

Surname <i>StemUp Model Solution</i>
First name(s)

Centre Number

Candidate Number
0



GCSE

3310U30-1



FRIDAY, 20 MAY 2022 – MORNING

**MATHEMATICS – NUMERACY
UNIT 1: NON-CALCULATOR
INTERMEDIATE TIER**

1 hour 35 minutes

ADDITIONAL MATERIALS

The use of a calculator is not permitted in this examination.
A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the additional page at the back of the booklet. Question numbers must be given for the work written on the additional page.

Take π as 3.14.

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

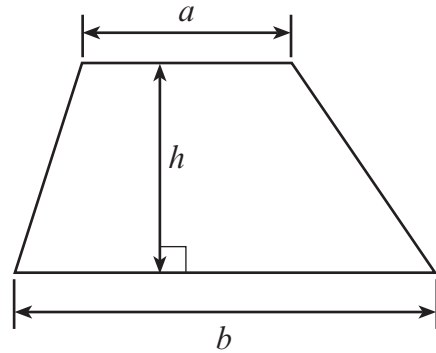
For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	4	
2.	5	
3.	3	
4.	6	
5.	8	
6.	3	
7.	8	
8.	6	
9.	5	
10.	2	
11.	6	
12.	4	
13.	10	
Total	70	



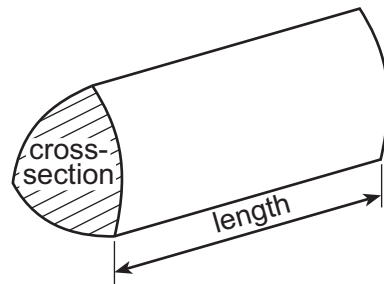
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Formula List – Intermediate Tier

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



Volume of prism $= \text{area of cross-section} \times \text{length}$



1.

Castell Car ParkParking charges£3 for the first **2 hours**, or part of the first 2 hours

AND after that

40p for every further **20 minutes**, or part of each 20 minutes

Maximum stay is 24 hours

- (a) Dewi parks his car in Castell Car Park. He parks for 2 hours 30 minutes.
How much should Dewi pay?
Circle your answer.

[1]

£3.60

£3.40

£3.20

£3.80

£6.00

First 2 hours = £3, then 30 minutes = 2 lots of 20 minutes (one part)

£3 + 2 × 40p = £3 + 80p = £3.80

- (b) Elin paid £5.80 to park her car in Castell Car Park.
What is the maximum length of time that Elin has paid for?
Give your answer in hours and minutes.
You must show all your working.

[3]

Money left after the first 2 hours = £5.80 - £3 = £2.80

Number of 20 minute lots = £2.80 ÷ 40p = 280 ÷ 40 = 7

Extra time = 7 × 20 minutes = 140 minutes = 2 hours 20 minutes

Total time = 2 hours + 2 hours 20 minutes

= 4 hours 20 minutes

Maximum length of time is 4 hours 20 minutes



2. In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.

During the first 10 days of April, the mean daily rainfall in Gwentre was 1.8 cm.
On 11th April, the rainfall in Gwentre was 4 cm.

By finding the total rainfall for the first 10 days of April, calculate the mean daily rainfall for the first 11 days of April.

You must show all your working.

[3 + 2 OCW]

$$\text{Total rainfall for the first 10 days} = 10 \times 1.8 \text{ cm} = 18 \text{ cm}$$

$$\text{Total rainfall for the first 11 days} = 18 \text{ cm} + 4 \text{ cm} = 22 \text{ cm}$$

$$\text{Mean daily rainfall for the first 11 days} = 22 \text{ cm} \div 11 \text{ days}$$

$$= 2 \text{ cm}$$

Conclusion: the mean daily rainfall for the first 11 days of April was 2 cm.

3. Apples cost £3 per kg.
Elsa buys some apples weighing a total of 200 g.
She pays with a £10 note.



Calculate how much change Elsa should get.

You must show all your working.

