model represents the new wall.

continued on the next page . . .

(Turn over)

Question 3 (c) continued

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

The diagram is NOT drawn to scale.

The diagram shows the uniform cross – section labelled *ABCD*.

In the diagram:

$$**AB = 12.6 m**$$

$$**AD = 7.6 m**$$

$$**DC = 18.8 m**$$

The wall is 50 m long.

continued on the next page . . .

(Turn over)

[7 marks]

(Turn over)

4. (a) A volcano is an opening in the Earth's crust, through which molten lava, hot ash and gases escape into the air.

(i) An estimated 500 000 000 people live near active volcanoes.

What is 500 000 000 written in standard form?

[1 mark]

continued on the next page . . .

(Turn over)

Question 4 (a) continued

4. (a) (ii) The teragram is a unit of mass.

$$\mathbf{1 \text{ teragram} = 10^9 \text{ kg}}$$

Last year, a volcano released a total of 140 teragrams of carbon dioxide in 300 days.

Calculate the average number of kilograms of carbon dioxide that were released by this volcano PER HOUR.

continued on the next page . . .

(Turn over)

Question 4 (a) (ii) continued

**Give your answer correct to
3 significant figures.**

You must show all your working.

(Turn over)

Question 4 continued

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

The planet Venus orbits the Sun.

Its orbit can be considered to be circular.

This is represented in the diagram.

continued on the next page . . .

(Turn over)

Question 4 (b) (i) continued

**The distance between
Venus and the Sun is
 1.08×10^8 km.**

**Venus orbits the Sun once
every 224.7 days.**

**Calculate the distance
Venus travels in 1 day.
Give your answer in
standard form.**

(Turn over)

Question 4 (b) continued

4. (b) (ii) The surface area of Venus is 460 234 320 km²

The surface of Venus is wrinkled – volcanic, smooth – volcanic or NON – volcanic.

The areas of these three different types of surface are in the ratio 7 : 1 : 2

Look at the information provided for Question 4 (b) (ii) in the separate Diagram Booklet.

continued on the next page . . .

(Turn over)

Question 4 (b) (i) continued

Calculate the total surface area of Venus that IS volcanic. You must show all your working.

41

[3 marks]

(Turn over)

5. Caryl needs to calculate the cost of the petrol she used for a recent car journey.

She knows the following information about her journey:

- For part of her journey, she travelled a distance of 36 miles at a steady speed of 25 mph.**
- For the rest of her journey, she travelled at a steady speed of 65 mph for 1 hour 24 minutes.**

continued on the next page . . .

(Turn over)

Question 5 continued

Some fuel economy information for her car is given in the following table:

SPEED	NUMBER OF MILES TRAVELLED PER GALLON
60 mph or less	48
Greater than 60 mph	35

continued on the next page . . .

(Turn over)

Question 5 continued

5. (a) Calculate how many gallons of petrol Caryl used during her journey.

(Turn over)

[4 marks]

continued on the next page . . .

(Turn over)

Question 5 continued

- 5. (b) Caryl paid £1.49 for each LITRE of petrol.**

Calculate the cost of the petrol used for the journey.

Remember:

1 gallon = 8 pints

(Turn over)

47

[3 marks]

(Turn over)

6. (a) C-clips are used in motors and turbines as a type of fastener. CLIP ZONE makes metal C-clips. The C-clips have a uniform cross-section.

Ask for the model for Question 6 (a).

The model is NOT made to scale. The model represents a metal C-clip.

continued on the next page . . .

(Turn over)

Question 6 (a) continued

**Look at the diagram for
Question 6 (a) in the separate
Diagram Booklet.**

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

In the diagram:

**O is the centre of the circular arcs
 AC and BD .**

OAB and OCD are straight lines.

$OA = OC = 50$ mm.

$AB = CD = 4$ mm.

**The C-clips have a uniform
thickness of 2 mm.**

continued on the next page . . .

(Turn over)

Question 6 (a) continued

C-clips are made by melting down metal bars and re-casting them.

Calculate the number of C-clips that can be made from a metal bar with a volume of $1\,500\,000\text{ mm}^3$

You must show all your working.

(Turn over)

[5 marks]

continued on the next page . . .

(Turn over)

Question 6 continued

6. (b) Look at the table for Question 6 (b) in the separate Diagram Booklet.

Clip Zone makes four types of fastener.

The table shows the number of each type produced each week.

Clip Zone takes a sample of these 149 000 fasteners to check the quality of its products.

A stratified sample of 1500 fasteners is taken, based on the type of fastener.

continued on the next page . . .

(Turn over)

Question 6 (b) continued

TYPE OF FASTENER	NUMBER IN THE SAMPLE
C – clips	
Jubilee clips	
Screws	
Bolts	

[3 marks]**(Turn over)**

7. Sara and Tanvi are taking part in an orienteering race.

The start and finish points of the race are the same.

They will take different routes from the start point to get to the same last marker point.

They then head directly back to the start / finish point.

continued on the next page . . .

(Turn over)

Question 7 continued

- 7. (a) Look at the diagram for Question 7 (a) in the separate Diagram Booklet.**

The diagram is NOT drawn to scale.

The diagram shows some information about Sara's route.

Show that the distance Sara travels from the last marker back to the finish point is 7.7 km, correct to 1 decimal place.

(Turn over)

Question 7 continued

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

The diagram is NOT drawn to scale.

The diagram shows some information about Tanvi's route.

Tanvi started her race by running 6.3 km on a bearing of 120° to point A.

She then ran 2.1 km to reach the last marker.

continued on the next page . . .

(Turn over)

Bearing is _____^o

[5 marks]

continued on the next page . . .

(Turn over)

Question 7 continued

- 7. (c) Look at the diagram for Question 7 (c) in the separate Diagram Booklet.**

The diagram is NOT drawn to scale.

The map that Sara and Tanvi were each given before the start of the race was 33 cm long.

