GCSE

3310U40-1

TUESDAY, 7 JUNE 2022 – MORNING

MATHEMATICS – NUMERACY

UNIT 2: CALCULATOR – ALLOWED

INTERMEDIATE TIER

1 hour 35 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.	**5**	
2.	**8**	
3.	**7**	
4.	**9**	
5.	**5**	
6.	**10**	
7.	**13**	
8.	**5**	
9.	**4**	
10.	**4**	
Total	**70**	

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.

Model for Question 9.

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 $3{\cdot}14$ or use the π button on your calculator.

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.

1. Look at the diagram for Question 1 in the separate Diagram Booklet.
The diagram is a travel graph.

The travel graph shows a journey Luke made on Saturday along a straight road.

(a) How far away from home was Luke at 17:00?

_____

_____

_____ km

[1 mark]

continued on the next page . . .

Question 1 continued

1. (b) For what length of time was Luke away from home on this journey? Circle your answer.

$17\frac{1}{2}$ hours
$7\frac{1}{2}$ hours
$4\frac{1}{2}$ hours
$4\frac{3}{4}$ hours
$7\frac{1}{4}$ hours

[1 mark]

continued on the next page . . .

Question 1 continued

1. (c) During his journey, Luke visited a friend's house.
He stopped for an hour and then continued his journey.
How far from Luke's home does his friend live?

_____

_____

_____ **km**

[1 mark]

continued on the next page . . .

Question 1 continued

1. (d) How many kilometres did Luke travel between 13:00 and 14:30?

[2 marks]

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

Lewis has been told by his doctor to eat 2400 calories per day.

He has been told to eat 35% of these calories at breakfast.

Lewis's breakfast on Tuesday had a total of 860 calories.

By how many calories did his breakfast on Tuesday exceed the amount he should have eaten?
You must show all your working.

[3 marks + 2 marks OCW]

continued on the next page . . .

Question 2 continued

2. (b) The following information is stated on the packet of breakfast cereal.

Values for 100 g of cereal	
Energy	358 calories
Fat	3·7 g
Carbohydrates	69 g
Protein	15 g
Fibre	12 g
Salt	0·3 g

(i) Express, in its simplest terms, the ratio Carbohydrates : Protein.

_____

_____

_____

[1 mark]

continued on the next page . . .

Question 2 (b) continued

2. (b) (ii) A serving of cereal has a mass of 30 g.

Calculate the mass of carbohydrates in a serving of this cereal.

[2 marks]

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

After taking her meter reading, Alys always works out her electricity bill. She has created this table to fill in.

Complete Alys's table to calculate her electricity bill.

[7 marks]

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

Esme has a pond and a flowerbed in her garden.
The pond is circular and the flowerbed is in the shape of a quadrilateral, as shown.

The diameter of the pond is 140 cm.

The perimeter of the pond and the perimeter of the flowerbed are equal.

Esme needs to know the lengths of all the sides of her flowerbed.

continued on the next page . . .

Question 4 (a) continued

Complete the following statement for Esme.

“The lengths of the sides of the flowerbed are 176 cm, 128 cm, 60 cm and _____ cm.”

You must show all your working.

[4 marks]

continued on the next page . . .

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.

Bill has a vegetable plot in his garden.
It is in the shape of a trapezium,
labelled *ABCD*.

In the diagram:

$AB = 4{\cdot}3$ m

$AD = 2{\cdot}5$ m

$DC = 5{\cdot}6$ m

The angles inside the trapezium at *A* and *D* are right angles.

Fertiliser is sold in small bags.
Each bag contains enough fertiliser to treat an area of $0{\cdot}9$ m^2

A bag of fertiliser costs £1.15

continued on the next page . . .

Question 4 (b) continued

How much will it cost Bill to buy enough bags of fertiliser to treat his vegetable plot?

You must show all your working.

[5 marks]

5. **Look at the diagram for Question 5 in the separate Diagram Booklet.**
The diagram is a scatter diagram.

An engine normally runs at $100^{\circ}C$

When the engine runs at $110^{\circ}C$ or more, a warning light comes on.

A section of the temperature chart for the engine, from 12:00 to 16:00, is shown on the scatter diagram.

continued on the next page . . .

Question 5 continued

5. (a) How often was the temperature of the engine recorded?

Circle your answer.

Every 5 minutes
Every 12 minutes
Every 15 minutes
Every $2\frac{1}{2}$ minutes
Every 30 minutes

_____

_____

[1 mark]

continued on the next page . . .

Question 5 continued

5. (b) At what time was it first recorded that the warning light had come on?

_____

_____

[1 mark]

(c) What was the range of the recorded temperatures of the engine between 12:00 and 16:00?

_____

_____

[1 mark]

continued on the next page . . .