[3]

$$1 \text{ kg} = 1000 \text{ g, so } 200 \text{ g} = 200 \div 1000 = 0.2 \text{ kg}$$

$$\text{Cost of apples} = 0.2 \times £3 = £0.60 \text{ (60p)}$$

$$\text{Change} = £10 - £0.60 = £9.40$$

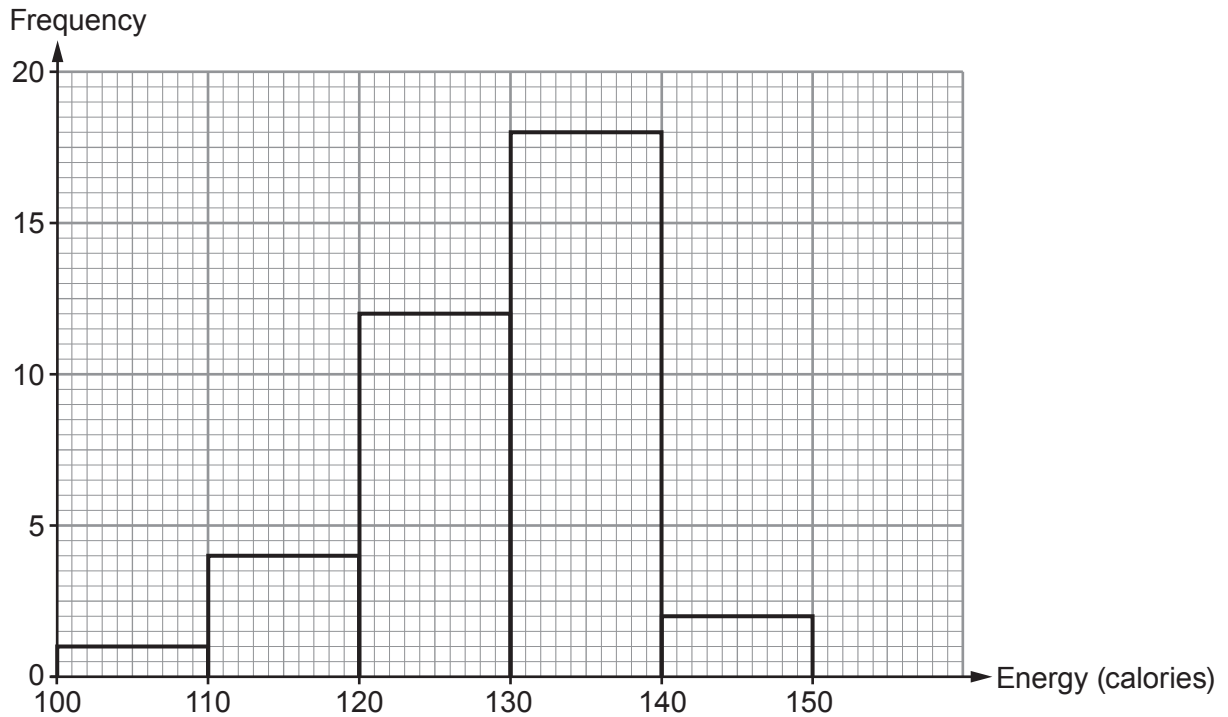
Elsa should get £9.40 change.



4. Rodney records how much energy, in calories, different energy bars provide. Each energy bar has a mass of 35g.

Rodney draws a frequency diagram to display his findings. He uses groups of width 10 calories:

$$100 \leq \text{energy} < 110, \quad 110 \leq \text{energy} < 120, \quad \dots, \quad 140 \leq \text{energy} < 150$$