Tanvi decided to reduce the size of her map to a mathematically similar size, as shown in the diagram.

continued on the next page . . .

(Turn over)

Question 7 (c) continued

**The area of Tanvi's map is
now 19% less than the area of
Sara's map.**

Calculate the length of Tanvi's map.

[4 marks]

continued on the next page . . .

(Turn over)

Question 7 continued

7. (d) Look at the diagram for Question 7 (d) in the separate Diagram Booklet.

The diagram is a graph.

Sara's distance from the start, for the first part of her race, is shown in the graph.

Estimate Sara's speed 20 minutes after the start of the race.

Give your answer in MILES PER HOUR.

8. (a) The Cardiff Saver account pays interest at a rate of 0.6% every 3 months.

Evan invests $\pounds 5000$ in this account.

Evan does not make any further deposits or withdrawals after opening the account.

Calculate how much money is in the account after $4\frac{1}{2}$ years.

(Turn over)

[2 marks]

continued on the next page . . .

(Turn over)

Question 8 continued

- 8. (b) The Pontypridd Saver account has an AER of 4%
The account pays interest every 6 months. Myles invests money in this account.**

Calculate the interest rate that is applied to the account every 6 months.

continued on the next page . . .

(Turn over)

[4 marks]

END OF PAPER

TOTAL 80 MARKS

(Turn over)



