Surname	Centre Number	Candidate Number
Other Names		0

GCSE

3310U30-1

A17-3310U30-1

MATHEMATICS – NUMERACY
UNIT 1: NON-CALCULATOR
INTERMEDIATE TIER

MONDAY, 6 NOVEMBER 2017 – 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. Question numbers must be given for all work written on the continuation 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.

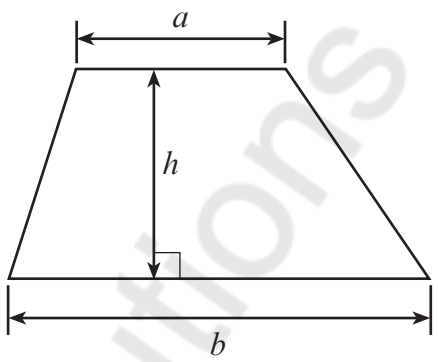
For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**6**	
2.	**8**	
3.	**10**	
4.	**4**	
5.	**4**	
6.	**6**	
7.	**3**	
8.	**7**	
9.	**6**	
10.	**9**	
11.	**10**	
12.	**5**	
13.	**2**	
Total	**80**	

3310U301
01

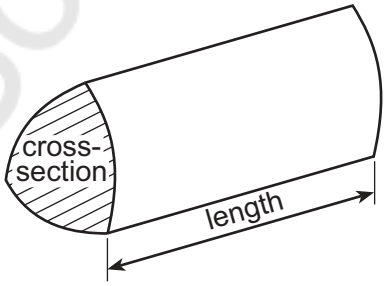
NOV173310U30101

Formula List – Intermediate Tier

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



Volume of prism = area of cross-section × length



Examiner only

1. Pont y Ddraig (Dragon's Bridge) opened in Rhyl harbour in autumn 2013.

The harbour development cost £9·8 million.
£4·3 million of this money was spent on Pont y Ddraig.

(a) How much was spent on the rest of the harbour development in Rhyl?
Circle your answer. [1]

£55 000 £550 000 £5 500 000 £55 000 000 £550 000 000

€ 9 800 000
− € 4 300 000
5 500 000

1·6
× 15
80
16
24 0

(b) A newspaper at the time said,
'Pont y Ddraig provides the final link in 15 miles of traffic-free cycling across Conwy and Denbighshire.'

Write 15 miles in kilometres. [2]

1mile = 1·6km
1mile = 1·609km

15miles → km
15miles = 1·6 × 15 = 24km

(c) The height of the mast on the bridge is 148 feet.
Using the conversion 1 foot = 30 cm, calculate the height of the mast in **metres**. [3]

height = 148 feet.
1 foot = 30 cm
148 feet = 148 × 30 cm
148 feet = 4440 cm
1m = 100cm
148 feet = 4440 cm × 1m / 100cm
= 44·4m

148
30
000
444
4440

h = 44·4m

Examiner only

2. Four different supermarkets have special offers on the price of lemons.

Supermarket	Special offer
Cost 4go	Lemons: usually 40p each Now on offer! Buy 3 for the price of 2
Edges Mart	A net of 4 lemons for 75p
Food Uno	A bag of 5 lemons for 76p
Greenway	Lemons: only 26p each

Aled needs 6 lemons to make lemon cakes for a birthday party.

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

Aled only has time to go to one supermarket.

Calculate how much Aled would pay in each of the supermarkets.
In which supermarket will he be able to get the lemons he needs for the least amount of money?
You must show all your working. [5 + 2 OCW]

Case A: Cost 4go

Aled needs 6 lemons

So, he will 3 lemons + 3 lemons

↓ Pay for 2 lemons ↓ Pay for 2 lemons

1 lemon = 40p

So, Aled will pay = 2×40 + 2×40

= 80 + 80 = 160p

Case B: A net of 4 lemons is 75p

In this case, Aled will buy 2 net of lemons which has 8 lemons. [2 extra]

Aled will pay = 2×75 = 150p

Case C: A bag of 5 lemons is 76p
In this case, Aled will buy 2 bags of lemon
[4 extra lemons]

5

Examiner only

Aled will pay = 2x76 = 152p

26 x6 156

Case B: lemon is 26p each
Since Aled needs 6 lemons
Then Aled will pay = 6x26 = 156p

Case B is the best offer because it is cheapest.