Question 5 continued

5. (d) (i) Use the graph paper provided for Question 5 (d) (i) in the separate Diagram Booklet to plot the recorded temperature of the engine at 12:00, 13:00, 14:00, 15:00 and 16:00 only.

[1 mark]

(ii) Why is the graph you have drawn misleading?

_____

_____

_____

_____

_____

_____

[1 mark]

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

Last year, Janita recorded the number of miles she travelled each week in her car.
She summarised the information in the frequency table shown.

continued on the next page . . .

Question 6 (a) continued

6. (a) (i) In which group does the median weekly number of miles lie?

Circle your answer.

$20 \leq x < 60$
$80 \leq x < 100$
$150 \leq x < 200$
$60 \leq x < 80$
$100 \leq x < 150$

[1 mark]

continued on the next page . . .

Question 6 (a) continued

6. (a) (ii) Calculate an estimate of the mean number of miles Janita travelled each week in her car.

[4 marks]

Question 6 continued

6. (b) Last month:

- **Janita travelled 440 miles in her car**
- **the cost of fuel was £1.30 per litre.**

Janita's car averages 11 miles per litre of fuel.
Next month, she needs to budget for an increased travel cost.

Janita says,

> **The number of miles I travel will increase by 12%**
> **The cost of fuel will increase by 10% next month.**

Calculate how much Janita should budget for her car travel costs for next month.
You must show all your working.

_____

_____

[5 marks]

7. Look at the diagram for Question 7 in the separate Diagram Booklet.
The diagram is a map.

Mito is a city in Japan.

(a) Complete the following statement.

“The bearing of Tokyo from Mito is _____°”

_____

_____

[1 mark]

continued on the next page . . .

Question 7 continued

7. (b) The road distance from Mito to Tokyo is 114 km.

Anzu travelled by car from Mito to Tokyo in 1 hour 27 minutes.

Calculate the average speed of Anzu's journey.

Give your answer in km/h.

[3 marks]

continued on the next page . . .

Question 7 continued

7. (c) Tilly is travelling to Mito.

She wants to exchange no more than £800 into Japanese yen.

The exchange rate is £1 = 135.72 Japanese yen.

On the day Tilly exchanges her money, the exchange shop only has 1000 Japanese yen notes and 5000 Japanese yen notes available.

Calculate:

- **the maximum number of Japanese yen Tilly can buy**
- **how much, to the nearest penny, this will cost her.**

You must show all your working.

[5 marks]

continued on the next page . . .

Question 7 continued

7. (d) Mito has a population of 270 400

25% of Mito's population is aged 65 or over.

The ratio of the number of people aged 0 to 14 to the number of people aged 15 to 64 is 9 : 41

Calculate the number of people aged 0 to 14

[4 marks]

8. **Look at the diagrams for Question 8 in the separate Diagram Booklet.**
The diagrams are NOT drawn to scale.

A motorcyclist leans into a corner on a motorcycle.
The angle of lean is the angle between the vertical and the motorcycle.

When the motorcycle is upright, the centre of the handlebars is 110 cm above the ground.
The diagrams illustrate a front view of a motorbike as its rider goes into a corner.

The motorcycle is vertical to begin with. It then leans 30 cm horizontally into the corner.
The motorcycle then leans a further 30 cm into the corner, with a total horizontal lean distance of 60 cm.

continued on the next page . . .

Question 8 continued

Show that the angle of lean more than doubles as the motorcycle leans from 30 cm horizontally to 60 cm horizontally.

You must show all your working.

[5 marks]

9. **Ask for the model for Question 9.**

The model is NOT made to scale.

The model represents a cylindrical water tank.

The cylindrical water tank has a radius of 36 cm.

There are 80 litres of water in the tank.

Calculate the height of the water in the tank in centimetres.

_____

_____

The height of the water in the tank

is _____ cm

[4 marks]

10. Look at the information provided for Question 10 in the separate Diagram Booklet.

Last year, Khalida paid 2400 dollars income tax.
The tax bands for last year are shown.

Calculate Khalida's income before the deduction of tax.

_____

_____

Khalida's income was _____ dollars

[4 marks]