GCSE

3310U60-1

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**MATHEMATICS – NUMERACY
UNIT 2: CALCULATOR – ALLOWED
HIGHER TIER**

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

Diagram Booklet

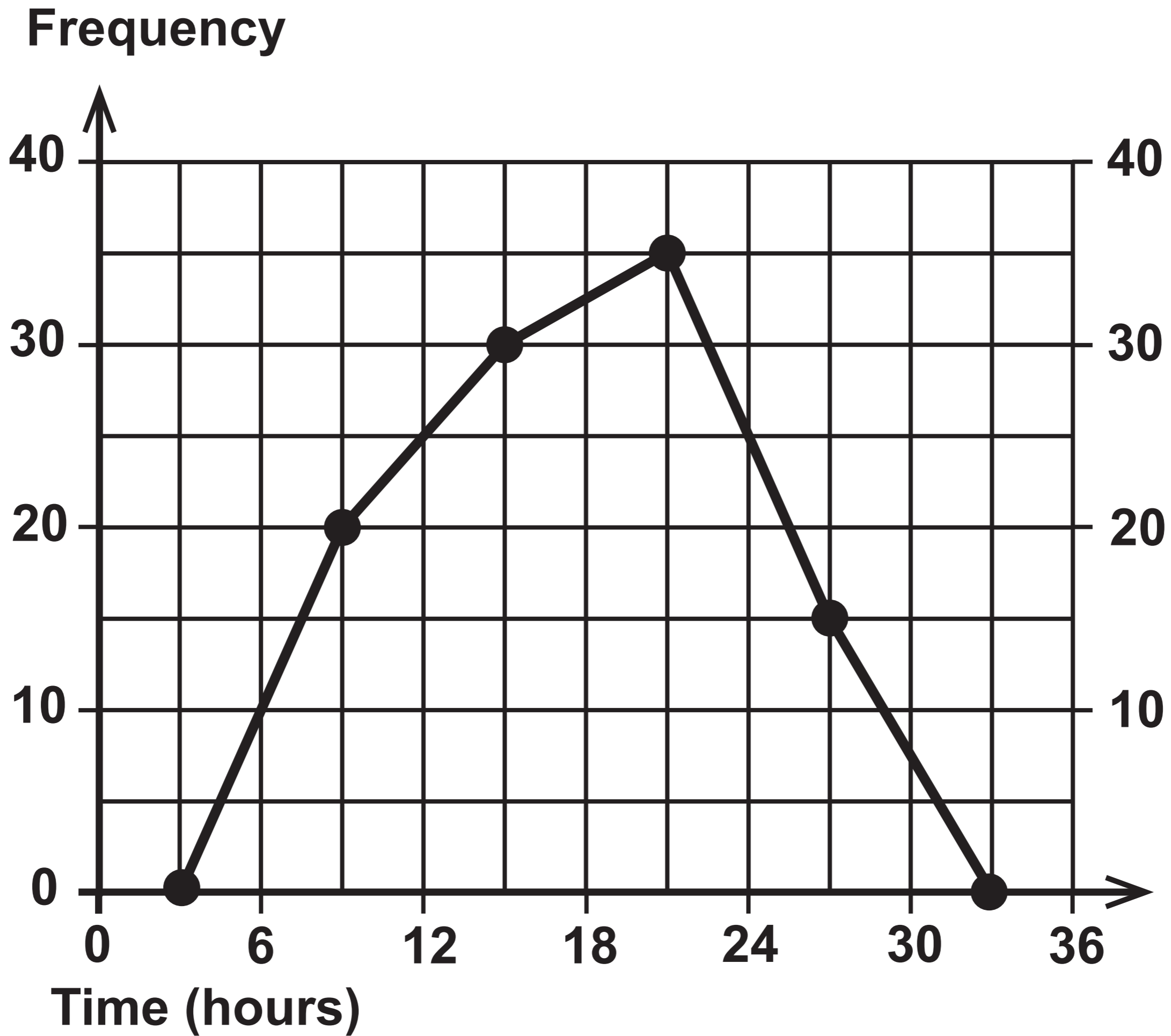
Surname: _____

First name(s): _____

Centre Number: _____

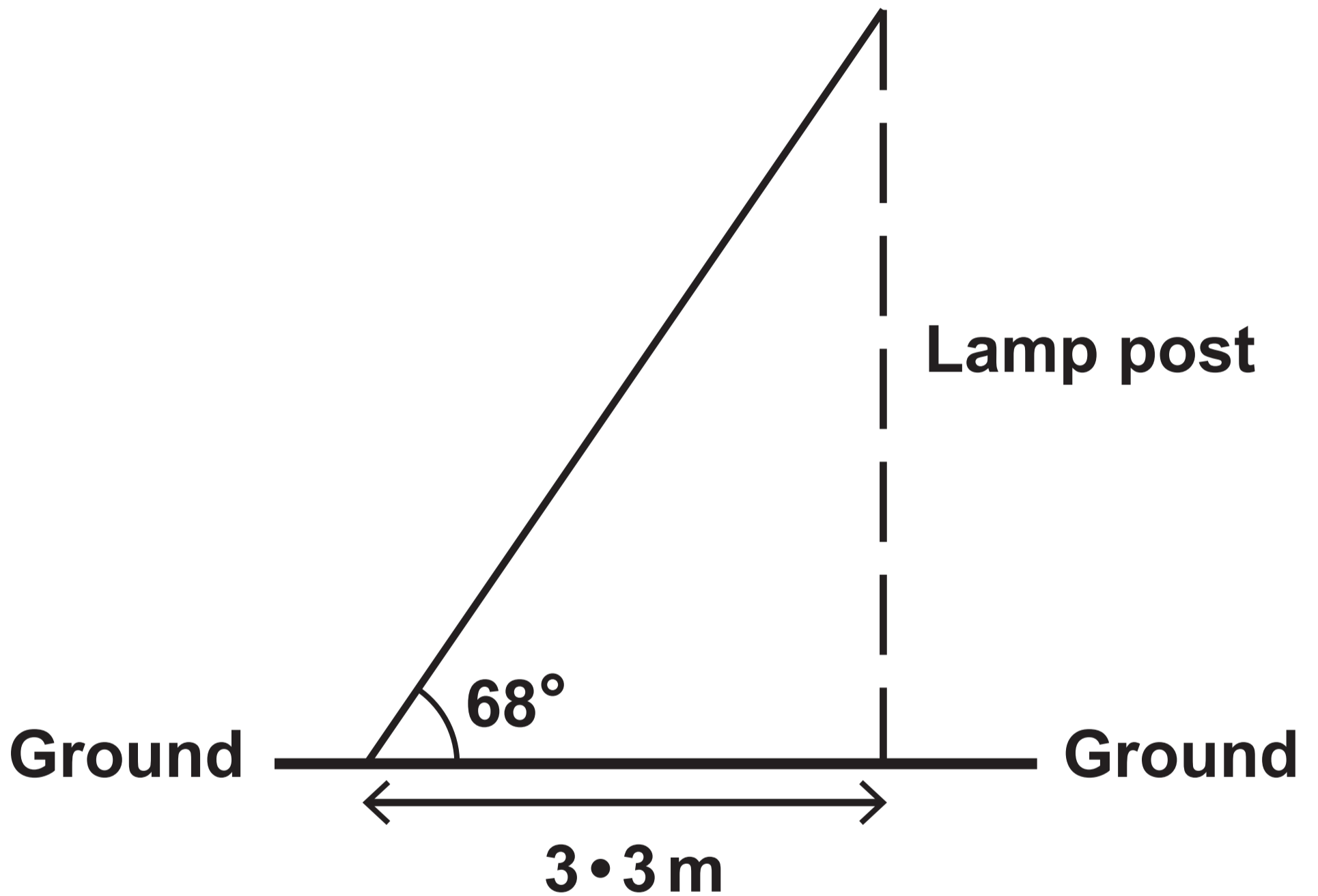
Candidate Number: 0 _____

Question 1 (a)



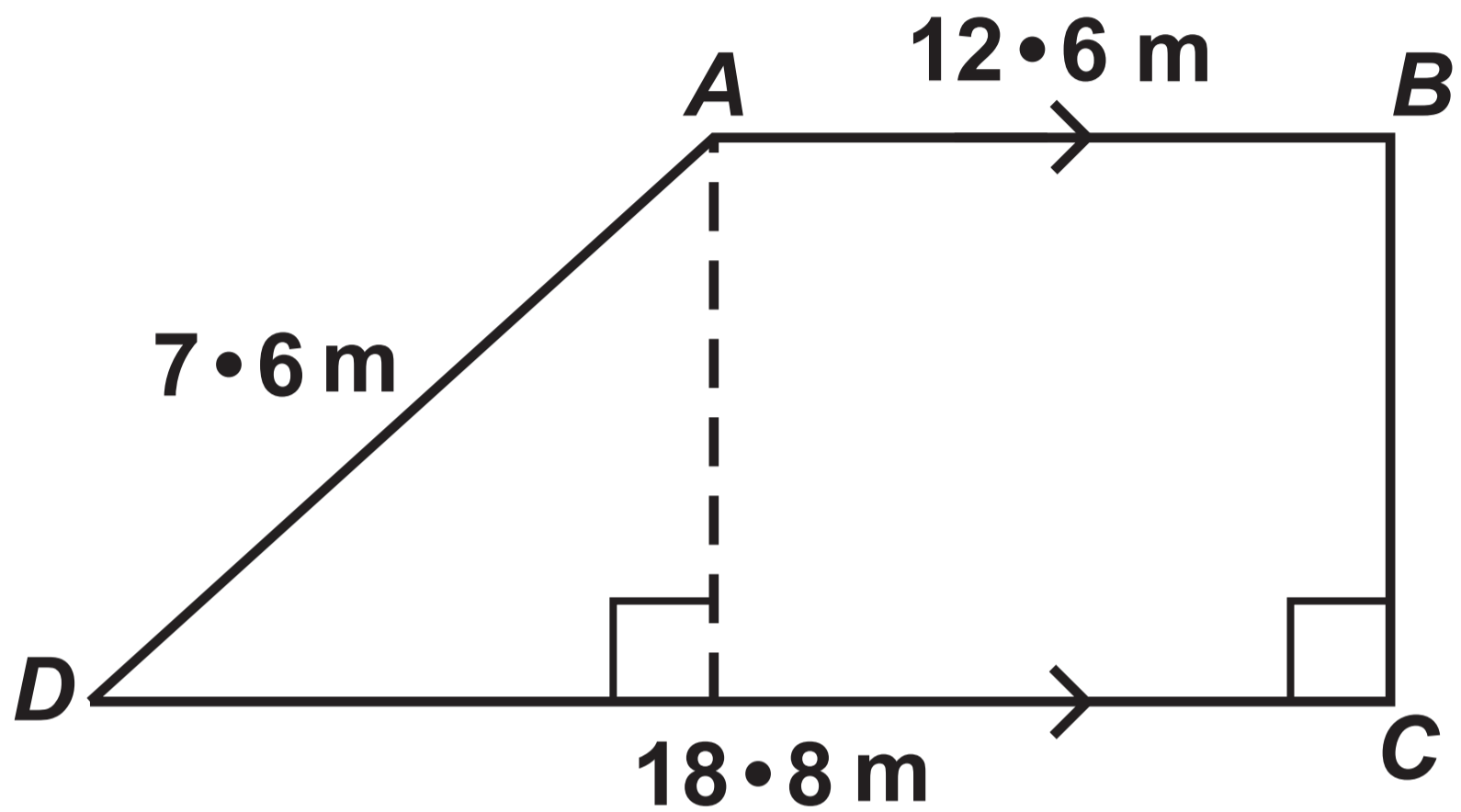
Question 2 (b)