Edges Mart is the best offer because it is the cheapest among the supermarket.

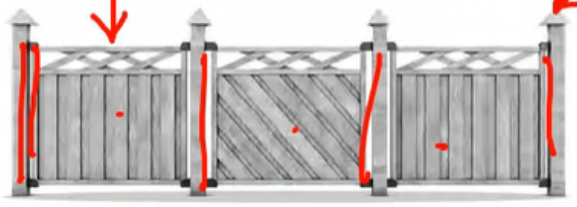
(b) Aled can use any left over lemons to make muffins.

Which supermarket gives the best value for money?
Give a reason for your answer. [1]

Case C: gave the best offer for money. Food Uno will give 10 lemons for 152p while Edges mart will give 8 lemons for 150p
This means Food Uno is give extra 2 lemon for 2p. This shows thats food Uno is the best value for money.

Examiner only

3. Mehmet needs a new fence for one end of his garden.
Fences are constructed using panels and posts.



Panel Panel

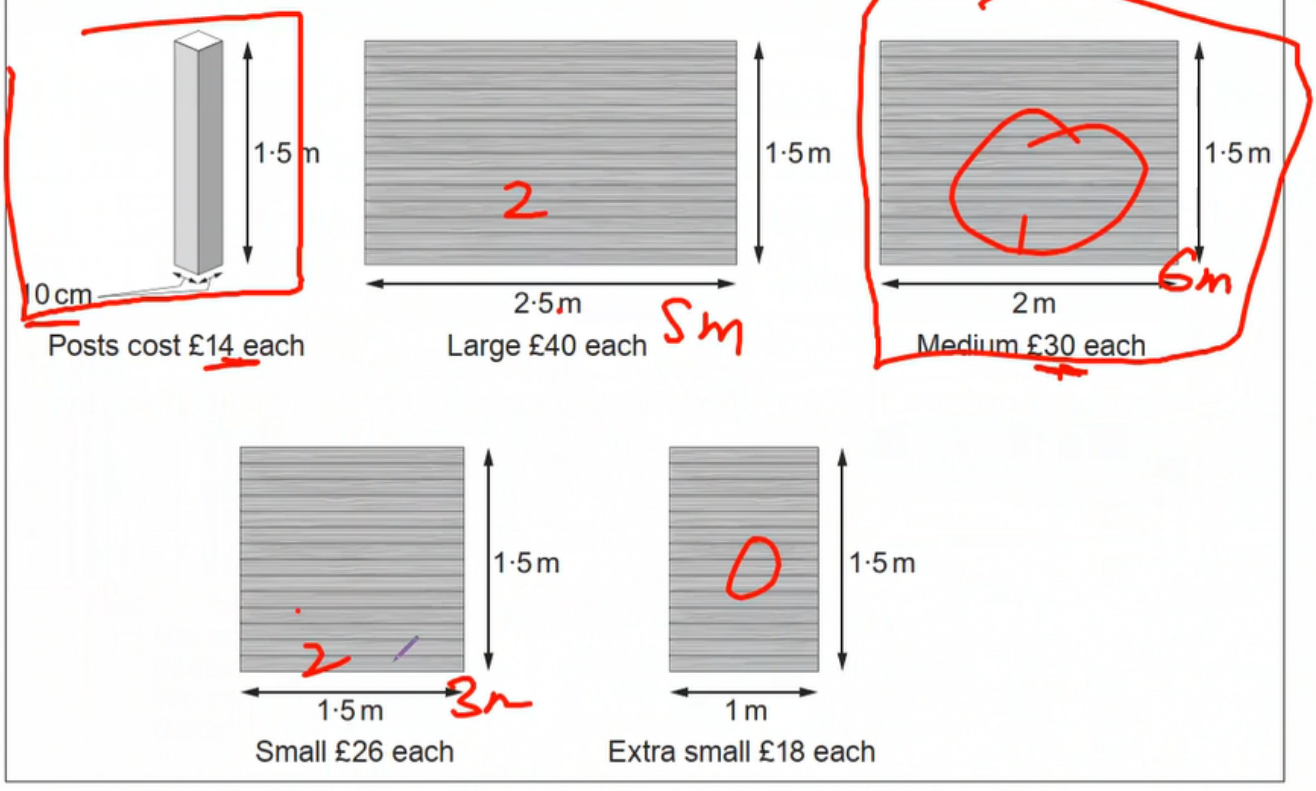
1 panel → 2 posts
2 panels → 3 posts
3 panels → 4 posts
⋮
34 panels → 35 posts