END OF PAPER

TOTAL 70 MARKS

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

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INTERMEDIATE TIER

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Diagram Booklet

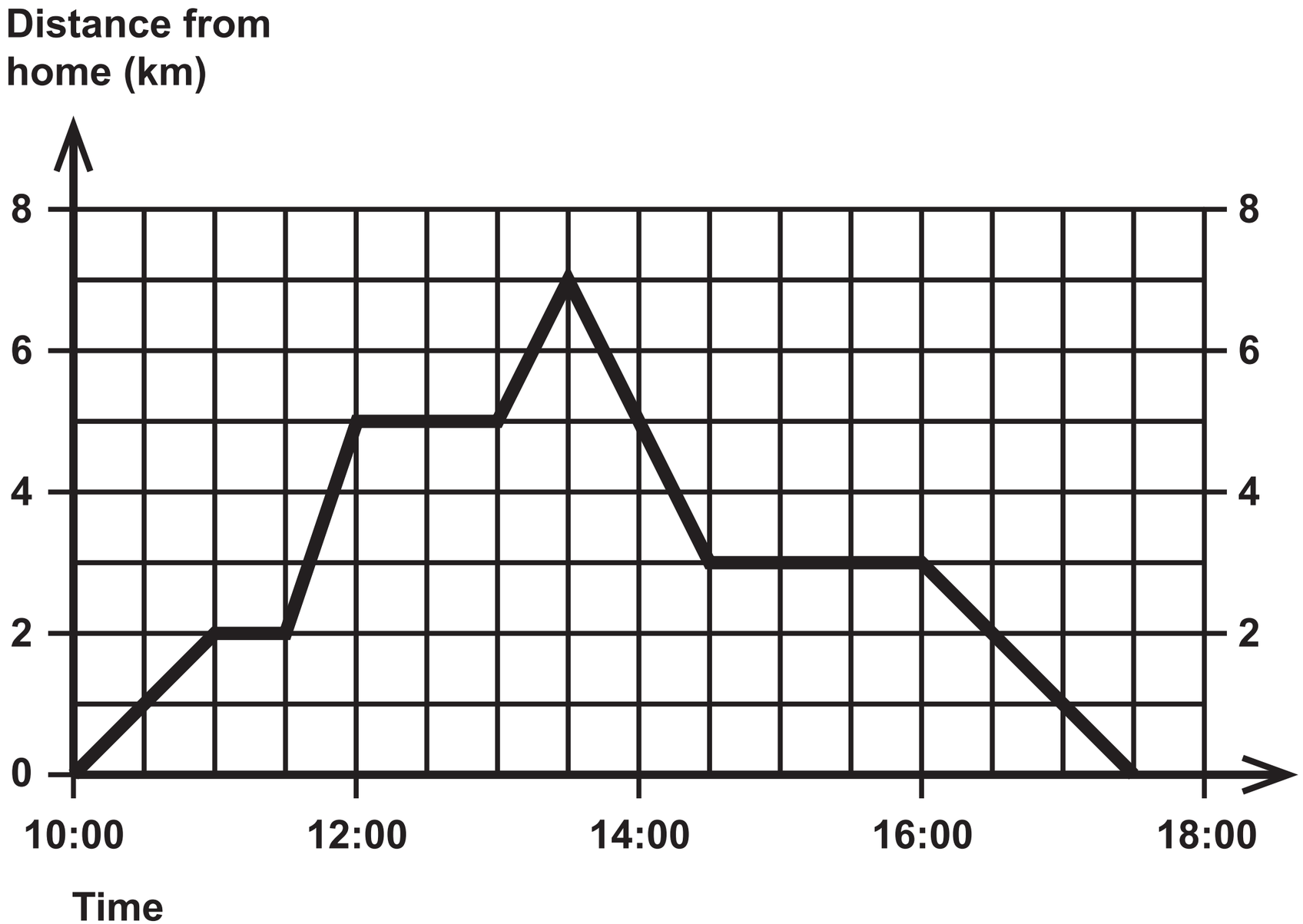
Surname: _____

First name(s): _____

Centre Number: _____

Candidate Number: 0 _____

Question 1



Question 3

Table

Period	Previous meter reading	Present meter reading	Number of units of electricity used
January, February and March 2022	4380	4900	_____

CHARGE FOR ELECTRICITY: _____ units at 21p PER UNIT	£ _____
STANDING CHARGE: 3 months at £7.00 PER MONTH	£ _____
Total charges:	£ _____

