Surname	Centre Number	Candidate Number
Other Names		0

GCSE – NEW

3310U30-1

A16-3310U30-1

MATHEMATICS – NUMERACY
UNIT 1: NON-CALCULATOR
INTERMEDIATE TIER

WEDNESDAY, 2 NOVEMBER 2016 – MORNING

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 continuation page at the back of the booklet, taking care to number the question(s) correctly.

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.	**3**	
2.	**8**	
3.	**3**	
4.	**9**	
5.	**6**	
6.	**4**	
7.	**4**	
8.	**5**	
9.	**9**	
10.	**7**	
11.	**8**	
12.	**9**	
13.	**5**	
Total	**80**	

3310U301
01

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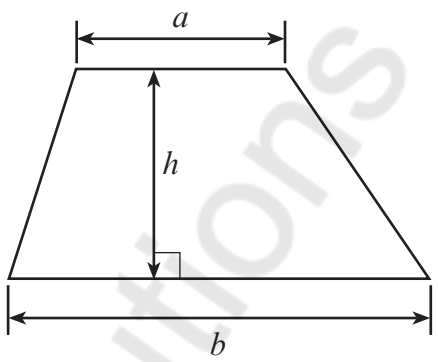
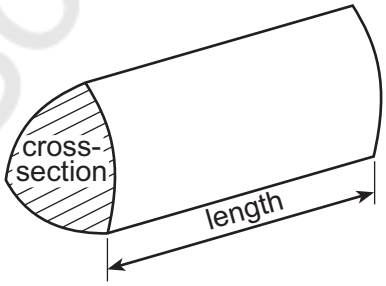
Formula List – Intermediate Tier

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

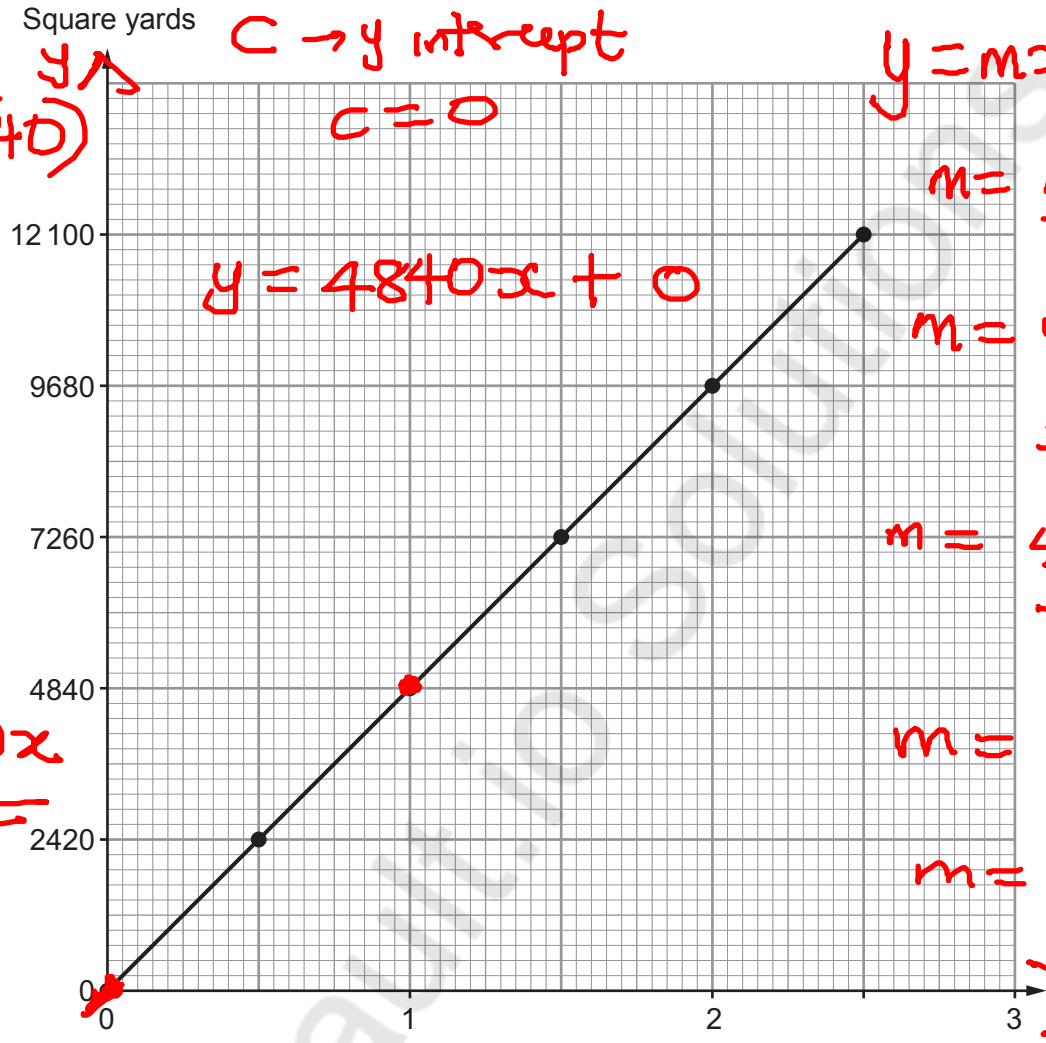


Volume of prism = area of cross-section × length



Examiner only

1. Marcus is a farmer.
He has his own conversion graph to change between acres and square yards.



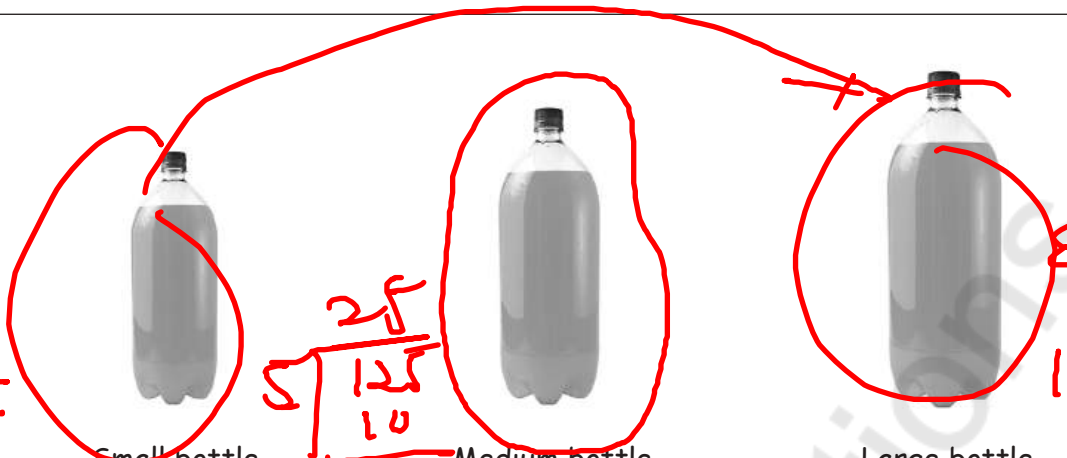
Complete each of the following statements.