(a) Posts are needed between each fence panel and at both ends.
How many posts are needed for a fence made with 34 panels?
Circle your answer. [1]

33 **35** 37 34 36

Number of Posts = Number of panels + 1
x = y + 1

(b) Mehmet wants a new 1·5 m high fence for his garden.
The fence panels come in different lengths.
The posts Mehmet wants to use are all the same size.
Mehmet has the following information.



length of Post = 10 cm / 100 = 0·1 m

Examiner only

The fence Mehmet wants to make is 8·5 m long, including the posts.
He has started to sketch a plan, as shown below.

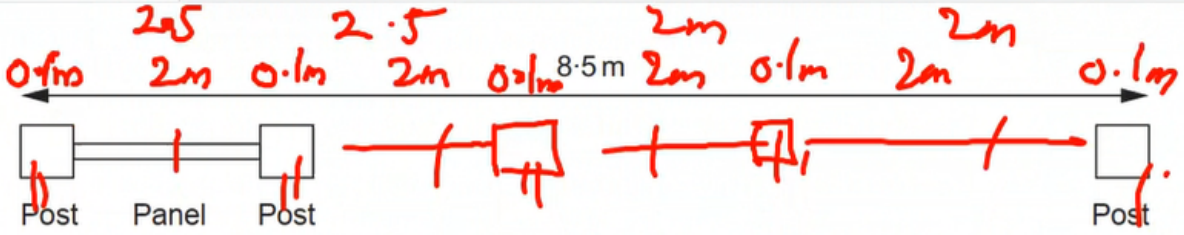


Diagram not drawn to scale

Let length of Panel be a

Mehmet needs to use 5 posts.
Work out **one** possible choice of panels that Mehmet could use.
You may use the plan to help you.
Calculate the total cost of the posts and panels for this choice of fence. [6]

Number of posts = 5 $x = 5$

$x = y + 1$; $y = x - 1 = 5 - 1 = 4$

Number of panels = 4

Length of wall = 5 × length of Posts + 4 × length of Panel

$8.5 = 5 \times 0.1 + 4 \times a$

$8.5 = 0.5 + 4a$

$-0.5 \quad -0.5$

$\frac{8}{4} = \frac{4a}{4}$

$2 = a$

$8 = 4a$

Length of Panel to use is 2m

Choice = $5 \times 14 + 4 \times 30 = 70 + 120 = £190$

Total cost of making the 8·5 m fence is £ 190

(c) It costs 2p to paint each 100 cm² of a fence post.
How much will it cost to paint the 4 vertical sides of 1 fence post? [3]

Cost of painting = 2p per 100 cm² [Fence post]

1p per 50 cm²

So, Calculate Area of 4 sides of the fence post

So, One side is rectangle = $L \times b = 0.1 \times 1.5$

Area (One side) = $0.15 m^2$

Area (four sides) = $4 \times 0.15 = 0.60 m^2$

$0.6 m^2 \Rightarrow 6000 cm^2$

0.60
1.5m
150
0.1m
10cm
1500 cm²

Turn over.

