Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

3310U30-1

A20-3310U30-1

TUESDAY, 3 NOVEMBER 2020 – MORNING

MATHEMATICS – NUMERACY
UNIT 1: NON-CALCULATOR
INTERMEDIATE TIER

1 hour 45 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 all 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***(a)*, 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.	**5**	
2.	**12**	
3.	**6**	
4.	**3**	
5.	**3**	
6.	**11**	
7.	**6**	
8.	**11**	
9.	**3**	
10.	**3**	
11.	**6**	
12.	**6**	
13.	**5**	
Total	**80**	

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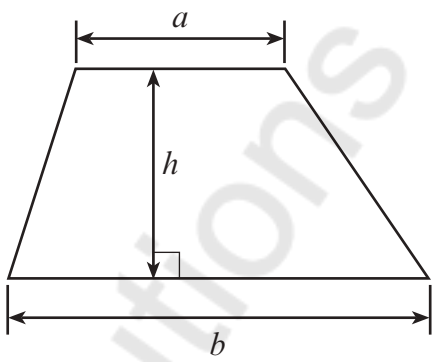
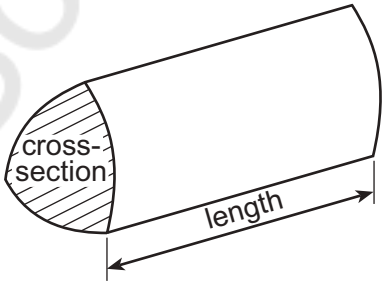
Formula List – Intermediate Tier

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



Volume of prism = area of cross-section × length



Examiner only

1. Marium buys some blueberries and strawberries.

Blueberries cost £4 per kg

Strawberries cost £3.60 per kg

Marium buys 1·5 kg of blueberries.
She receives £6.80 change from a £20 note.

Calculate the mass of the strawberries that Marium buys. [5]

Since the Blueberries Cost £4 per kg
then it follows that =>
1.5kg of blueberries => £4 × 1.5kg
=> £6.0

Cost of Strawberries => £20 − £6.80 = £6.0

=> 20 − 6.80 = 6.0
=> 20.00 − 6.80 = 13.20
6.00 + 13.20
£7.20

Mass => £7.20 / £3.60 = 2kg

1.5 × 4
15 = 4
60
6.0

13.20
6.00
7.20

7.20 / 3.60 = 720 / 360
= 2

3.60
3.60
7.20

Examiner only

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

Suzy buys a Jack Russell dog.
The dog costs her £450.
Pet insurance costs £18 per month.
Food for a Jack Russell costs £7 per week.

Calculate the total cost of buying, insuring and feeding Suzy's dog for the **first year**.
You must show all your working. [4 + 2 OCW]

* Pet Insurance = £18 per Month
For the first Year ⇒ ?
But it is believed that 12 Months ⇒ 1 Year
1st Year ⇒ 12 × £18 ⇒ £216

* Rusell Cost ⇒ £7 Per Week
For the First Year ⇒ ?
But it is believed that 52 Weeks ⇒ 1 year
1st Year ⇒ 52 × £7 ⇒ £364

Total Cost = Dog Cost + Insurance Cost + Food Cost
= £450 + £216 + £364
= £450
£216
£364
£1030

∴ Total Cost of buying, insuring & feeding Suzy's dog for the first year = £1030

18 (
12
136
18
216

52 | 7 | 364

Examiner only

(b) Remember:
1 inch ≈ 2·5 cm

1 kg ≈ 2.2 pounds

The height of a fully-grown Jack Russell dog is between 25 cm and 30 cm.
A fully-grown Jack Russell dog has a mass of between 6 kg and 8 kg.

Complete each of the following statements.

(i) 'The height of a fully-grown Jack Russell dog is between
10 inches and 12 inches.' [3]

Since the height ⇒ 25cm and 30cm
By Conversion ; we have ⇒ $\frac{25}{2.5}$ and $\frac{30}{2.5}$
= 10 inches and 12 inches

(ii) 'A fully-grown Jack Russell dog has a mass of between
13.2 pounds and 17.6 pounds.' [3]

Since the Mass is between = 6kg and 8kg
By Conversion ; we have ⇒ (6×2.2) and (8×2.2)
= 13.2 and 17.6