(a) 3 acres is equal to ..... square yards. [1]

(b) 5·5 acres is equal to ..... square yards. [2]

Examiner only

2.



Small bottle
300 ml for 66p

Medium bottle
400 ml for 92p

Large bottle
500 ml for £1.25

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

Roland is going to buy some orange juice for a party.
Which size bottle of orange juice offers the best value for money?
You must show your working. [3 + 2 OCW]

Small bottle : 300ml → 66p ÷3 ✓
Medium bottle: 400 ml → 92p ÷4
Large bottle: 500ml → 125p ÷5
Reduce each bottle to 100ml price
Small bottle: 100ml → 22p ✓
Medium bottle: 100ml → 23p
Large bottle: 100ml → 25p
So, the small has the best value for money.

(b) Galina needs to buy **exactly** 800 ml of orange juice.
Which is the best option for Galina?
You must show your working and consider all options.
You must give a reason for your choice. [3]

Galina → 800 ml
Case 1: Galina needs to buy 1 large and 1 small bottle
1 large bottle : 125p & small bottle 66p
So, Galina will spend £1·91 //
Case 2: Galina needs to buy 2 medium bottle
Price: 2 × 92 = £1·84

So, the best value for money is buying two medium bottle because of low price

Examiner only

3. A survey was carried out to find how often teenagers buy DVDs.

The following two questions were asked in a questionnaire.

Q1. Where do you live?

Q2. How often do you buy DVDs?

Never	*1-10 times*	*10-15 times*	*More than 15 times*
☐	☐	☐	☐

(a) For each question give **one** reason why it is **not** suitable. [2]

Q1. This is a personal question and it doesn't tells anything about how often teenagers buys DVDs.

Q2.

Q2. The data is insufficient to tell how often they buy DVDs - No specific period of time.

(b) The survey was carried out by leaving copies of the questionnaire on the DVD shelves in a supermarket.

Give **one** criticism of how the survey was carried out. [1]

(1) Poor distribution

(2) The distribution will not reach the target audience [teenagers]

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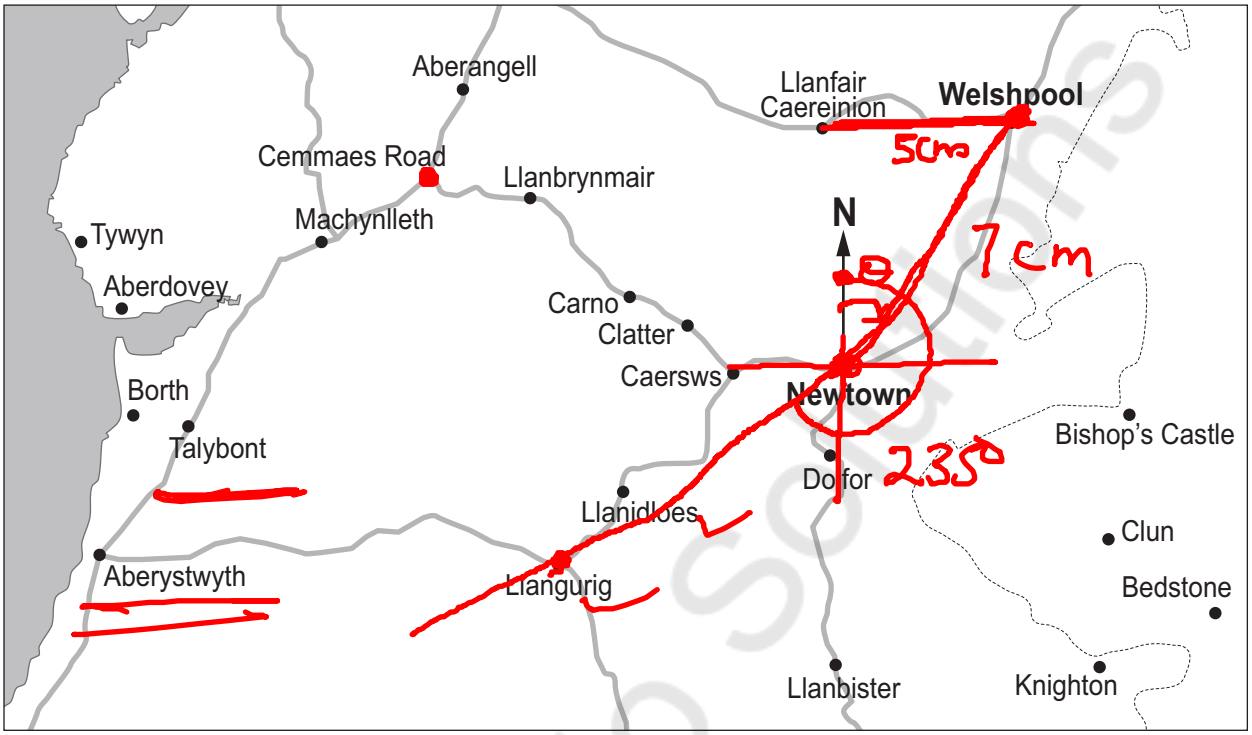
 (3310U30-1) **Turn over.**

Examiner only

4. The map shows a part of Wales.
The position of Newtown is shown on the map.

Ruler, Protractor



(a) Write down the bearing of Welshpool from Newtown. [1]

30° .....°

235°

(b) Name the place on the map that is on a bearing of 235° from Newtown. [2]

Llangurig

Examiner only

(c) The distance from Newtown to Welshpool is approximately 14 miles by road.