- (a) Which is the modal group? [1]

$$130 \leq \text{energy} < 140$$

- (b) What fraction of the energy bars provide less than 130 calories? [3]

$$\text{Total number of bars} = 1 + 4 + 12 + 18 + 2 = 37$$

$$\text{Bars with less than 130 calories} = 1 + 4 + 12 = 17$$

$$\text{Fraction} = \frac{17}{37}$$

- (c) Consider **only** the energy bars providing 130 calories or more. What percentage of these energy bars provide 140 calories or more? [2]

$$130 \text{ calories or more: } 18 + 2 = 20 \text{ bars, } 140 \text{ or more: } 2 \text{ bars}$$

$$2 \div 20 \times 100 = 10\%$$

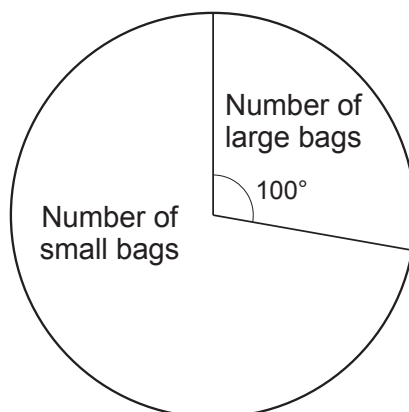


5. Evans Grocery sells bags of frozen peas.

Cost of small bag (400 g) = 80p

Cost of large bag (1000 g) = £1.80

- (a) The pie chart shows information about the number of bags of frozen peas that were sold last month.



A total of 720 bags of frozen peas were sold last month.
Calculate the total cost of the sales of the frozen peas.

[6]

$$\text{Number of large bags} = 100 \div 360 \times 720 = 100 \times 2 = 200 \text{ bags}$$

$$\text{Number of small bags} = 720 - 200 = 520 \text{ bags } (260^\circ \times 2 = 520)$$

$$\text{Sales of large bags} = 200 \times \text{£}1.80 = \text{£}360$$

$$\text{Sales of small bags} = 520 \times 80\text{p} = 41\,600\text{p} = \text{£}416$$

$$\text{Total cost of the sales} = \text{£}360 + \text{£}416$$

$$= \text{£}776$$

The total cost of the sales of the frozen peas was £776.

- (b) Which of the two sizes of bags of peas offers the better value for money?
You must show all your working.

[2]

Compare 2000 g of peas:

$$\text{Small bags: } 2000 \div 400 = 5 \text{ bags, } 5 \times 80\text{p} = \text{£}4.00$$

$$\text{Large bags: } 2000 \div 1000 = 2 \text{ bags, } 2 \times \text{£}1.80 = \text{£}3.60$$

£3.60 < £4.00, so the large bag offers the better value for money.



6. Waintram Housing has a plan for building some new houses. The plan below shows the layout of the drains for some of the houses. Some of the angles still need to be found.