$22 \times 6 = 132 = 13.2$

$8 \times 22 = 176 = 17.6$

1 inch ≈ 2.5
25cm

$2.5x = 25$, $x = \frac{25}{2.5}$

$\frac{25}{2.5} = \frac{25}{25} = 1$, $= 10$

$\frac{30}{2.5} = \frac{30}{25} = 1.2 = 12$

1 kg ≈ 2.2
6kg ≈ x
$x = 6 \times 2.2$

3310U301
05

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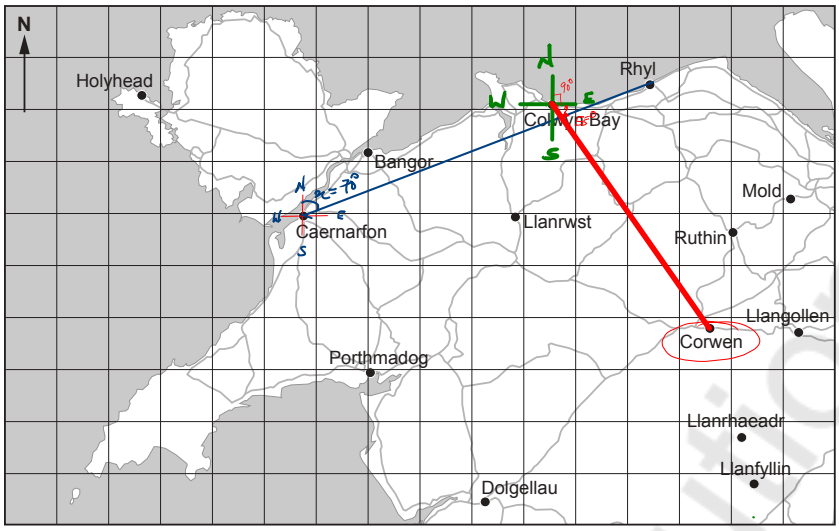
3. *(a)* The map shows part of Wales.



(i) Write down the bearing of Rhyl from Caernarfon. [1]

70 °

(ii) Name the place on the map that is on a bearing of 145° from Colwyn Bay. [2]

CORWEN

(b) Another map has a scale of 1 : 20 000.
Gwen measures 3·5 cm on this map.
What distance does this represent in **metres**? [3]

Given a scale of 1 : 20 000 ⇒ 1 cm on the map = 20,000 cm in real life
⇒ Since Gwen measures 3.5 cm in this map
Real distance ⇒ Real life measurement × Measurement on the map
= 20,000 × 3.5 = 70,000 cm

700 metres

Examiner only

4. A new runway is to be built at an airport.

The plan below shows some of the angles.

Bryn has been asked to complete the plan by finding each of the missing angles, x, y and z.

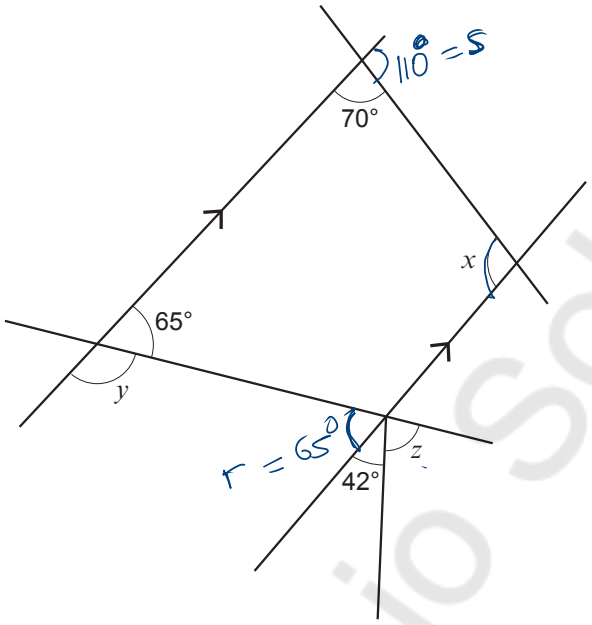


Diagram not drawn to scale

3310U301
07

Calculate the size of each of the angles x, y and z. [3]

$\Rightarrow y + 65^\circ = 180^\circ$ { Sum of angle formed on a Straight Line }

$y = 180^\circ - 65^\circ \Rightarrow 115^\circ$; $r = 65^\circ$ { Alt ∠ }

$r + z + 42^\circ = 180^\circ$ { Sum of ∠ __ } $\Rightarrow 65 + z + 42^\circ = 180$