1p = 50cm² 1cm² = 1p/50 £1·20

6000cm² = 1p/50 × 6000/8 = 120p

Examiner only

4. A number of paths are to be laid to join three new office buildings.
A sketch of the architect's plan is shown below.

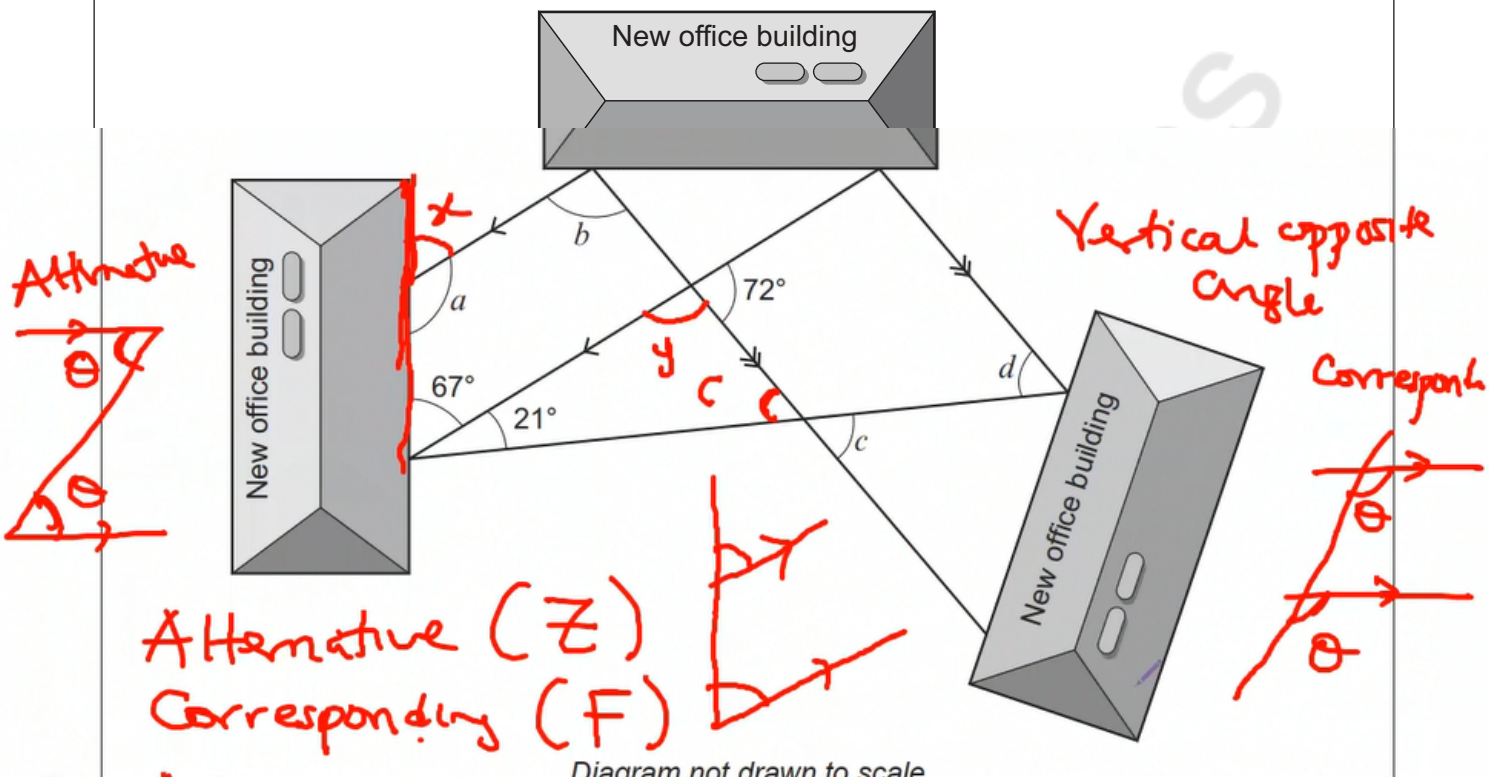


Diagram not drawn to scale

The architect has shown a number of the angles in his planning for the new paths.