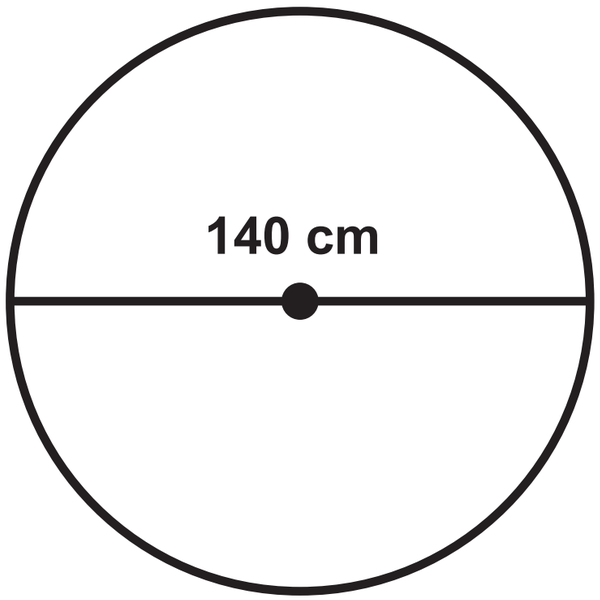
VAT AT 5%:	£ _____

AMOUNT TO PAY £ _____

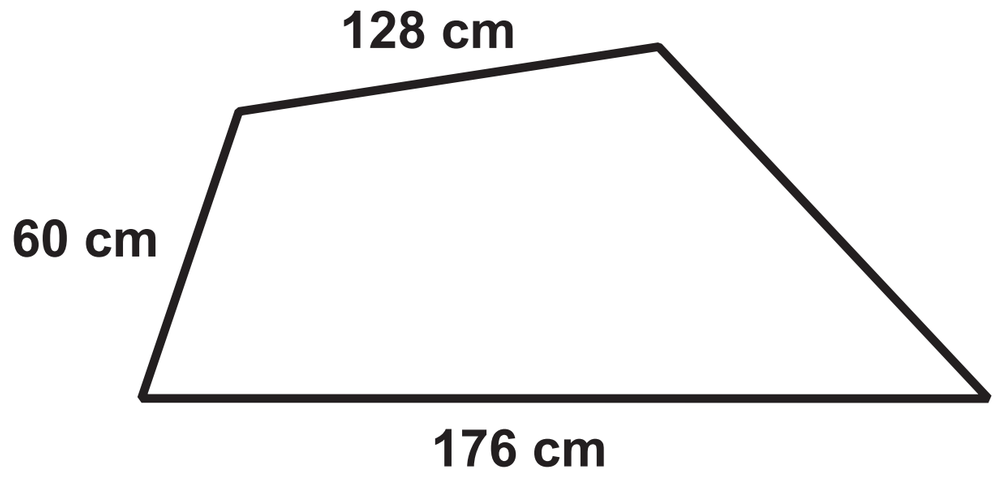
Question 4 (a)