(i) **Estimate** the distance by road from Welshpool to Llanfair Caereinion in miles. [1]

Newton – Welshpool → 14miles
7cm → 14 miles
1cm → 2miles
1cm → 2miles
5cm → 10mile

10 miles

(ii) Megan lives in Cemmaes Road.
To travel to work, she starts by heading towards Machynlleth.
Her journey to work is approximately **40 km**.

Convert 40 km to miles. [2]

1Km → 0·62miles

40km to miles
40km = 0·62×40 = 6·2×4

6·2
×4
24·8

1cm → 2miles
12cm

24·8 miles 25miles

In which town or village could Megan work? [1]

.....

(d) A different map has a scale of 1 : 10 000.
Megan measures 3 cm on this map.
What distance does this represent in **metres**? [2]

1m = 100 cm

1 : 10,000 ×3
3 : 30,000
3cm → 30,000cm × 1m / 100cm

300 metres

30,000cm = 300m

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07

Examiner only

5. *(a)* Students are taking tests in English and Welsh.
The English test is marked out of 80.
The Welsh test is marked out of 70.

(i) Dyfed scores 35 in his English test.
Estimate Dyfed's score as a percentage.
Circle your answer. [1]

4% 20% 23% 44% 51%

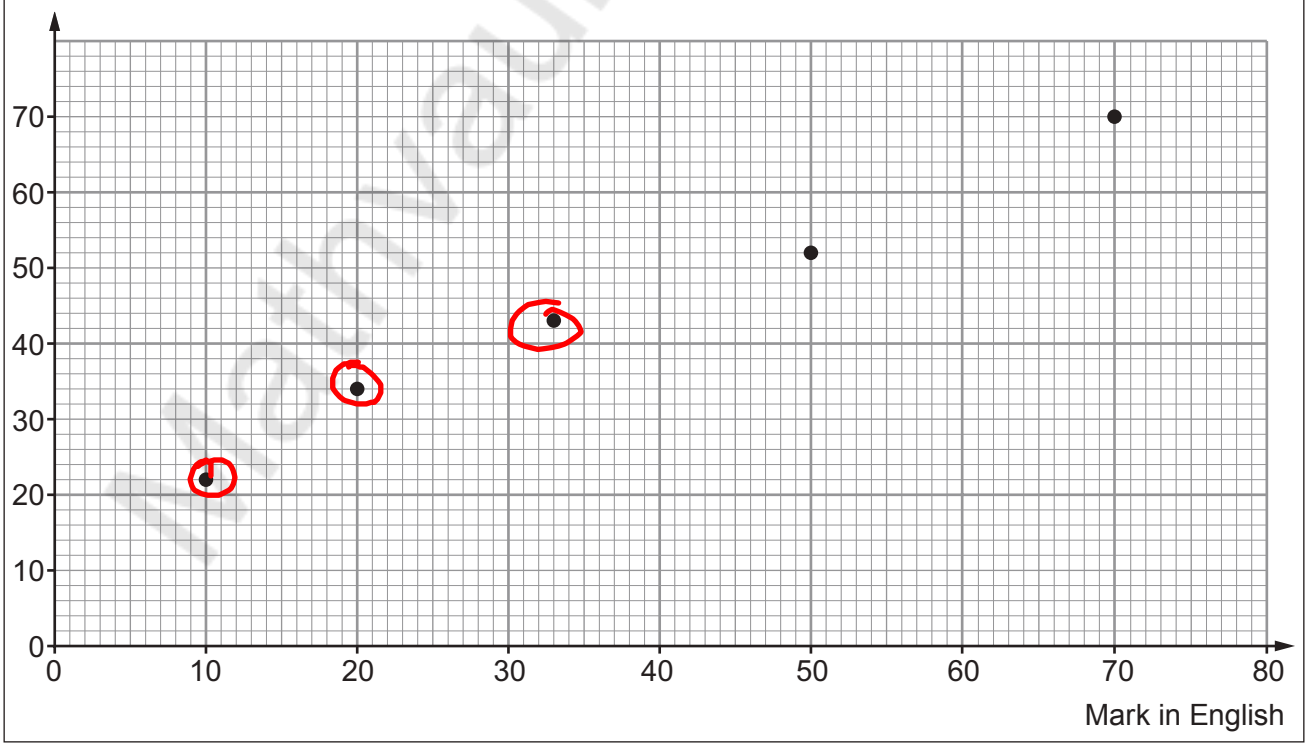
(ii) Liam scores 22 in his Welsh test.
Estimate Liam's score as a percentage.
Circle your answer. [1]

0·3% 3% 22% 31% 40%

(b) Rowena states a hypothesis,
'Boys do better than girls in their English tests.'