Calculate the size of each of the angles a, b, c and d. [4]

[4]

$x = 67°$ [corresponding angle]

$x + a = 180°$ [sum of angle on a straight line]

$67 + a = 180$ $a = 180 - 67$

$a = 113°$

$y + 72 = 180$ [sum of angle on a straight line]

$y = 180 - 72 = 108°$

$b = y$ [corresponding angle] $b = 108°$

$a =$ 113 ° $b =$ 10 ° $c =$ 51° $d =$ 51°

$y + c + 21 = 180$ [sum of angle in a triangle]

$c = 180 - 21 - y = 180 - 21 - 108$

$c = 51°$

$d = c$ [Alternative angle]

$d = 51°$

BLANK PAGE

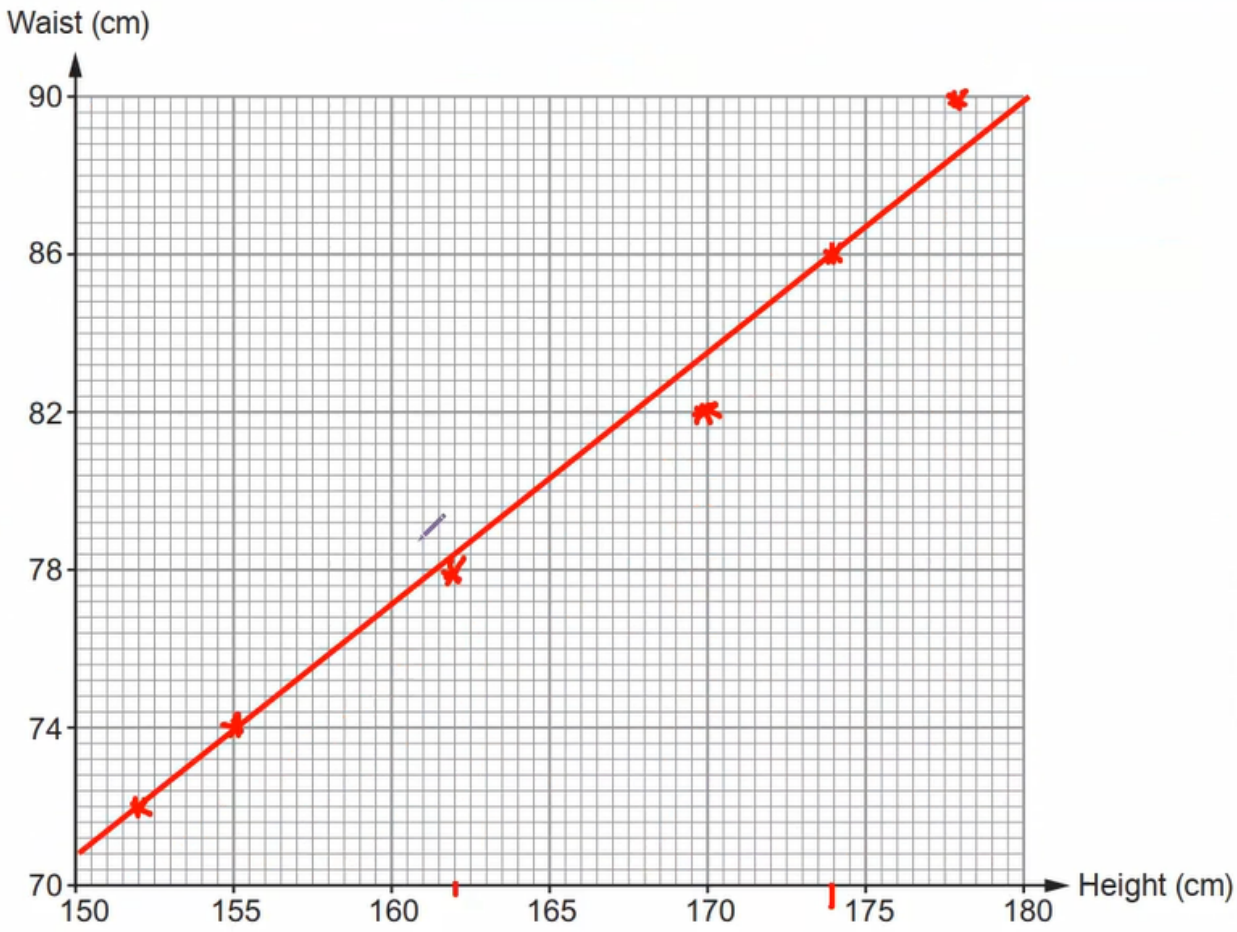
PLEASE DO NOT WRITE ON THIS PAGE

Examiner only

5. Ffion thinks that the taller you are, the greater your waist measurement will be.
She recorded the height and waist measurements, in centimetres, for 6 people.

Height (cm)	170	152	174	155	178	162
Waist (cm)	82	72	86	74	90	78

(a) Draw a scatter diagram to display these measurements.
Use the graph paper below. [2]



Examiner only

(b) Look at the results that Ffion has recorded for these 6 people.
Do they appear to support her thinking?
Give a reason for your answer. [1]

Yes ☑ No ☐ Can't tell ☐

Yes, it support her thinking because the graph has a positive slope and it's a straight line graph with positive correlation.
Height & Waist measurement

(c) Give **one** reason why using this scatter graph to estimate the waist measurement of other people is unlikely to give reliable results. [1]