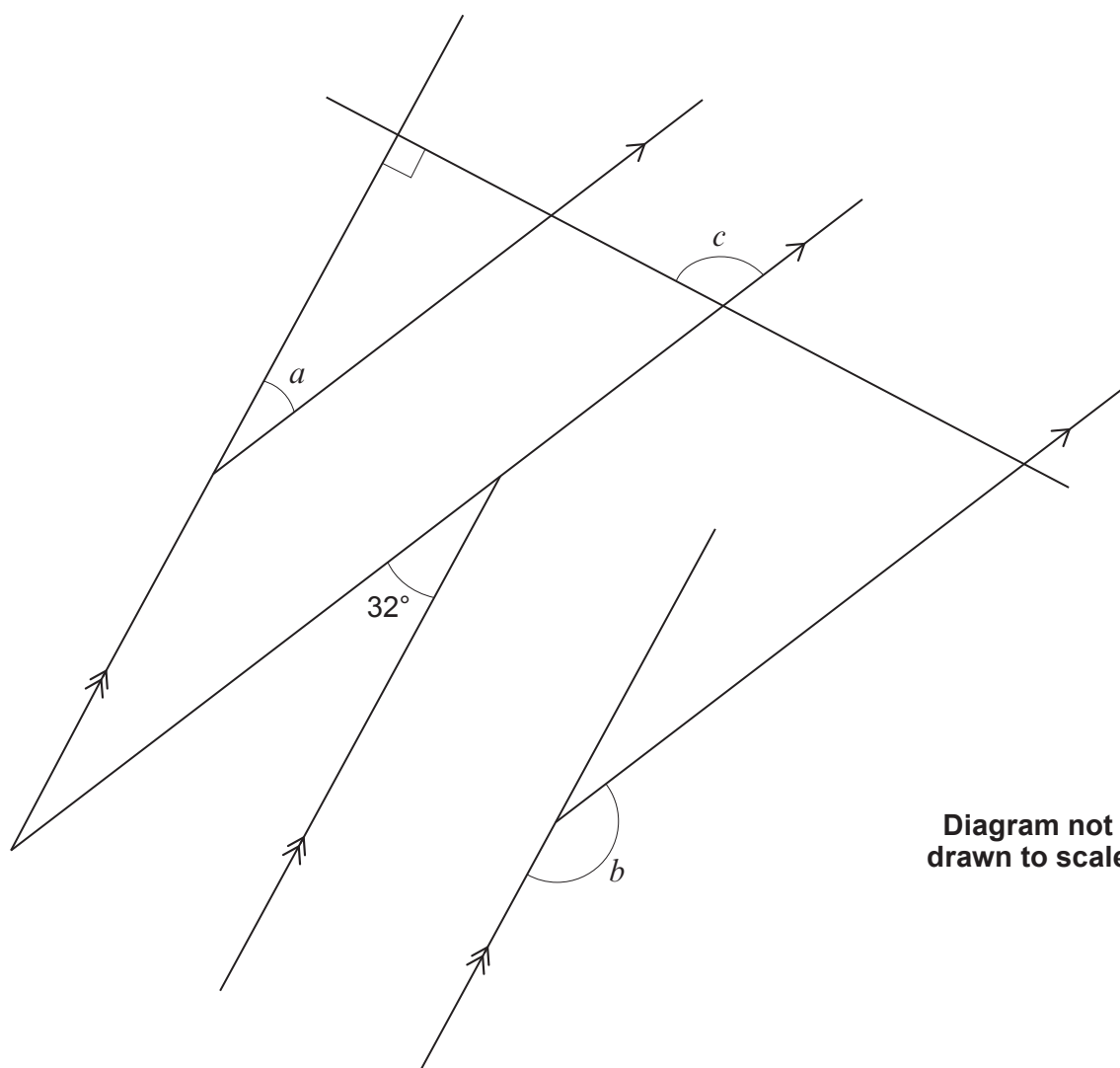


Diagram not
drawn to scale

Find the size of each of the angles a , b and c .

[3]