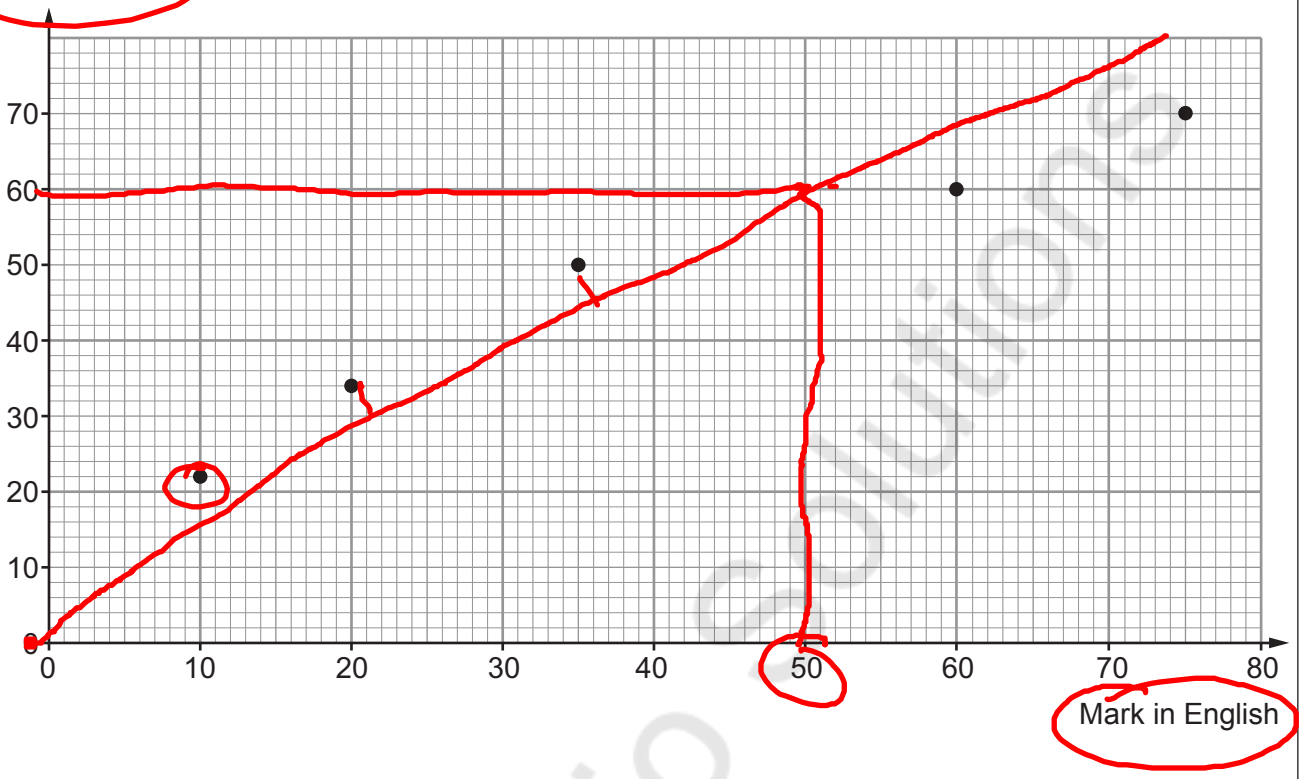
She displays the test marks for 5 girls and 5 boys in scatter diagrams.

Girls' test results



Examiner only

Boys' test results



(i) Does the data support Rowena's hypothesis?
You must give a reason for your answer. [1]

Girls score: 10, 20, 33, 50, 70 =
Boys score: 60, 20, 35 60, 75 =
Yes, the data support Rowena hypothesis because Boys have higher scores than girls in total.

(ii) How could Rowena improve the testing of her hypothesis? [1]

To improve the testing, She has to repeat the experiment several times and also increase the sample space.

(c) Draw, by eye, a line of best fit to estimate how many marks you might expect a **boy** to score in a Welsh test if he scored 50 marks in his English test. [2]

50 marks

Examiner only

6. Marcin has a market stall to sell his printed T-shirts.

It costs him:
- £250 to buy 100 **plain** T-shirts,
- 50p to print a design on each T-shirt.

Marcin sells his printed T-shirts for £4.00 each.

At the start of the week:
- His bank account balance is £820.
- Marcin has 100 printed T-shirts ready to sell.
- He has already paid for these printed T-shirts.

During the week:
- Marcin sells his stock of 100 T-shirts.
- He pays all the money he takes from selling T-shirts into his bank account.
- He buys and prints another 400 T-shirts.
- Marcin **does not** sell any of these 400 T-shirts.

How much will Marcin have in his bank account at the end of this week?
You must show all your working. [4]

Starting Balance : £820
1 T-shirt → £4
100 T-shirt → 4x100 = £400
Total Balance : £1220
Cost:
100 plain t shirts → £250
400 plain t shirts → £1000
1 print on t shirts → £0.50
400 print on T-shirts → £200
Total cost of 400 t shirts and prints = £1200

Balance = 1220 − 1200
= £20

Time Difference = 21:30 − 02:30 = 19:00

Examiner only

7. When it is 21:30 on a Tuesday in London, it is 02:30 on a Wednesday in Dhaka, Bangladesh.

It takes 10 hours 30 minutes to fly from Dhaka to London.
A flight leaves Dhaka on Thursday at 13:00 local Dhaka time.

On what day and at what time should this flight arrive in London?
Give your answer in local London time. [4]

13:00 + 19:00 = 32:00

London
Tuesday 21:30
Time Difference: 19hrs
Flight leaves
Friday: 8:00 ✓
So, the flight will 10hrs 30mins
8:00
10:30
18:30

Dhaka
Wednesday 02:30
Flight leaves
Thursday: 13:00 ✓

Arrival in London:

Day Friday Time 18:30

Turn over.

Examiner only

8. The scale diagram opposite shows an Eisteddfod camping field.

The camping field is 100 metres long and 80 metres wide.

A river runs along the side *AB*.
There is a hedge along *AD*.
There is a fence along *BC*.
DC is an opening with access to the Eisteddfod camping field.

The scale used is **1 cm represents 10 metres**.

A barbecue area is to be built on the camping field.

The barbecue area must be

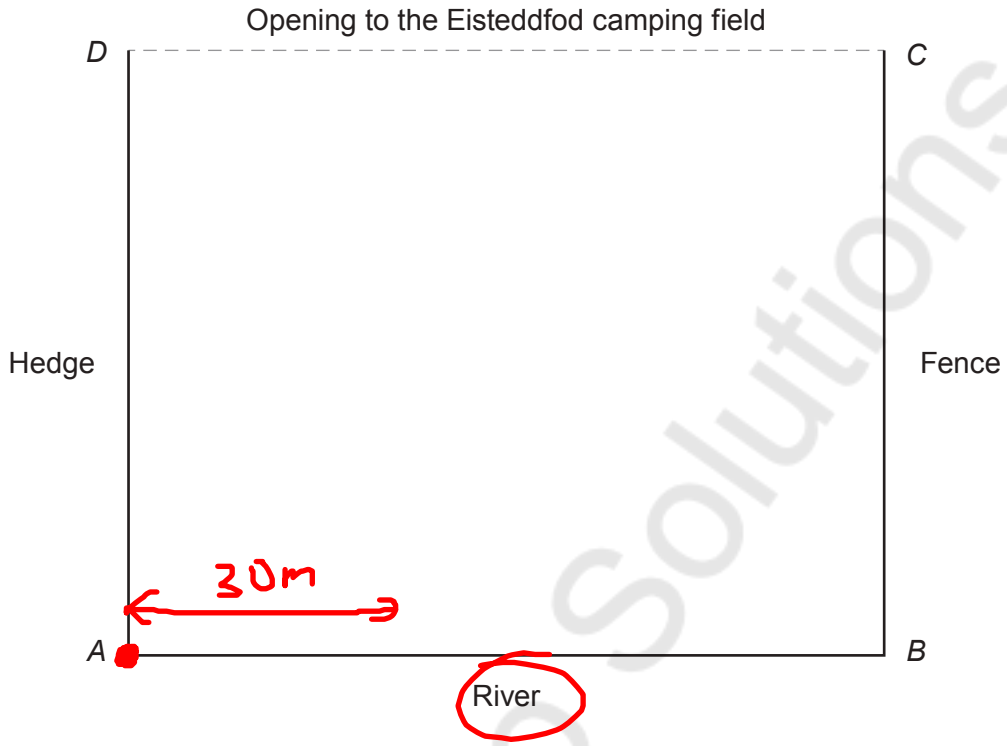
- nearer to the river than to the opening to the Eisteddfod camping field,
- nearer to the river than to the hedge,
- more than 30 metres from the corner of the field where the hedge meets the river.