The sample space is small, so there is not enough data.

Examiner only

6. *Truetool* is a tool hire company.

Hire charges	
The cost of hiring a cement mixer in £:	13 × number of days + 26
The cost of hiring a jet washer in £:	9 × number of days + 38

(a) Sara hires a cement mixer for 5 days and a jet washer for 7 days from *Truetool*.
How much **change** would she get from £200? [3]

cement mixer = 13 × number of days + 26
= 13 × 5 + 26
= 65 + 26 = €91.
Jet washer = 9 × number of days + 38
= 9 × 7 + 38 = €101.
Total cost = €91 + €101 = €192
Change = €200 − €192 = €8

(b) Geraint hired a cement mixer for a number of days.
Lois hired a jet washer for the same number of days.
They each paid the same amount of money.

For how many days did they each hire these tools from *Truetool*?
You must show all your working. [3]

Let number of days be x

Cost of washer = Cost of mixer
9x + 38 = 13x + 26
−9x −26 −9x −26
12 = 4x

4x = 12
x = 12/4
x = 3 days

Number of days 3 days

washer = 9 × 3 + 38 = 27 + 38 = €65
mixer = 13 × 3 + 26 = 39 + 26 = €65

Examiner only

The diagram below shows a sketch of the existing gas pipes that run to and from Tŷ Gwyn.
It also shows a proposed 180 m gas pipe which is to be laid to provide gas to Cae Nia.
The proposed pipe bisects the angle formed by the existing pipes at Tŷ Gwyn.