$$a = 32^\circ \text{ (corresponding angles, parallel lines)}$$

$$b = 180^\circ - 32^\circ = 148^\circ \text{ (angles on a straight line)}$$

$$c = 90^\circ + 32^\circ = 122^\circ \text{ (exterior angle of a triangle)}$$

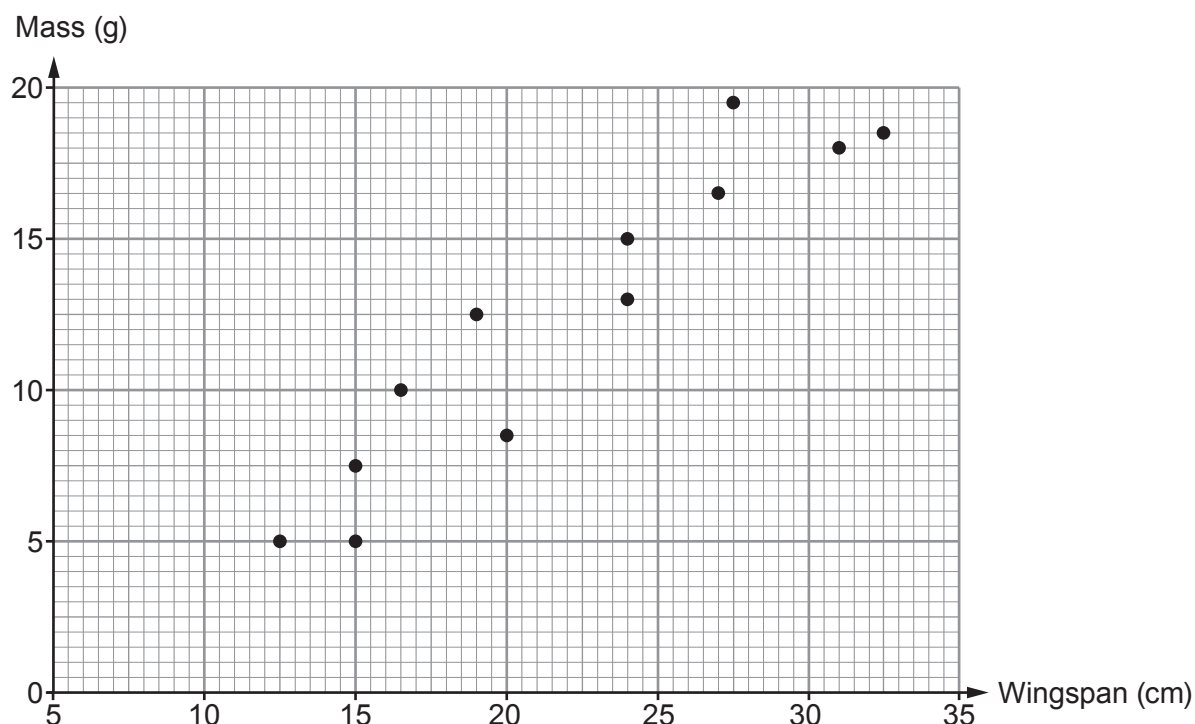
$$a = 32^\circ$$

$$b = 148^\circ$$

$$c = 122^\circ$$



7. Myra recorded the wingspan and mass of a number of birds. Her results are shown in the scatter diagram below.



- (a) The wingspan of one of the birds shown in the scatter diagram is 31 cm. What is the mass of this bird?

[1]

Mass is 18..... g

- (b) Two of the birds shown in the scatter diagram have a mass of 5g. What is the difference between the wingspans of these two birds?

[2]

$$15 - 12.5 = 2.5$$

Difference between the wingspans is 2.5..... cm

- (c) Use $30 \text{ cm} \approx 12 \text{ inches}$ to answer this question.

Find the wingspan of the bird with a mass of 8.5g.

Give your answer in **inches**.

[3]

The bird with a mass of 8.5 g has a wingspan of 20 cm

$30 \text{ cm} \approx 12 \text{ inches}$, so $1 \text{ cm} \approx 12 \div 30 = 0.4 \text{ inches}$

Wingspan = $20 \times 0.4 = 8 \text{ inches}$

Wingspan is 8..... inches



- (d) What type of correlation does this scatter diagram show? [1]

Positive correlation

- (e) Use the scatter diagram to estimate the wingspan of a bird with a mass of 12g. [1]

Wingspan is *20* cm

8. People travel by bus or by train from Hiraddug Station.
On Tuesday, 420 people travelled by bus from the station.

- (a) Of the 420 people who travelled by bus from the station, 35% had a travel pass.
Calculate the number of people who travelled by bus and did **not** have a travel pass. [3]

10% of 420 = 42, 30% = 3 × 42 = 126, 5% = 21

Had a travel pass: 35% = 126 + 21 = 147 people

Did not have a travel pass = 420 - 147

= 273 people

- (b) On Tuesday, 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. [3]

Bus : train = 20 : 17

20 parts = 420 people, so 1 part = 420 ÷ 20 = 21 people

Train = 17 parts = 17 × 21

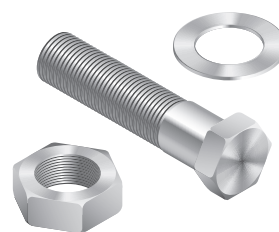
= 357 people



9. (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.



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 below to show the number of boxes of each item that Gwyn needs to buy.

You must show all your working.