Draw suitable lines on the diagram and shade the region where the barbecue area could be built. [5]

Ruler Pair of compasses

Examiner only

1 cm represents 10 metres



Turn over.

Examiner only

9. *(a)*

Lotty and Rafael decide to enter a prize draw.
They agree to share any money they win in the ratio 2 : 3 respectively.
After winning a total of £2000, they think again and decide that Lotty's share should be increased by 30%.

(i) Rafael thinks that his share will be reduced by 30%.
Without any calculation, explain why Rafael's thinking is incorrect. [1]

Rafael thinks his share will be reduced by 30% is incorrect because the total amount must stay the same because it depends on the new ratio.

(ii) Calculate the amount of money Lotty wins after the decision is made to increase her share. [4]

Ratio = 2 : 3
L R

Lotty: $\frac{2}{5} \times 2000 = £800$

Rafael: 2000 − 800 = £1200

Lotty share increased by 30%

$\frac{30}{100} \times 800 = £240$ *

Lotty share = 800 + 240 = £1040

£1040

Examiner only

(iii) Find the ratio that is now used to share the money between Lotty and Rafael.
Express your answer in its simplest form. [3]

Lotty : Rafael
Lotty = €1040
Rafael = €960
Lotty : Rafael = 1040 : 960
1040/960 = 26/24 = 13/12
13 : 12

Lotty's winnings : Rafael's winnings = 13 : 12

(b) In another prize draw, it was planned to give £5000 as the first prize.
To make it more popular, the organisers decide to increase this first prize by 26%.

The most efficient method of calculating the amount of the increased first prize is

1·26 × 5000.

The second prize was planned to be £3000, but it is now decided to decrease this prize by 6%.

Write down the most efficient method of calculating the amount of the decreased second prize.
You are not expected to work out the answer. [1]

€5000 26% + (1st Prize)
€3000 6% − 2nd Prize
100%
94% of 3000
0·94 of 3000
100%
− 6%
94%
0·94 × 3000

Examiner only

10.

Stylish computer desk Made of laminate wood. Non-scratch top. **Length is exactly 2000 mm**	

Luc wants this new desk for his bedroom.

The desk is to fit on the straight wall between his wardrobe and his bookcase.

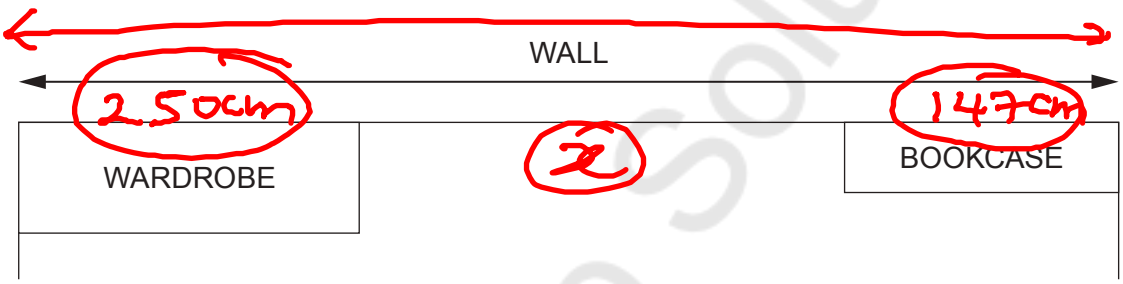


Diagram not drawn to scale

Luc has measured the length of

- the wall, which is 600 cm, correct to the nearest 10 cm,
- the bookcase, which is 147 cm, correct to the nearest 1 cm,
- the wardrobe, which is 250 cm, correct to the nearest 1 cm.

(a) What is the greatest possible length of the wall?
Circle your answer. [1]

600 cm 605 cm 645 cm 610 cm 650 cm

(b) What is the least possible length of the wardrobe?
Circle your answer. [1]

249 cm 249·45 cm 249·49 cm 249·5 cm 250 cm

Examiner only

(c) Can Luc be certain that this desk will fit in the space available?

You must
- show all your calculations,
- give the greatest or least bounds of any measurements used in calculations or comparisons,
- give a reason for your answer. [5]