Diagram NOT drawn to scale



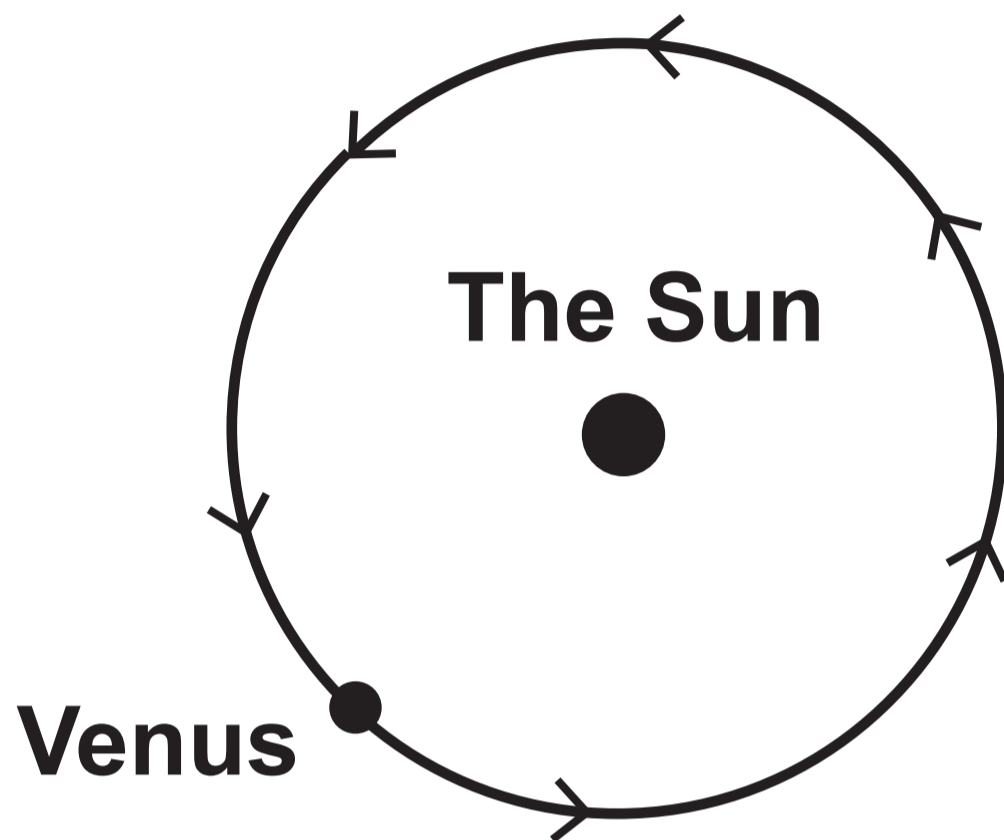
Question 3 (c)

Diagram NOT drawn to scale



Question 4 (b) (i)