[3]

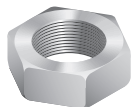
$$30 = 2 \times 3 \times 5, \quad 5 = 5, \quad 25 = 5 \times 5$$

$$\text{LCM of } 30, 5 \text{ and } 25 = 2 \times 3 \times 5 \times 5 = 150$$

So Gwyn needs 150 nuts, 150 bolts and 150 washers.

Nuts: $150 \div 30 = 5$ boxes, Bolts: $150 \div 5 = 30$ boxes,

Washers: $150 \div 25 = 6$ boxes

		Number of boxes needed
	Nuts (30 in each box)	5..... boxes
	Bolts (5 in each box)	30..... boxes
	Washers (25 in each box)	6..... boxes

- (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.

[2]

$$\text{Greatest thickness of one washer} = 2 + 0.25 = 2.25 \text{ mm}$$

$$\text{Greatest thickness of 6 washers} = 6 \times 2.25 = 13.5 \text{ mm}$$



10. The surface area of the Earth is 510 million km².
Write this area in standard form.

[2]

$$510 \text{ million} = 510\,000\,000$$

$$= 5.1 \times 100\,000\,000$$

$$5.1 \times 10^8 \text{ km}^2$$



11. 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:

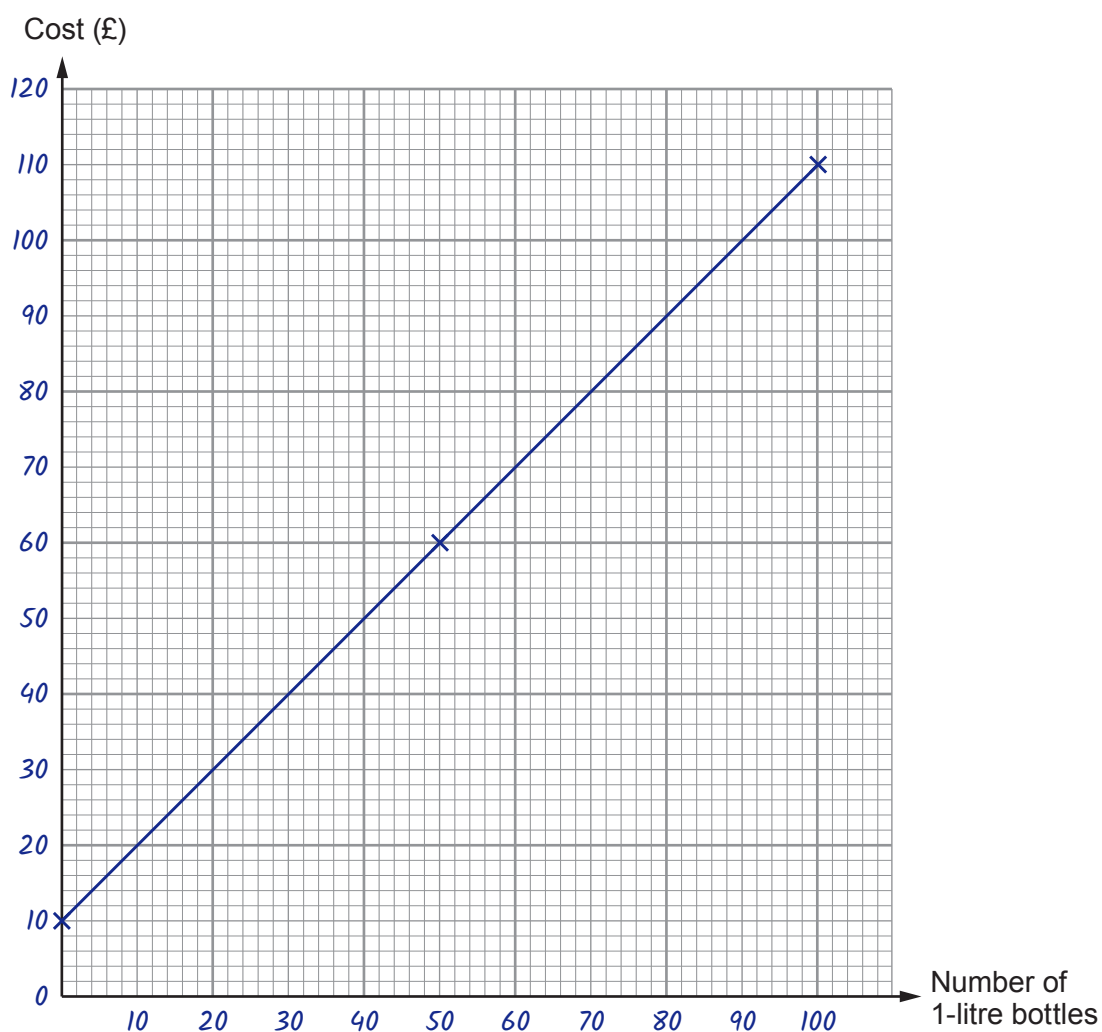
Fixed charge for use of equipment	£10
Cost of ingredients	80p per bottle
Cost of empty bottles with labels	20p per bottle