$z = 180 - 42 - 65$

$z = 73^\circ$

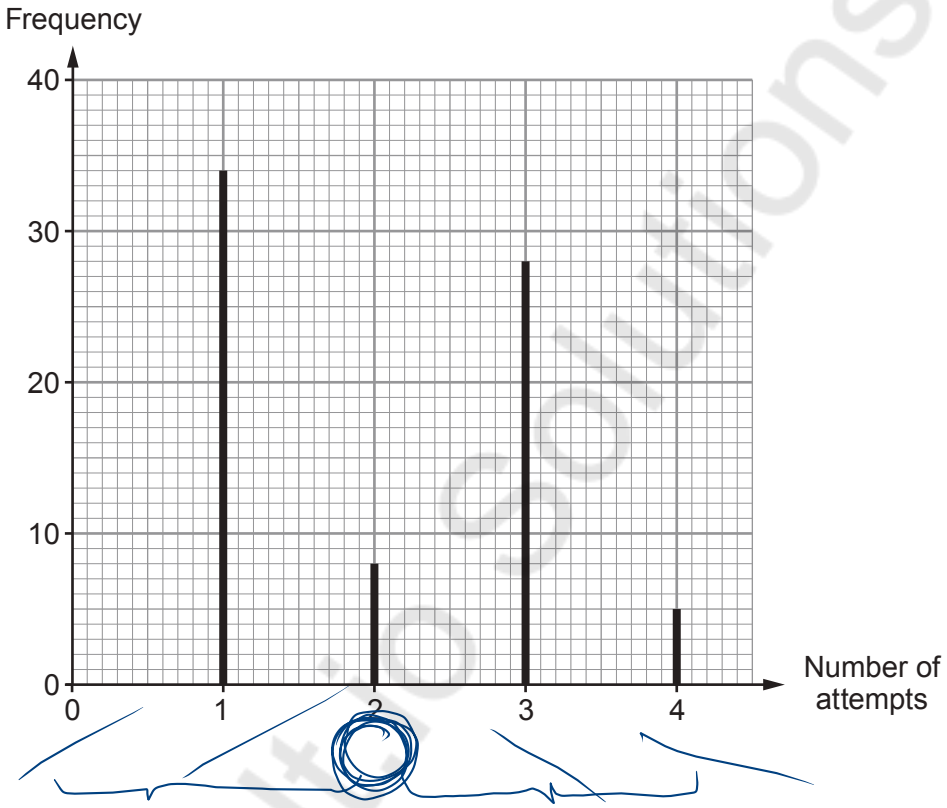
$x =$ 110 $^\circ$ $y =$ 115° $^\circ$ $z =$ 73° $^\circ$

where $5 = 110$ { Angle formed on a __ }

Examiner only

5. In an office, the ICT technician recorded the number of attempts each of 75 employees took to enter their correct password into a computer.

The results are displayed below.



(a) What was the modal number of attempts taken to enter the correct password? Circle your answer. [1]

1 2 2·5 3 4

(b) What was the median number of attempts taken to enter the correct password? Circle your answer. [1]

1 2 2·5 3 4

Examiner only

(c) A further 10 employees attempted to enter their correct password into a computer.
The median number of attempts for all these 85 employees is 3.

Did any of these 10 employees take fewer than 3 attempts to enter their correct password?

Yes ☐ No ☑

You must show working to support your answer. [1]

Initially, 75 employees tried to enter their Passwords

* Then 10 more employees tried ⇒ Total = 85 employees
* Median for 85 employees = 3
Median means the 43rd value is 3

$T_1, T_2, T_3, \ldots T_{75}$ be the original number of attempts by the first 75 employees

* Let $t_1, t_2, t_3, \ldots t_{10}$ be the attempts by the further 10 new employees

$T_1, T_2, T_3, \ldots, T_{75}, t_1, t_2, t_3, \ldots t_{10}$

total of 85 entries

Examiner only

6. *(a)* Rowan is going to make some muffins.

To make the muffins, he buys:
- muffin cases,
- ingredients,
- 1 flag per muffin, for decoration.

A pack of 16 muffin cases costs 22p.
The ingredients to make 6 muffins cost 25p.
A bag of 12 flags costs 40p.

Rowan buys 4 bags of flags.

Rowan plans to make as many muffins as possible and have no cases, ingredients or flags left over.

He will sell the muffins for 30p each.

Calculate Rowan's profit when he sells all the muffins he makes.
You must show all your working. [8]

Cost of flags ⇒ 4 × 40p = 160p

Cost of Muffin Cases ⇒ (4 × 12) ÷ 16 = 3

→ 3 × 22p = 66p

Cost of Ingredients ⇒ (4 × 12) ÷ 6 = 8

→ 8 × 25p = 200p

(4 × 12) × 30p = 1440p

Profit = 1440p − 160p − 66p − 200p

= 1014p → £10.14

1440
− 160
0

Examiner only

(b) Gerry makes biscuits.
Each box of biscuits costs him 80p to make.
He sells them for £4 a box.