Diagram NOT drawn to scale



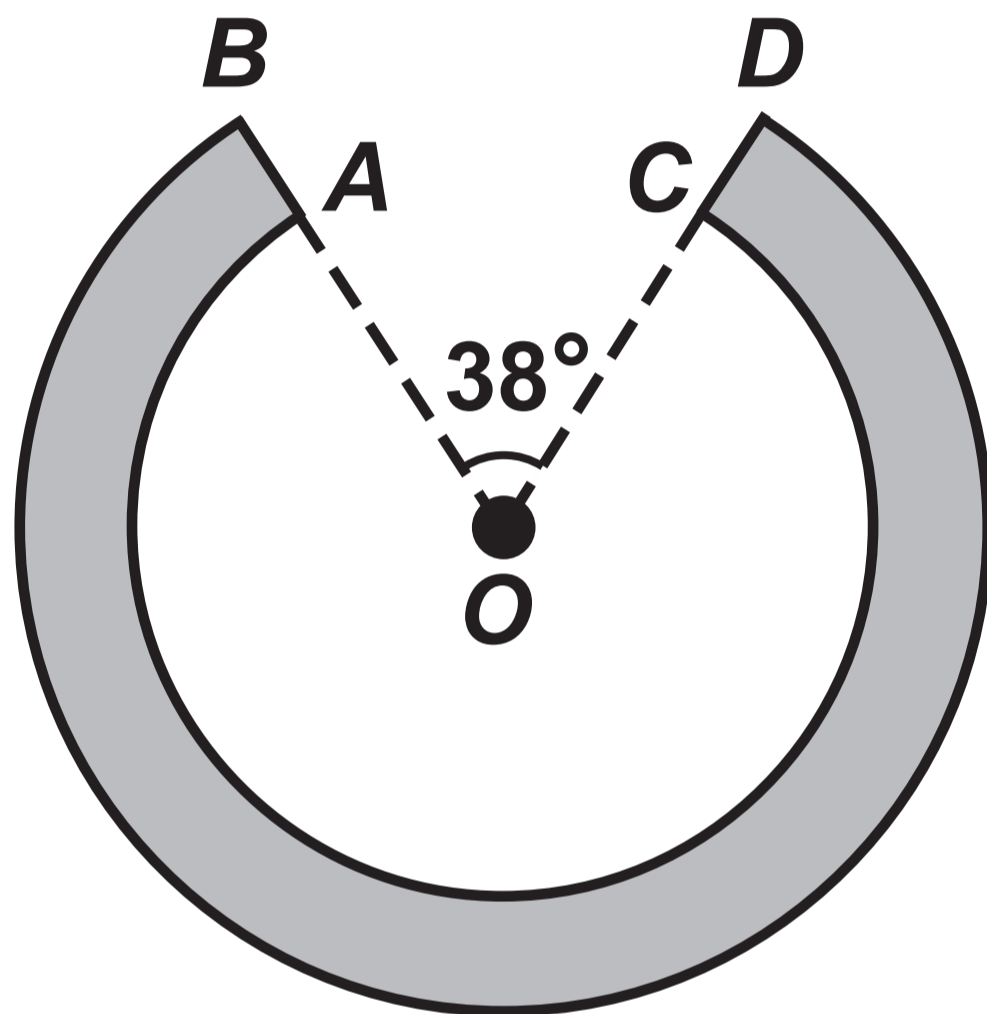
Question 4 (b) (ii)

Information

Wrinkled – volcanic : Smooth – volcanic : Non – volcanic = 7 : 1 : 2

Question 6 (a)

Diagram NOT drawn to scale



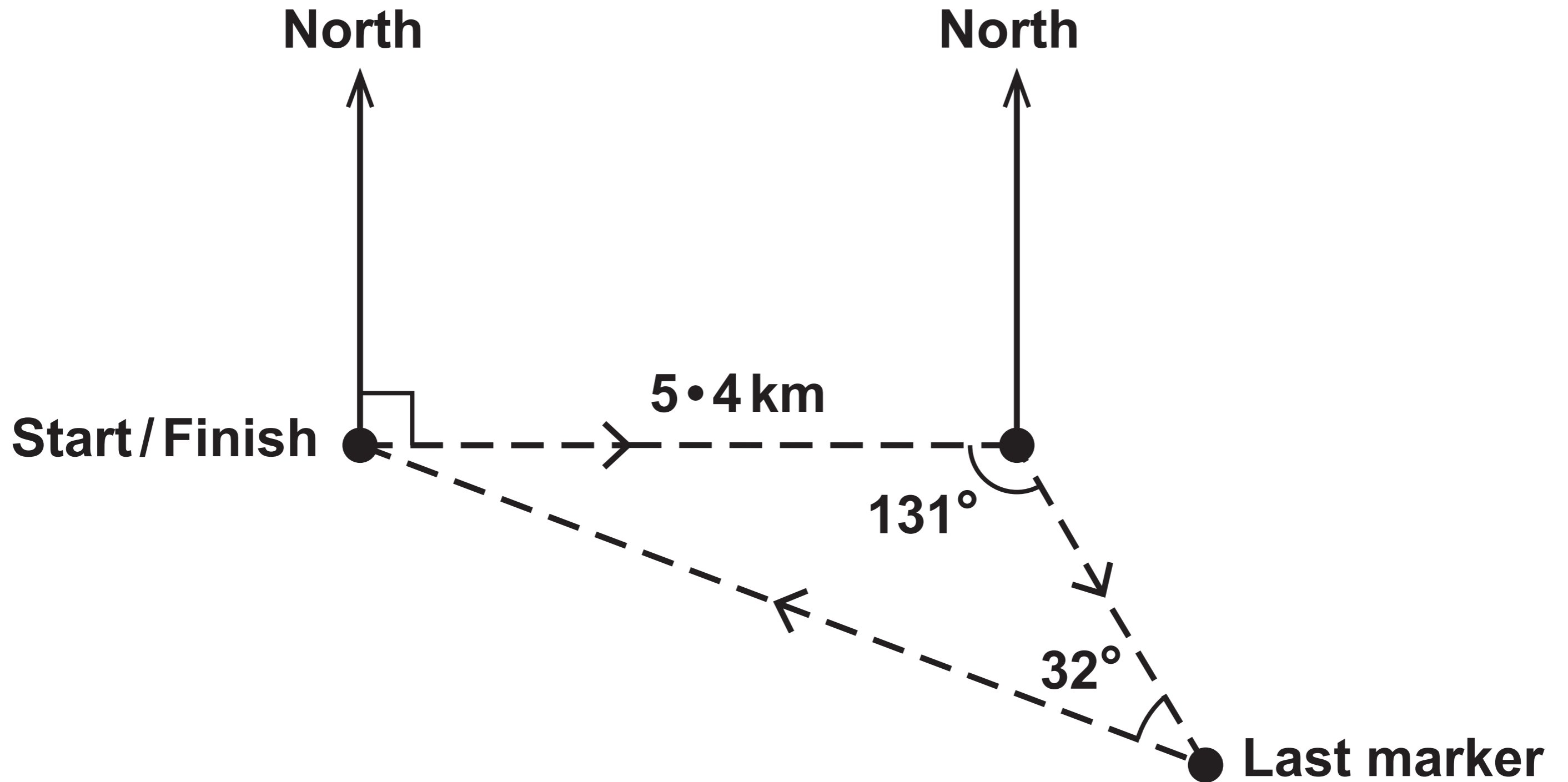
Question 6 (b)