Diagrams NOT drawn to scale

Pond

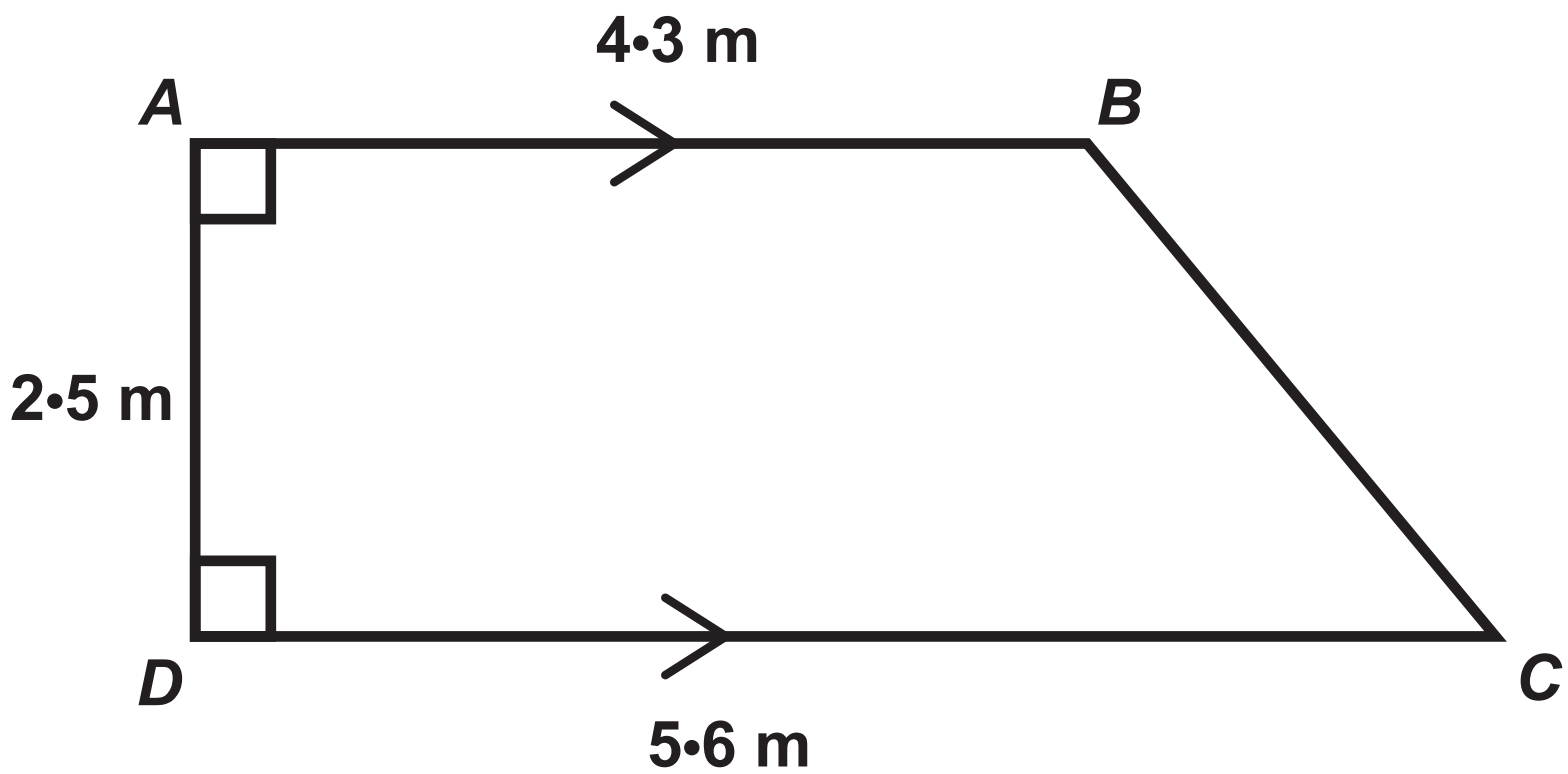


Flowerbed

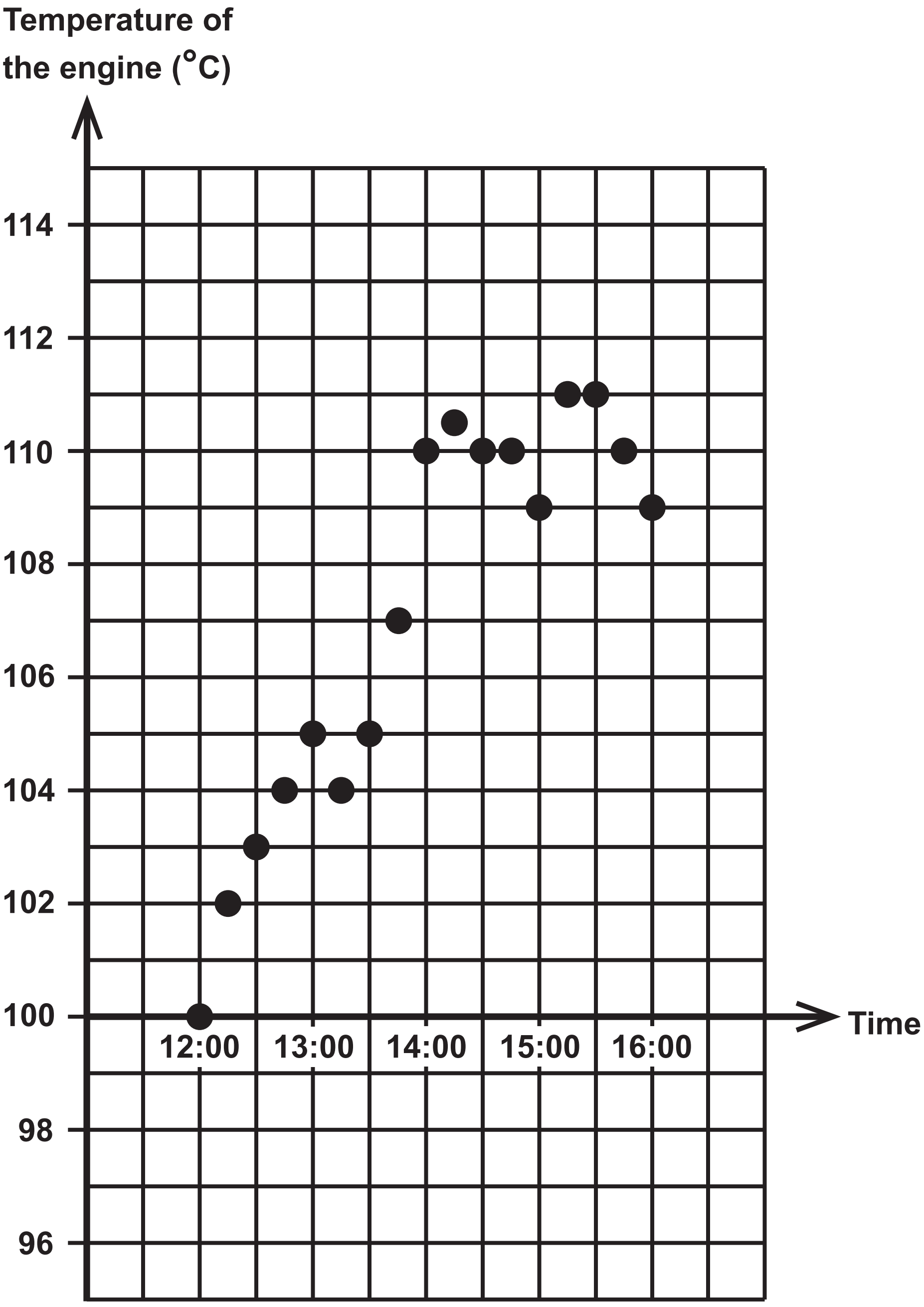


Question 4 (b)