Lenght of wall → 595 - 604

Minimum lenght of wall → 595 cm

lenght of Bookcase → 146.5 – 147.5

maximum lenght of Bookcase → 147.5

lenght of wardrope → 249.5 – 250.5

Maximum value of wardrope → 250.5cm

WD	x	BS
	wall	

WD + x + BS = W

250.5 + x + 147.5 = 595

398 + x = 595

x = 595 - 398

x = 197cm

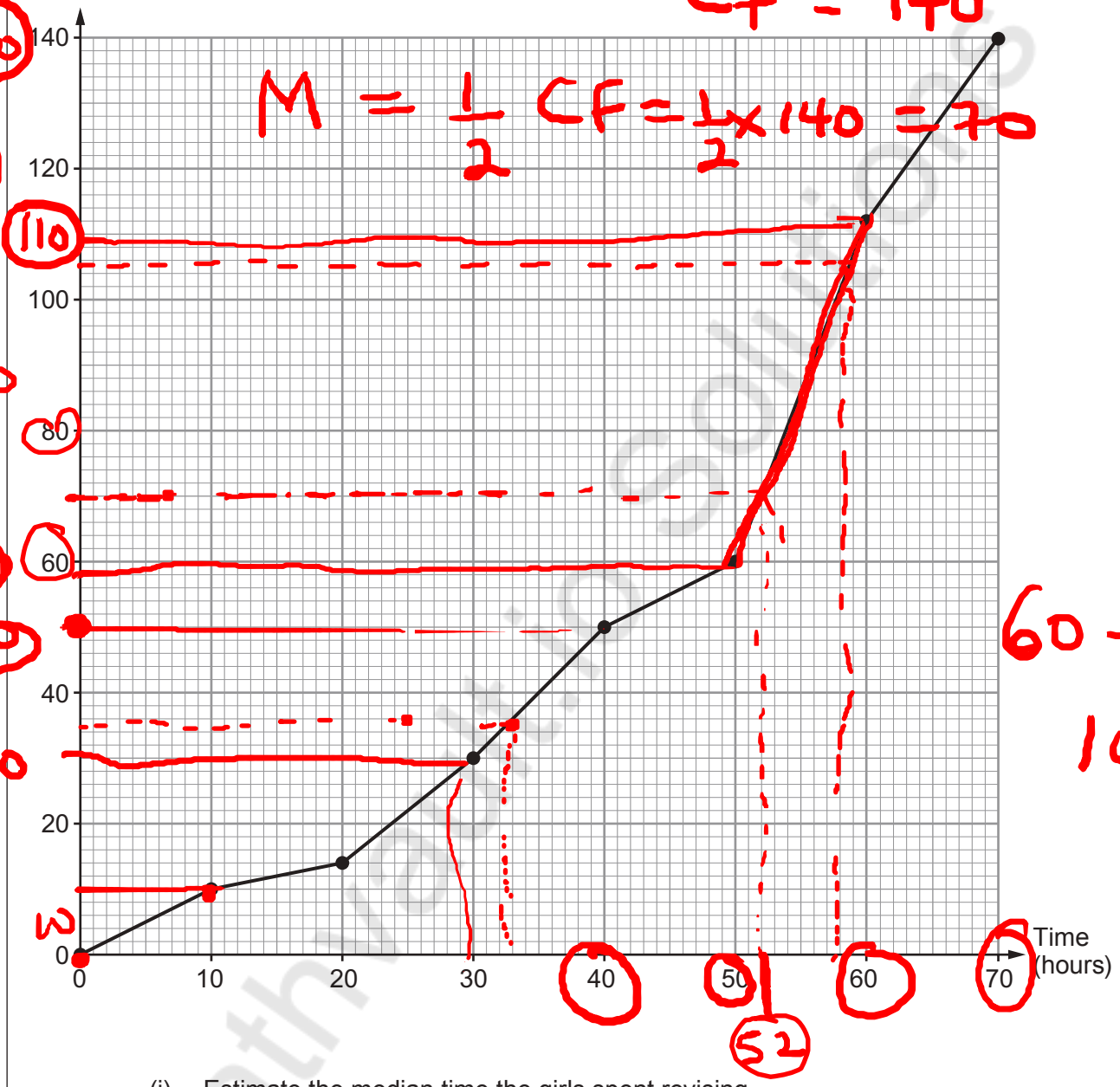
250.5
147.5
398 0

18,
4595
-398
197

Since the desk is 200cm, that means the desk will not fit into the space because 197cm < 200cm

Examiner only

11. *(a)* 140 girls were asked how long they spent revising for their GCSE examinations. The cumulative frequency diagram shows the results.



(i) Estimate the median time the girls spent revising.
Circle your answer. [1]

35 hours | 40 hours | 48 hours | 52 hours | 70 hours

(ii) Calculate the number of girls who spent between 40 and 50 hours revising.
Circle your answer. [1]