Table

TYPE OF FASTENER	NUMBER MADE EACH WEEK
C – clips	23 000
Jubilee clips	11 000
Screws	70 000
Bolts	45 000

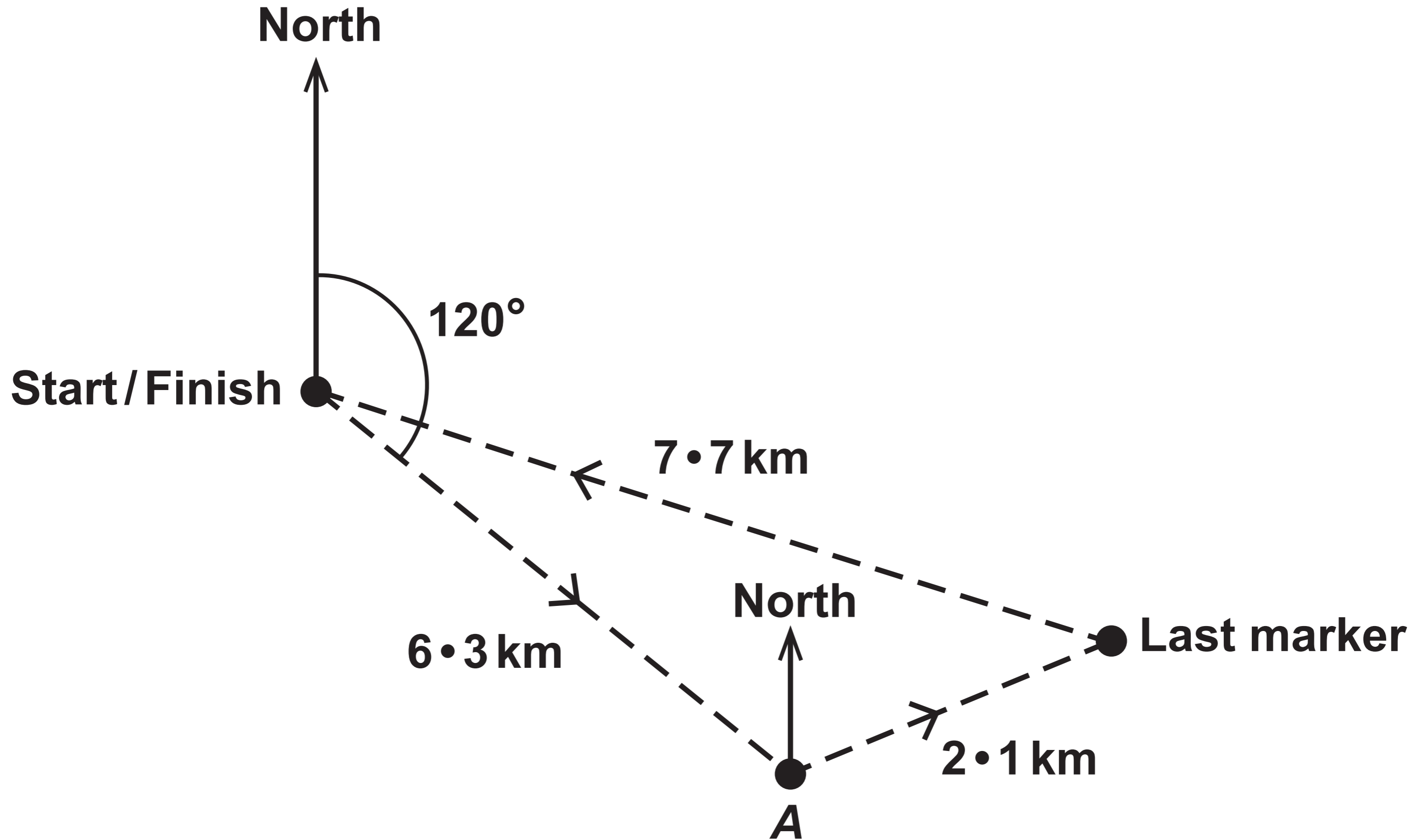
Question 7 (a)

Diagram NOT drawn to scale



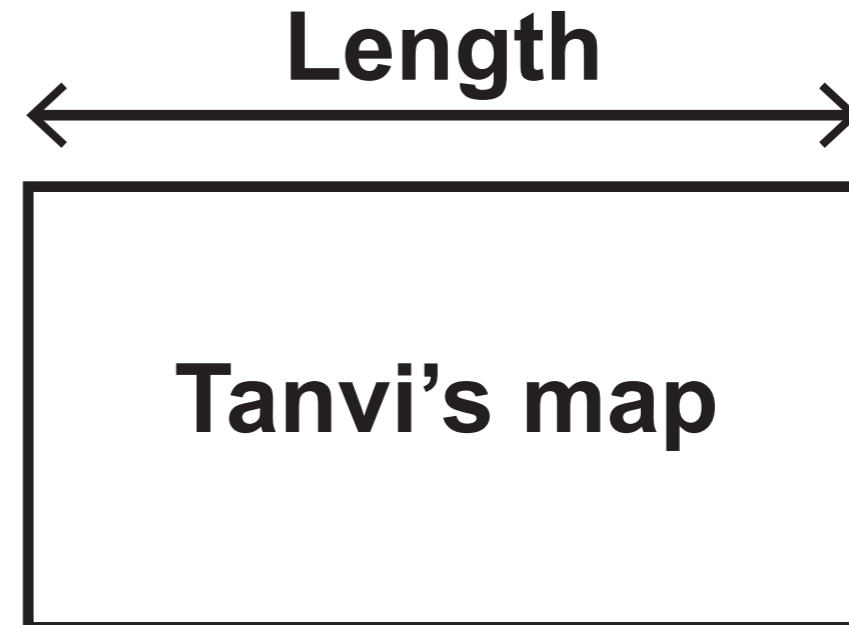
Question 7 (b)