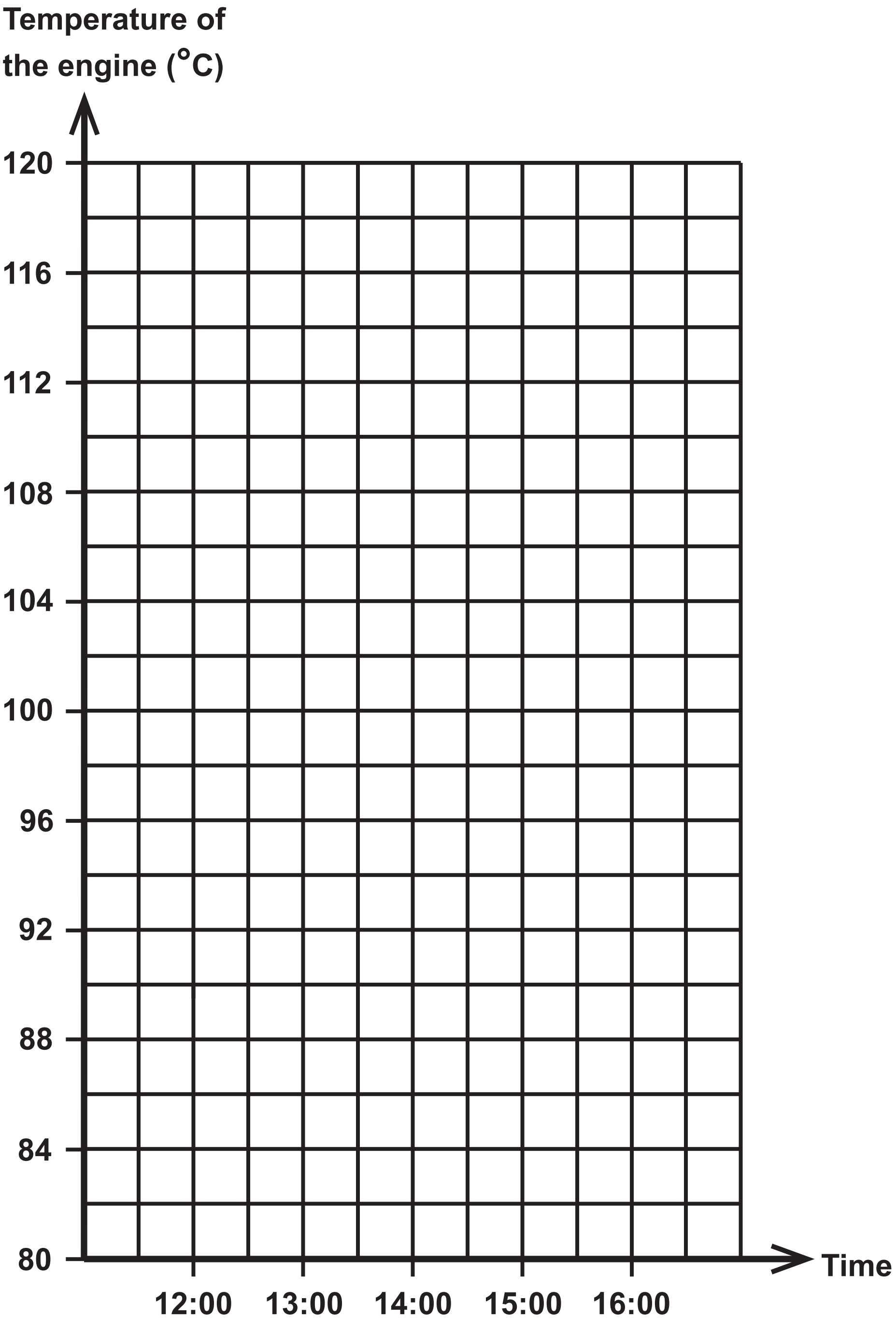
Diagram NOT drawn to scale



Question 5


Temperature of the engine (°C)
114
112
110
108
106
104
102
100
98
96
12:00
13:00
14:00
15:00
16:00
Time

Question 5 (d) (i)