Calculate the percentage profit Gerry makes on each box sold. [2]

=> By Conversion => £4 = 400p

$\frac{400p - 80p}{\text{Original Cost}} \times 100\% = \frac{320p}{80p} \times 100\%$

$= 4 \times 100\% = 400\%$

(c) Chloe makes flapjacks.
A pack of flapjacks costs Chloe 60p to make.
She sells the flapjacks for a profit of 30%.
For how much does Chloe sell a pack of flapjacks?
Circle your answer. [1]

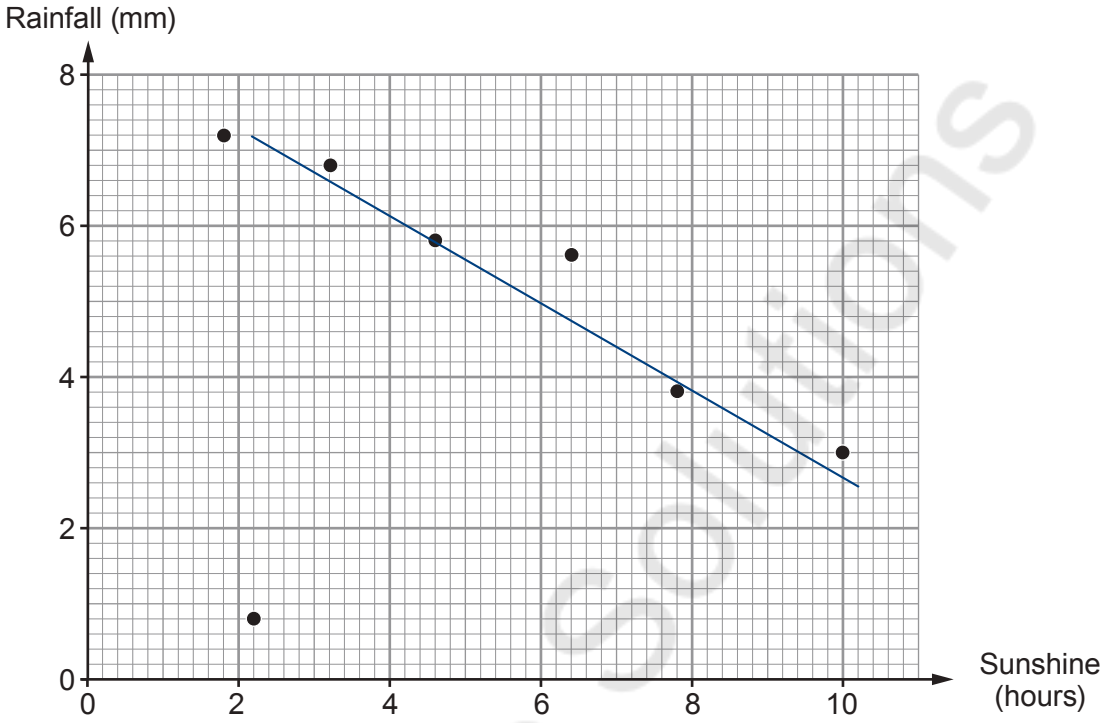
90p 66p 72p **78p** 42p

30% of $60p = \frac{30}{100} \times 60p = 18p$

=> 60p + 18p => 78p

Examiner only

7. *(a)* Rosie recorded the rainfall and the number of hours of sunshine each day last week.



(i) On one day last week, the number of hours of sunshine was low and the rainfall was lower than on any other day.
Which day was it?
Circle your answer. [1]

Saturday Sunday Monday Tuesday Can't tell

(ii) Rosie says,

There will be a positive correlation between rainfall and the number of hours of sunshine next week.

Is Rosie correct?