- (a) Draw a graph to show the total daily cost of producing between 0 and 100 bottles of orange juice.
Use the graph paper below.

[3]

Cost per bottle = 80p + 20p = £1, Total cost = £10 + £1 × number of bottles

0 bottles: £10, 50 bottles: £60, 100 bottles: £110



- (b) One day, OrenVit produces 1750 **pints** of orange juice in one-litre bottles. Calculate the cost of producing this quantity of orange juice.

[3]

$$1 \text{ litre} \approx 1.75 \text{ pints, so } 1750 \text{ pints} = 1750 \div 1.75 = 1000 \text{ litres} = 1000 \text{ bottles}$$

$$\text{Cost} = £10 + 1000 \times £1 = £10 + £1000$$

$$= £1010$$

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

The rectangular sticker shown below warns of hot water. It has a length of 14 cm and an area of 42 cm².



This water is hot

Diagram not
drawn to scale

The sticker below is mathematically similar to the first sticker. It is an enlargement of the first sticker, with scale factor 4.

This water is hot

Diagram not
drawn to scale

Calculate the length and the width of the larger sticker. You must show all your working.

[4]

$$\text{Width of small sticker} = \text{area} \div \text{length} = 42 \div 14 = 3 \text{ cm}$$

$$\text{Length of large sticker} = 4 \times 14 = 56 \text{ cm}$$

$$\text{Width of large sticker} = 4 \times 3 = 12 \text{ cm}$$

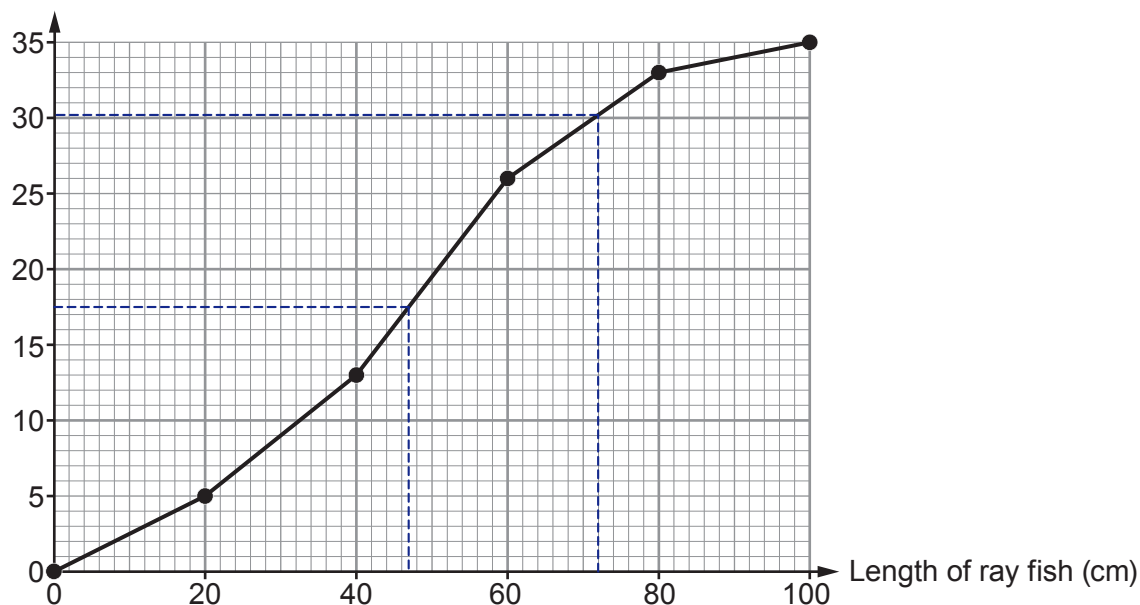
The larger sticker has length 56 cm and width 12 cm.