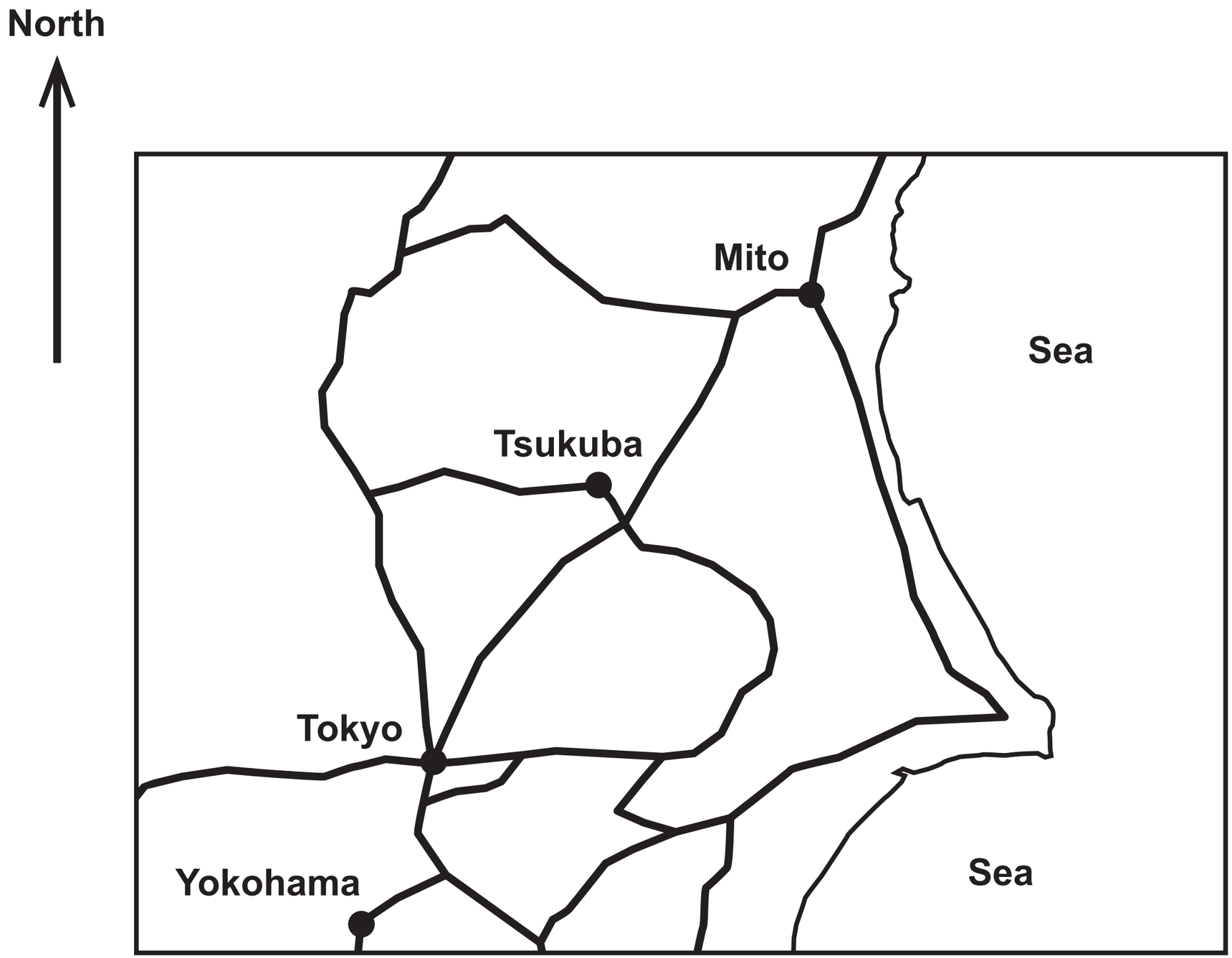


Question 6 (a)

Frequency table

Number of miles, x	Frequency
$20 \leq x < 60$	4
$60 \leq x < 80$	8
$80 \leq x < 100$	11
$100 \leq x < 150$	12
$150 \leq x < 200$	17