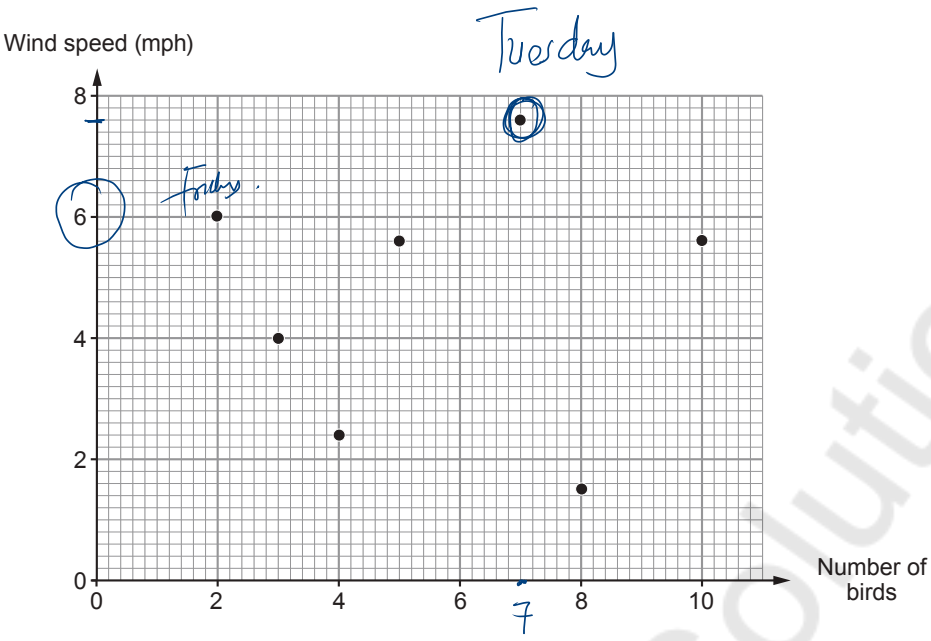
Yes ☐ No ☑

You must give a reason for your answer. [1]

No, It shows a negative Correlation

Examiner only

(b) At 3 p.m. each day last week, Rosie recorded the wind speed and the number of birds feeding in her garden.



(i) Was there a correlation between wind speed and the number of birds feeding in Rosie's garden last week?

Yes ☐ No ☑

You must give a reason for your answer. [1]

No, as scattered

(ii) The greatest wind speed at 3 p.m. last week was on Tuesday.
How many birds were feeding in Rosie's garden at this time? [1]

7 birds

(iii) On Wednesday last week, the wind speed at 3 p.m. was a quarter of that on Friday.
Complete the following table. [2]

Day	Wind speed (mph)
Wednesday	$\frac{1}{4} \times 6 = \frac{3}{2} = 1.5$
Friday	6

Examiner only

8. Albert, Terri and Gareth are going camping.

(a) Albert, Terri and Gareth paid for a tent between them.
The amount they each paid for the tent was in the ratio 1 : 4 : 6 respectively.
Gareth paid £66.36 towards the tent.

Calculate the cost of the tent. [3]

A T G

$\Rightarrow \frac{66.36}{6} \times (1+4+6)$

$\Rightarrow 11.06 \times 11$

$\Rightarrow £121.66$

(b) The charge to stay at a campsite has increased by 5% each year for the last two years.
Two years ago, the charge was £24 per night for a large tent and three people.

Calculate the current charge per night for a large tent and three people.
You must show all your working. [4]

By Formula:

Current Charge = Amount Charge $\times (1 + \text{rate})^n$

$= £24 \times (1+5\%)^2$

where Amount Charge = £24

n = no of years

$5\% = 5 \div 100 = 0.05$

$= 24 \times (1+0.05)^2 = 24 \times (1.05)^2$

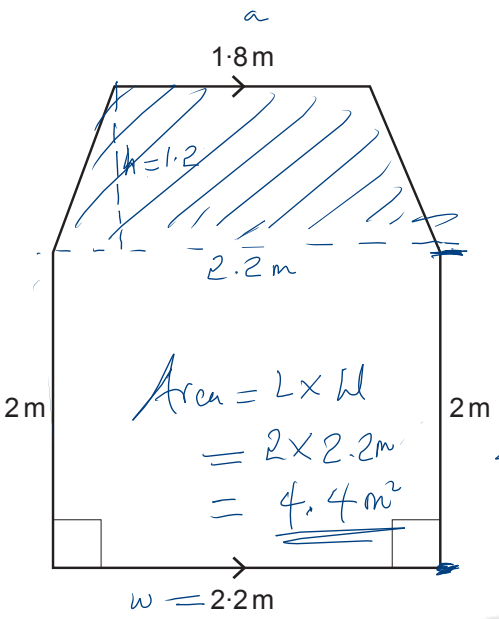
$= 24 \times (1.05 \times 1.05)$

$= 24 \times 1.1025$

$= 26.46$

Examiner only

(c) The diagram shows the groundsheet of a tent.