0 girls | 5 girls | 10 girls | 15 girls | 20 girls

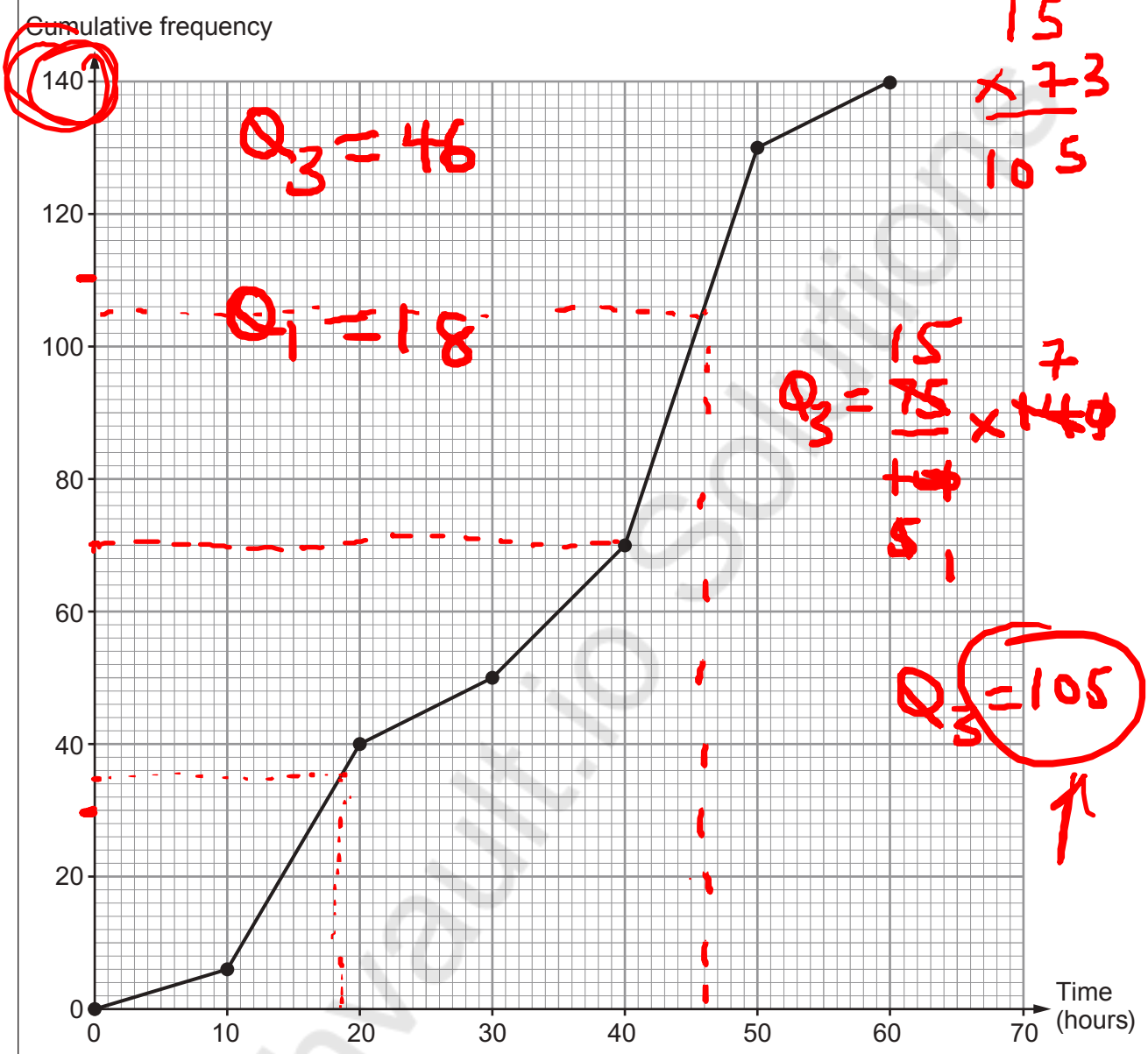
Examiner only

(iii) Circle either TRUE or FALSE for each of the following statements. [2]

25 girls spent between 30 and 50 hours revising.	TRUE	FALSE
No girls spent more than 80 hours revising.	TRUE	FALSE
The modal group is between 50 and 60 hours spent revising.	TRUE	FALSE
20 girls spent more than 60 hours revising.	TRUE	FALSE

Examiner only

(b) 140 boys were asked how long they spent revising for their GCSE examinations. The cumulative frequency diagram below shows the results.



$Q_3 = 46$

$Q_1 = 18$

$Q_3 = \frac{15}{20} \times 140$

$Q_3 = 105$

$Q_1 = \frac{25}{5+1} \times 140$

$Q_1 = 18$

$IQR_{Boy} = Q_3 - Q_1 = 46 - 18$

$= 28$

Examiner only

Trefor makes two statements.

1. The boys' interquartile range is greater than the girls' interquartile range.

2. On average, boys spent more time revising.

Are both Trefor's statements correct?
Show calculations and give reasons to support your answers. [4]

Statement 1: IQR = $Q_3 - Q_1$

$Q_3 = 75\%$

$Q_1 = 25\%$

$IQR_{boy} = 28$ ✓

$IQR_{girls} = 25$

$IQR_{Boy} > IQR_{girls}$

Statement 2:

mean, median, mode.

Median.

Median (Boys) = $\frac{140}{2} = 70$

Medians Boys = 40

Medians Girls = 52

In correct, the median of the boys is less than the girls.

Examiner only

12. Petra is organising a prom for her year group.
The number of people attending the prom is likely to be between 20 and 80.

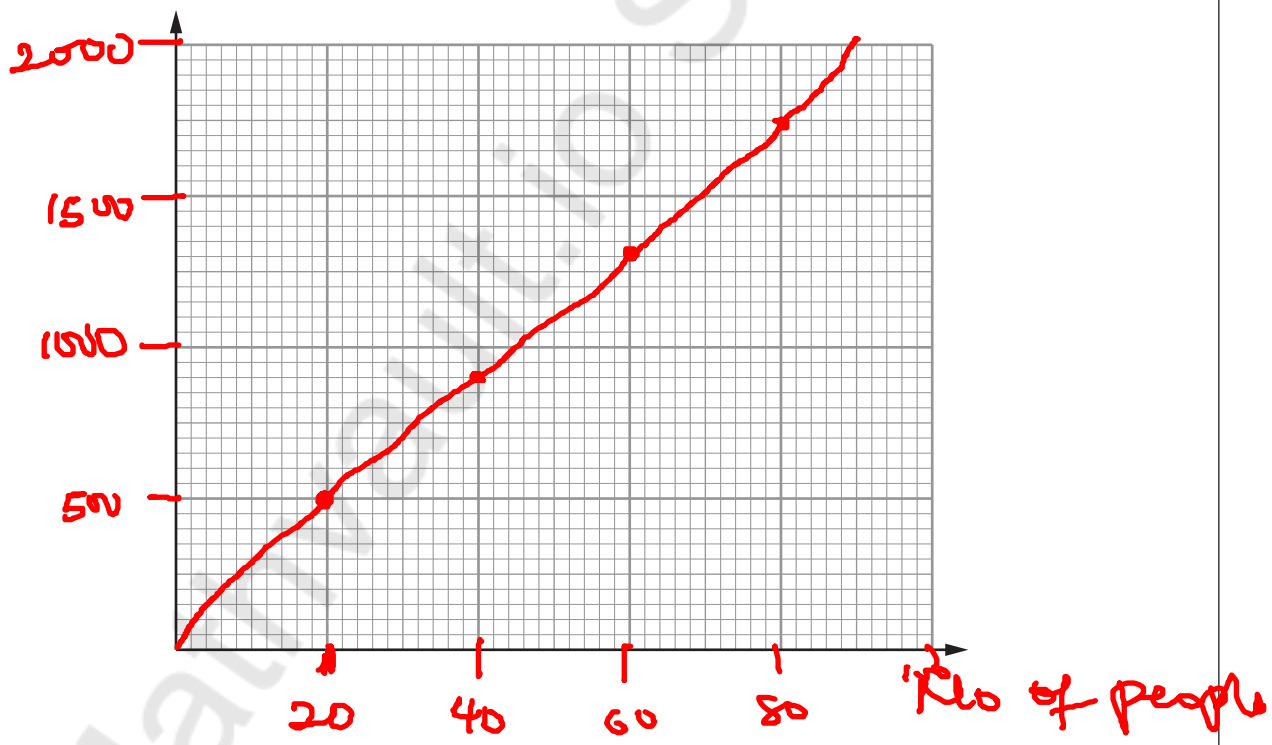
The cost of holding the prom at *Hotel Afonwen* would be as follows.