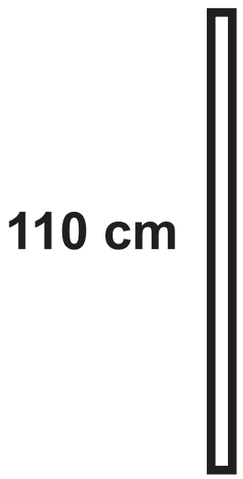
Question 7



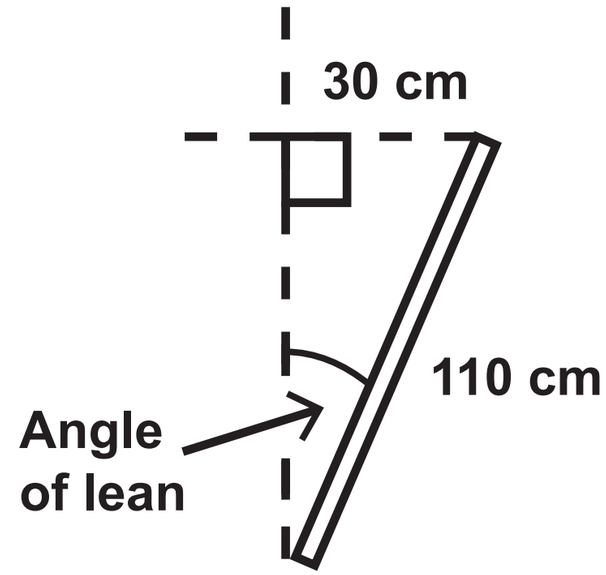
Question 8

Diagrams NOT drawn to scale

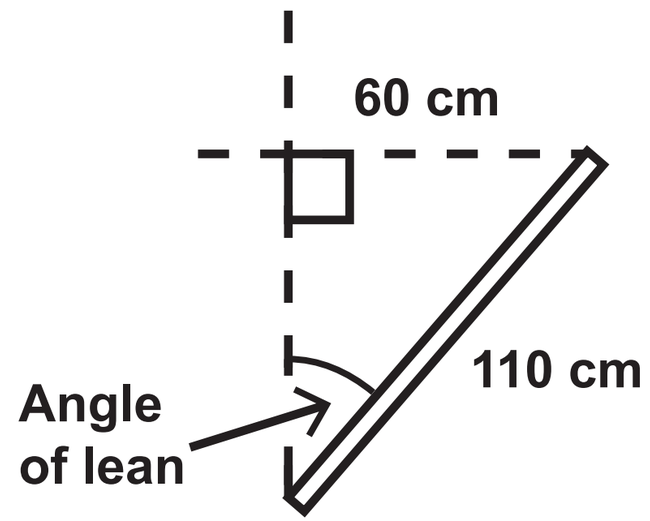
Before the corner



Lean of 30 cm into the corner



Lean of 60 cm into the corner



Question 10

Information

BAND	TAXABLE INCOME	TAX RATE
Personal allowance	Up to 5000 dollars	0%
Basic rate	5000 dollars to 25000 dollars	20%

GCSE
MATHEMATICS
and
NUMERACY

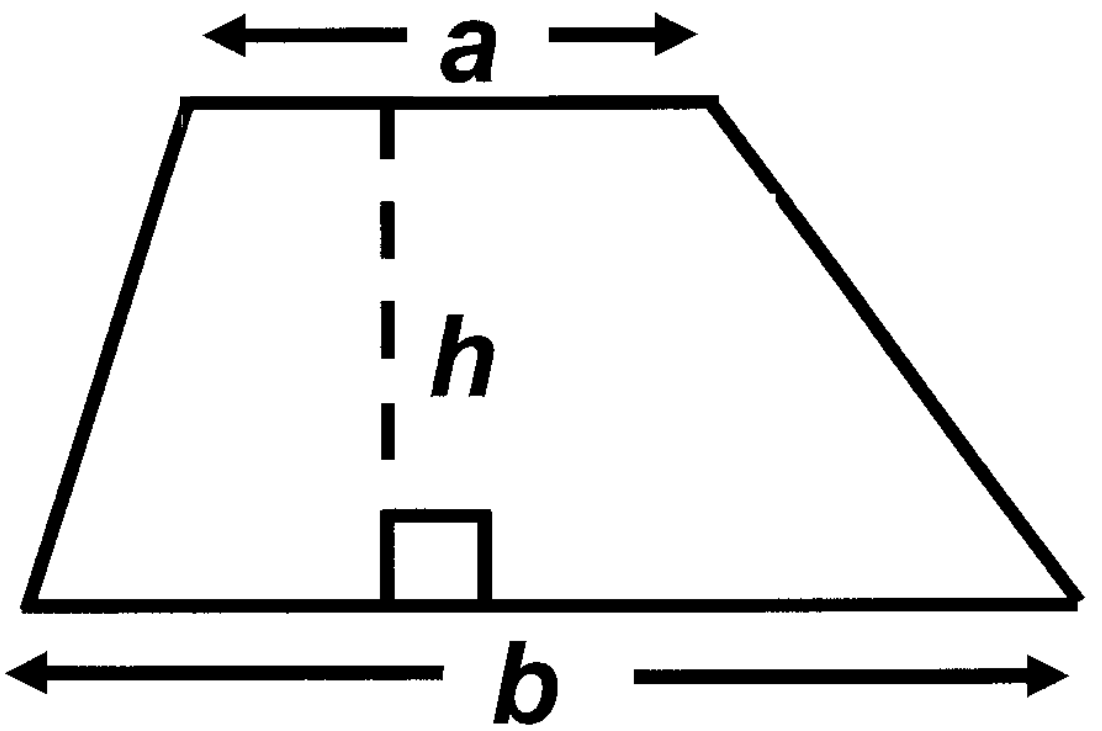
FORMULA LIST
INTERMEDIATE TIER
GCSE

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 × length