Overall length of the groundsheet

Diagram not drawn to scale

The area of the groundsheet is 6·8 m².
The width of the groundsheet is 2·2 m.
Calculate the overall length of the groundsheet. [4]

Area of a Trapezium $= \frac{1}{2}(a+b) \times h = \frac{1}{2}(1.8+2.2) \times h$

Area of a Rectangle $= L \times W = 2 \times 2.2 = 4.4$

Area of the the ground sheet $= 6.8\text{m}^2 = A_T + A_R$

$6.8 = \left[\frac{1}{2}(4.0) \times h\right] + [4.4]$

$6.8 = 2h + 4.4 \Rightarrow 6.8 - 4.4 = 2h$

$2.4 = 2h$

$\Rightarrow \frac{2.4}{2} = \frac{2h}{2}$ $\quad h = 1.2\text{m}$

Overall length = 2m + height of the Trapezium

$= 2\text{m} + 1.2\text{m} = 3.2\text{m}$

Examiner only

9. The scale diagram below shows Haydn's garden.

His garden is 27 metres long and 18 metres wide.
The scale used is **1 cm represents 3 metres**.

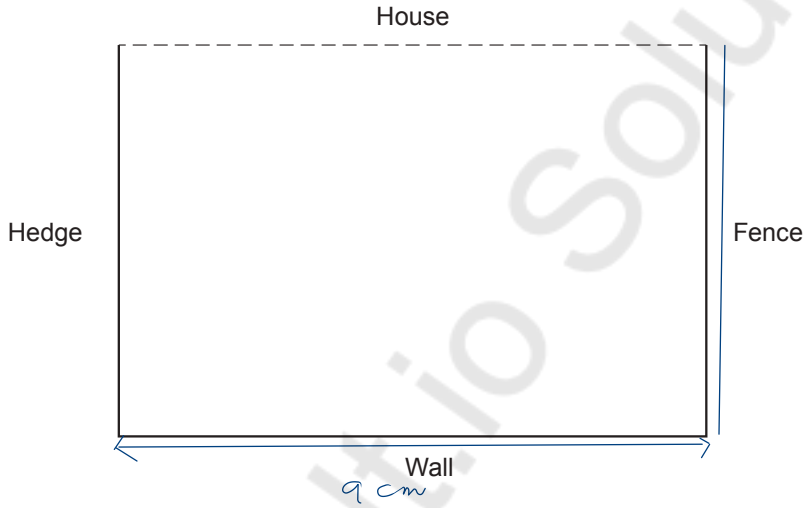
Haydn is planting a tree in his garden.

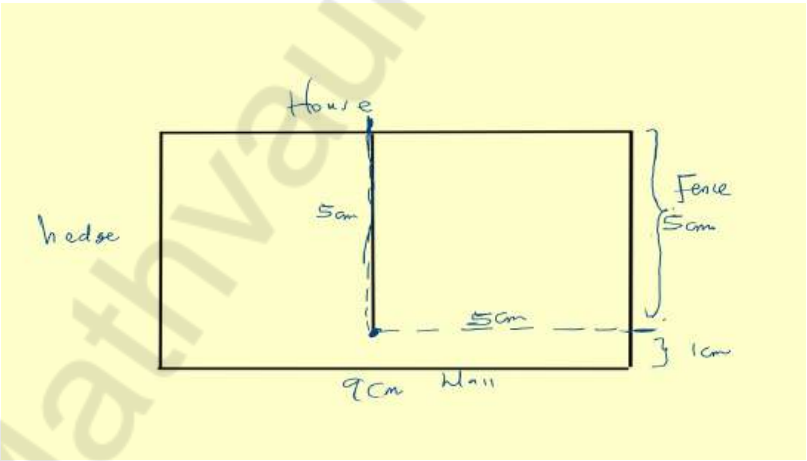
He decides that the tree must be planted:

- 15 metres from the fence,
- equidistant from the house and the fence.

Draw suitable lines on the diagram and show where Haydn should plant the tree. [3]

1 cm represents 3 metres





Examiner only

10. There are 600 pupils in a school.
8 of these pupils are to be selected to discuss changes to the school uniform.

The headteacher has a spreadsheet of the names of all 600 pupils.
There are 600 rows of pupil names in the spreadsheet, starting at row 1.
There is one pupil name on each row.

The headteacher uses a systematic sampling method.

(a) The first pupil selected on the headteacher's list is a boy whose name is in the 25th row.