- Hire of the room: £100
- Food: £15 per person
- Welcome drink on arrival: £3 per person
- Decorations: £2 per person

20

(a) Draw a graph to illustrate the total cost of holding the prom for between 20 and 80 people.
Use the graph paper below. [4]

Number of people	20	40	60	80
Cost	500	900	1300	1700



Examiner only

(b) Petra decides to share all the costs equally between the people attending.

- Let £*P* be the price paid per person.
- Let *N* be the number of people attending the prom.

Write a formula for *P*, in terms of *N*. [3]

$P = \frac{20N+100}{N}$

£P is price person
N number of attendee

Total cost = 20 × N + 100

Total cost = 20N + 100

Each Person Cost = $\frac{20N+100}{N}$

$P = \frac{20N+100}{N}$

(c) Hiring a larger room at *Hotel Afonwen* costs £200.
The cost per person for food, welcome drinks and decorations remains the same.
If the total cost is £2240, how many people attend? [2]

£20 [welcome drink, decoration, food]

Total Cost = 200 + 20N

2240 = 200 + 20N

−200 −200

2040 = 20N

$N = \frac{2040}{20} = 102$

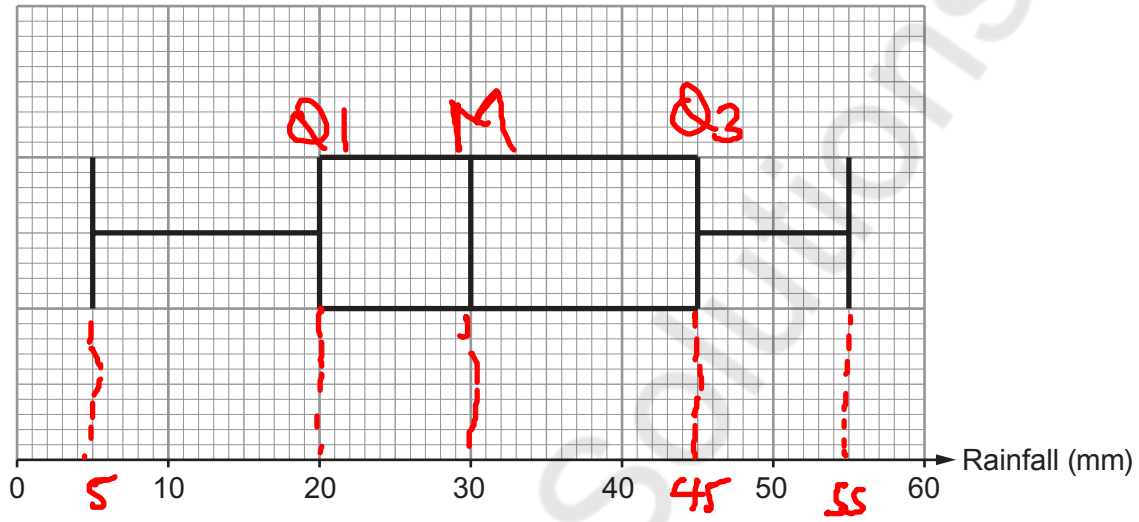
N = 102

Examiner only

13. The following box-and-whisker plots illustrate the daily rainfall for April 2016 in Trefwen and in Nawrby.

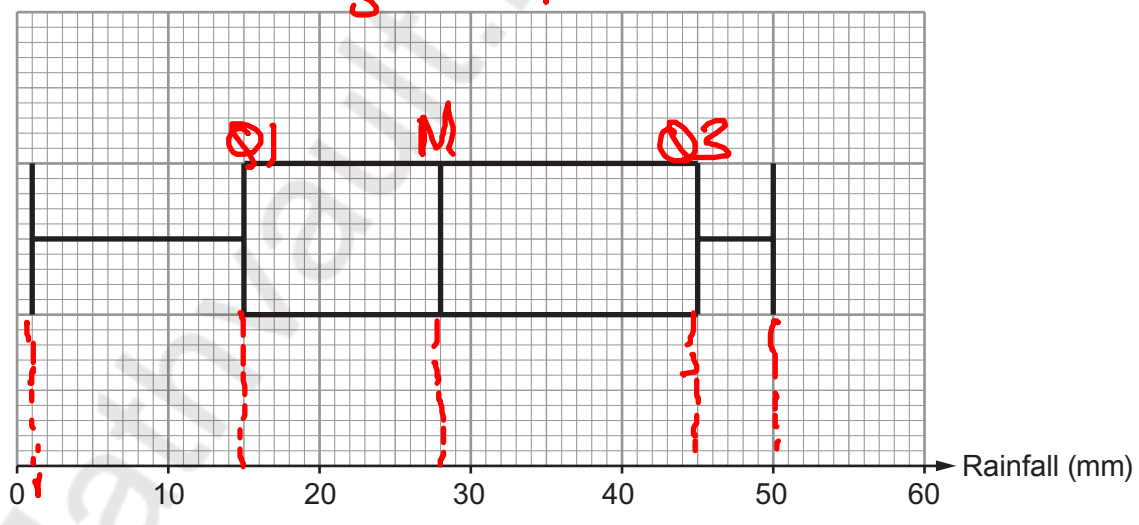
April rainfall in Trefwen

IQR = $Q_3 - Q_1 = 45 - 20 = 25$



April rainfall in Nawrby

IQR = $Q_3 - Q_1 = 45 - 15 = 30$



50

Range = Highest value − lowest value

50 − 1

= 49

IQR = $Q_3 - Q_1$

Examiner only

(a) Complete the following table. [4]

	Range	Median	Interquartile range
Trefwen	50 mm	30 mm	25 mm
Nawrby	49 mm	28 mm	30 mm

Range (Trewen) = Highest value − lowest value

55 − 5 = 50

(b) Iona is going on holiday next April.
She is hoping for good weather, with hardly any rain.
She decides to go to Nawrby.
Give a reason to support Iona's decision.
Include values for both Trefwen and Nawrby. [1]

median Trefwen = 30mm

median Nawrby = 28mm

The decision to go towards Nawrby is right because the median of Nawrby is lower or less than Trefwen showing that there is less rain fall in Nawrby.

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

Examiner only

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