13. (a) An aquarium has 35 ray fish.
The cumulative frequency graph shows information about the lengths of these ray fish.



Cumulative frequency



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

- (i) What is the median length of these ray fish? [1]

Half of 35 = 17.5, read across from 17.5

47 cm

- (ii) How many of these ray fish have lengths greater than 72 cm? [1]

At 72 cm the cumulative frequency is 30

35 - 30 = 5 ray fish



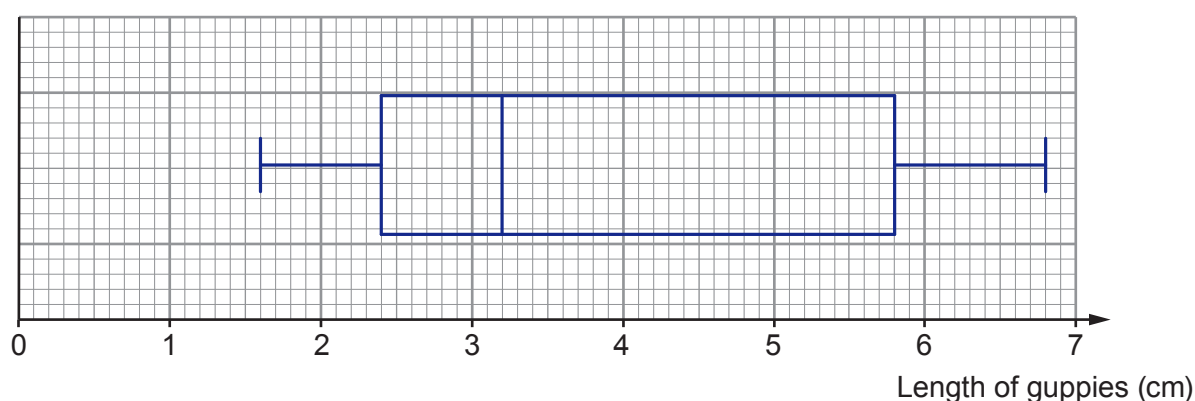
- (b) The aquarium also has guppies.
The table shows information about the length of the guppies in a sample of 60 guppies.



Minimum	Range	Median	Lower quartile	Interquartile range
1.6 cm	5.2 cm	3.2 cm	2.4 cm	3.4 cm

- (i) Draw a box-and-whisker plot of this data on the grid below.

[4]



$$\text{Upper quartile} = 2.4 + 3.4 = 5.8 \text{ cm}, \quad \text{Maximum} = 1.6 + 5.2 = 6.8 \text{ cm}$$

$$\text{Minimum } 1.6, \text{ LQ } 2.4, \text{ median } 3.2, \text{ UQ } 5.8, \text{ maximum } 6.8$$

- (ii) How many of the sample of 60 guppies have a length greater than or equal to 2.4 cm?

[2]

$$75\% \text{ of the guppies have a length greater than or equal to the LQ (2.4 cm)}$$

$$0.75 \times 60 = 45$$

$$45 \text{ guppies}$$

- (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.



[2]

$$\text{Mass in April} = 110\% \text{ of mass in November}$$

$$\text{Mass in November} = 9.9 \div 1.1 = 99 \div 11$$

$$= 9 \text{ kg}$$



[illegible]