Give the row numbers in the spreadsheet of the other 7 pupils who would be selected.
Complete the table below. [2]

$\Rightarrow \frac{600}{25} = 75$

Pupil	1st	2nd	3rd	4th	5th	6th	7th	8th
Row in the spreadsheet	25th	100	175	250	325	400	475	550

75, 25, 100

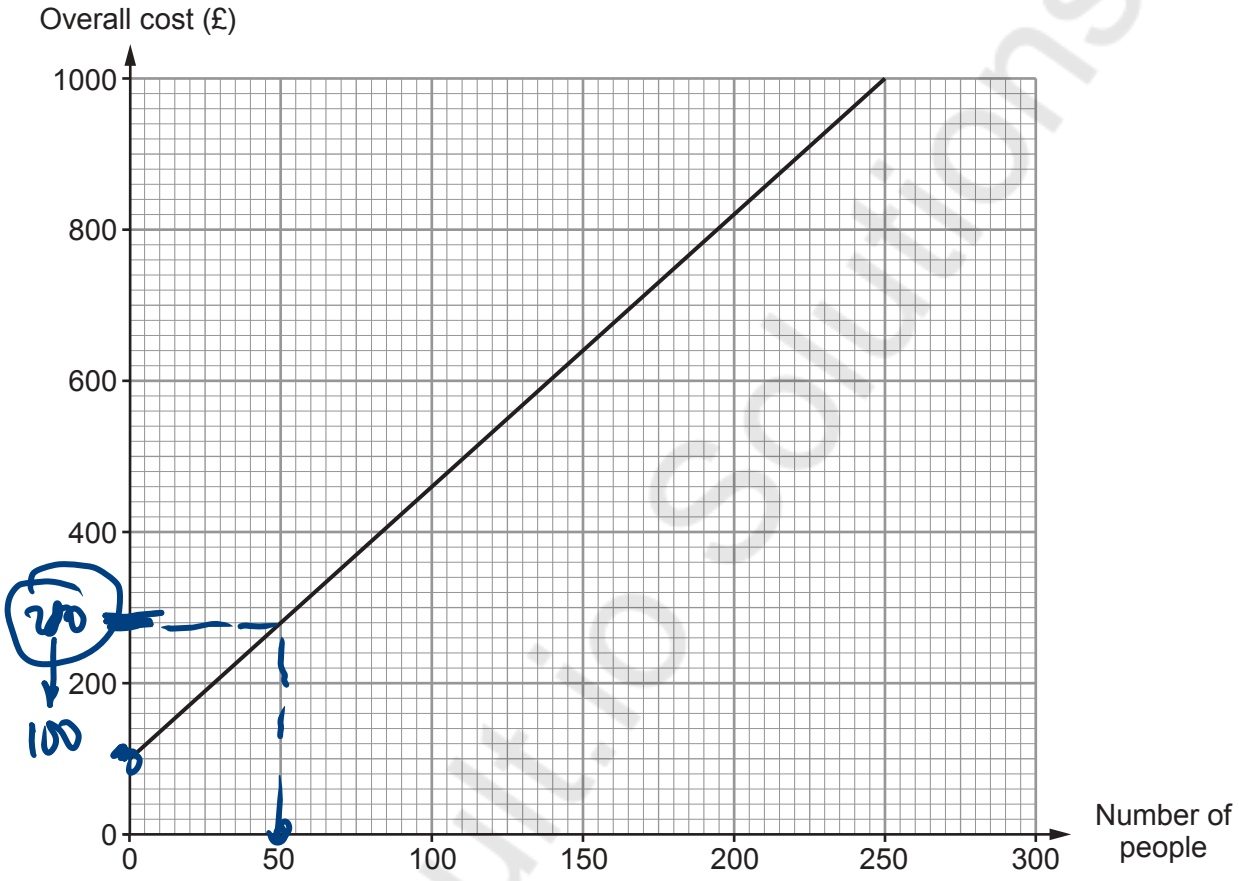
175, 75, 250, 75, 325, 75, 400

(b) Explain how the headteacher selected the first pupil. [1]

Headteacher selected the first pupil at random : random sampling

11. Meinir is planning a charity event to be held at a hotel.

A section of a straight line graph showing the hotel charges for this event is shown below.
These charges include a single payment for the room hire and the cost of one drink for each person attending.



Meinir decides to pay the room hire cost herself.
She decides to price the tickets so that she will be able to make £500 to give to charity.

Examiner only

(a) Calculate the selling price of each ticket if Meinir plans the event for 50 people. [3]

$(280 - 100 + 500) \div 50 + 500 \div 50$

$(180 + 500 \div 50)$

$3.6 \div 10$

$= 13.6$

(b) Calculate the selling price of each ticket if Meinir plans the event for 400 people. [3]

$\dfrac{(400 \div 50) \times (280 - 100) + 500}{400}$

$= \dfrac{8 \times 180 + 50}{400}$

$= 9.85$

1m → 1000 mm

Examiner only

12. *(a)* A square piece of card measures 1 m by 1 m.