Diagram NOT drawn to scale



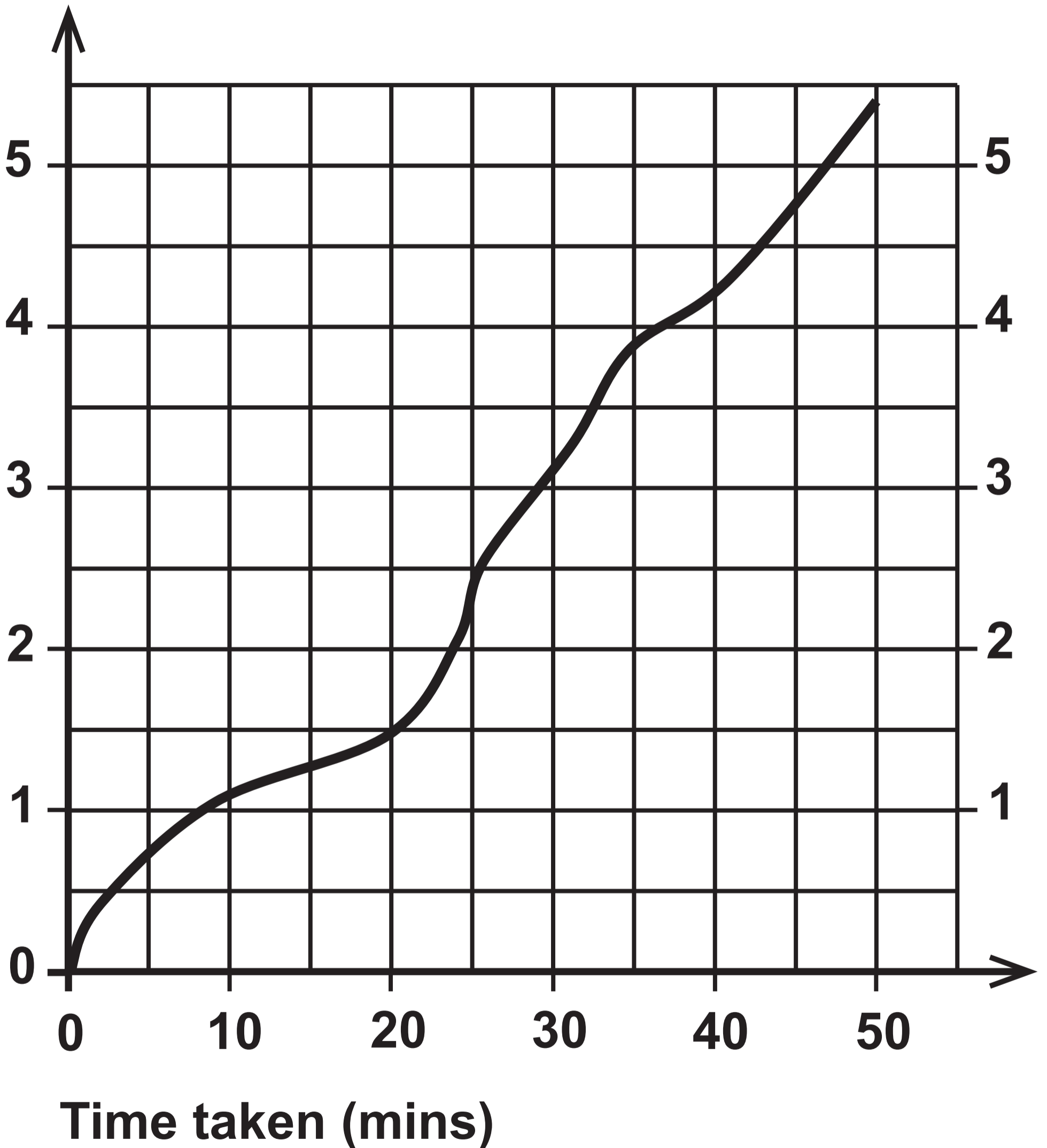
Question 7 (c)

Diagram NOT drawn to scale



Question 7 (d)

Distance from the start (km)



**GCSE
MATHEMATICS
and
NUMERACY**

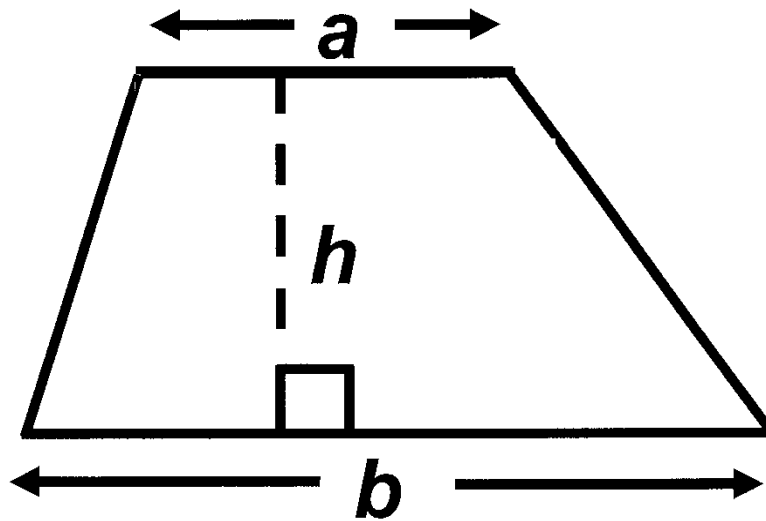
**FORMULA LIST
HIGHER TIER
GCSE**

You must not write on these formula pages.