Calculate the area of this piece of card.
Give your answer in **standard form** in mm^2. [2]

1m by 1m = 1000 mm by 1000 mm

Area = 1000 mm × 1000 mm = 1 000 000 mm^2

Area = 1 × 10 × 10 × 10 × 10 × 10 × 10 = 1×10^6

1×10^6 mm^2

(b) Some fabric shrinks when it is washed.

A piece of fabric is washed twice.

After the first wash, the area of the fabric is 75% of the area of the original piece of fabric.
After the second wash, the area of the fabric is 90% of the area of the fabric after the first wash.

After these two washes, the area of the fabric is 2700 cm^2.

Calculate the area of the original piece of fabric. [4]

* First Wash ⇒ A_1 = 75% = $\frac{75}{100}$ ⇒ 0.75

* Second Wash ⇒ A_2 = 90% = $\frac{90}{100}$ = 0.9

* By Formula!

Area of the original piece of fabric ⇒ ?

$= \frac{2700 \text{ cm}^2}{A_1 \times A_2} = \frac{2700}{0.75 \times 0.9} = \frac{2700}{0.675}$

$= \frac{2700}{0.675}$

$= 4000 \text{ cm}^2$

$\frac{2700}{0.675} \Rightarrow \frac{2700}{675}$ ⇒ 4000

675 × 4 = 2700 = 4000

0.75 × 0.9 = 675 = 0.675

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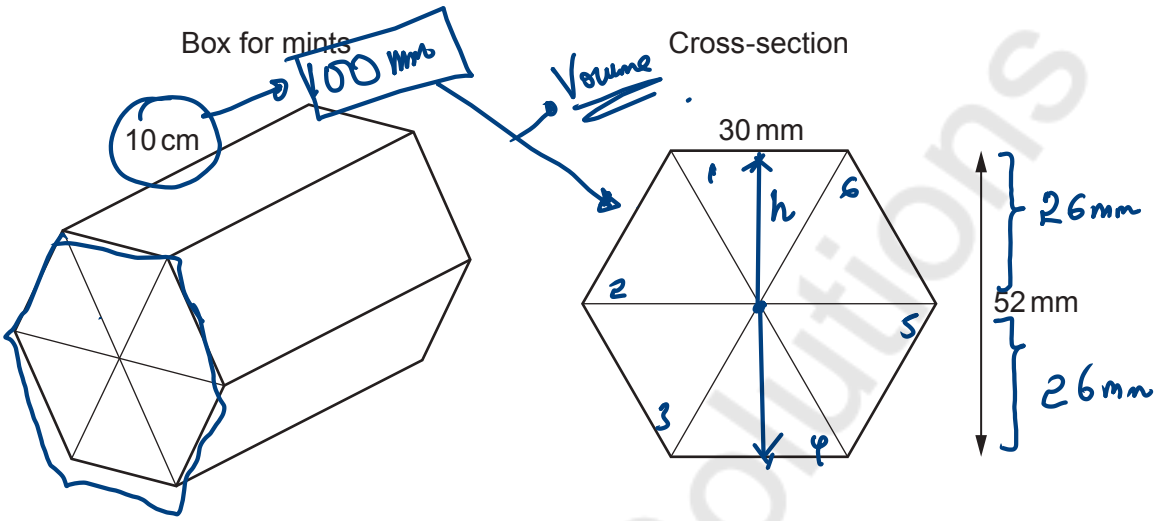
Examiner only

13. A box for mints is to be made in the shape of a hexagonal prism.
The cross-section of the box is a regular hexagon.
The volume of the box must be greater than 230 000 mm^3.



Diagrams not drawn to scale

Using the measurements above, show that this would make a suitable box for the mints.
You must show all your working. [5]

Area of Cross-section $\Rightarrow 6 \times \left(\frac{1}{2} \times b \times h\right)$

$= 6 \times \left(\frac{1}{2} \times 30\text{mm} \times \frac{1}{2} \times 52\text{mm}\right)$

$= 6 \times (15\text{mm} \times 26\text{mm})$

$= 2340\ mm^2$

Volume $= 2340\ mm^2 \times 100\ mm$

$= 234000\ mm^3$

$V = 234000\ mm^3 > 230,000\ mm^3$

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