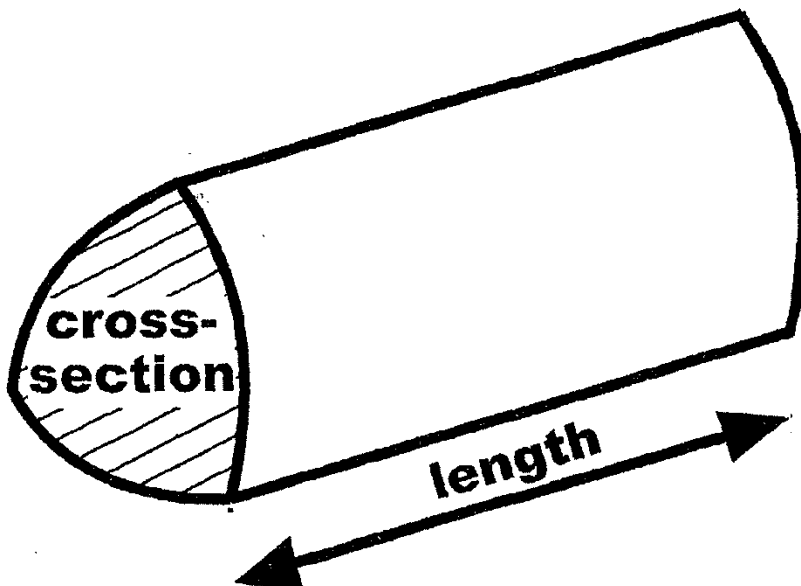
Anything you write on these formula pages will gain NO credit.

Formula List – Higher Tier

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

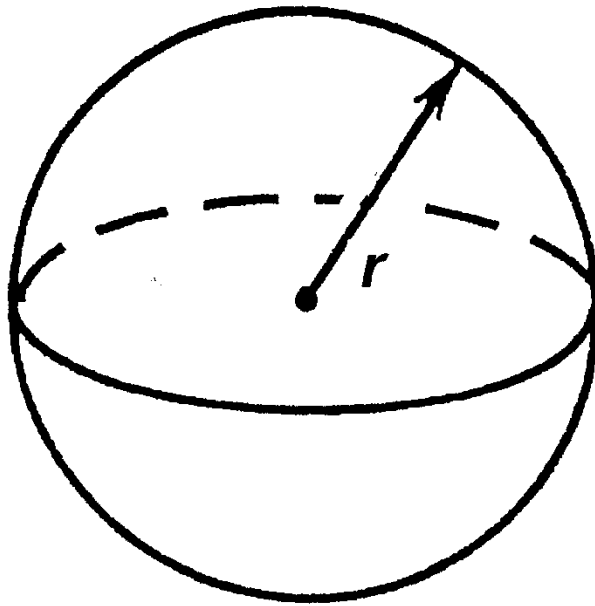


Volume of prism =
area of cross – section \times length



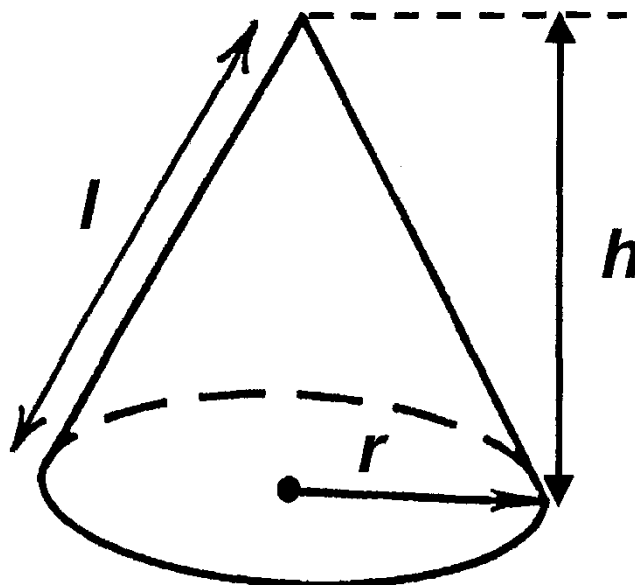
Volume of sphere = $\frac{4}{3}\pi r^3$

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

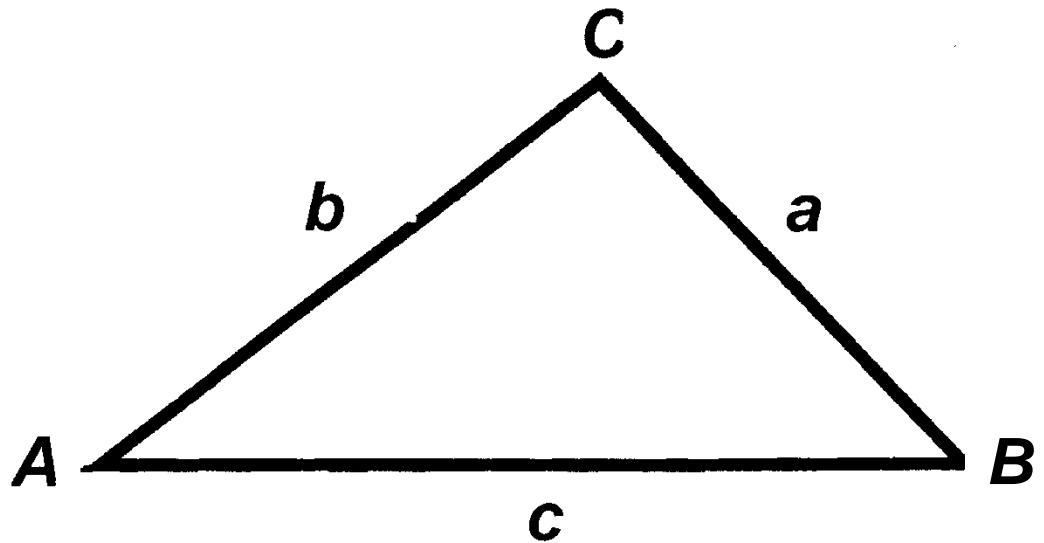


Volume of cone = $\frac{1}{3}\pi r^2 h$

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.