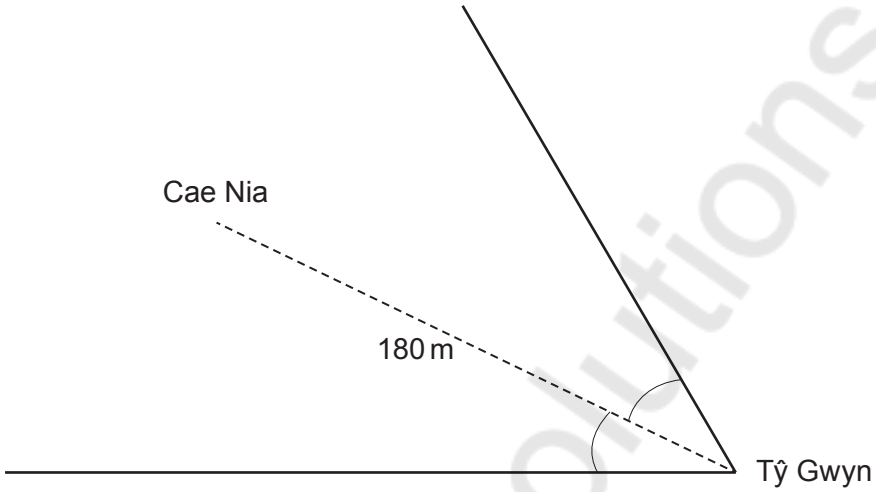
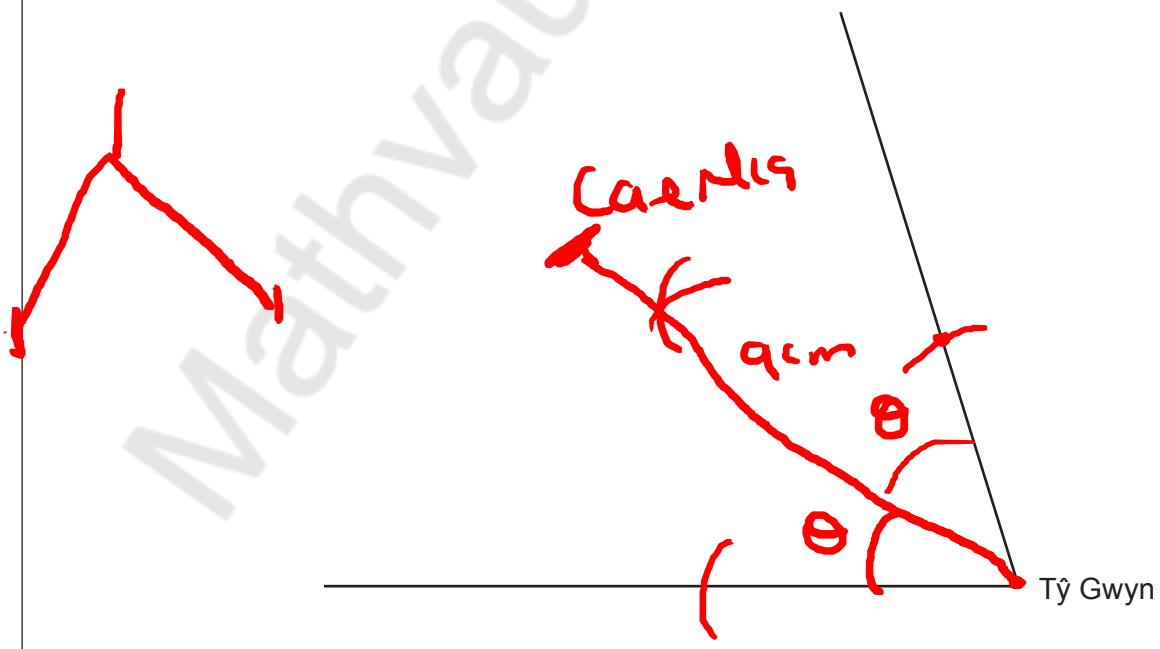


Diagram not drawn to scale

Complete the scale drawing below to show the proposed pipe.

- You must use a pair of compasses to construct the angle bisector.
- Use a scale of 1 cm to represent 20 metres. [3]

1cm → 20m × 9
9cm → 180m



3310U301
13

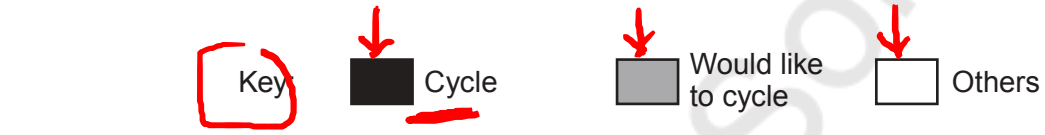
Examiner only

8. *(a)* Ysgol Fron Isa and Ysgol Caewen are two very different high schools.
One school is large, and in a rural area. The other is a small school in a town.
The town in which the small school is situated has many traffic-free cycle routes.

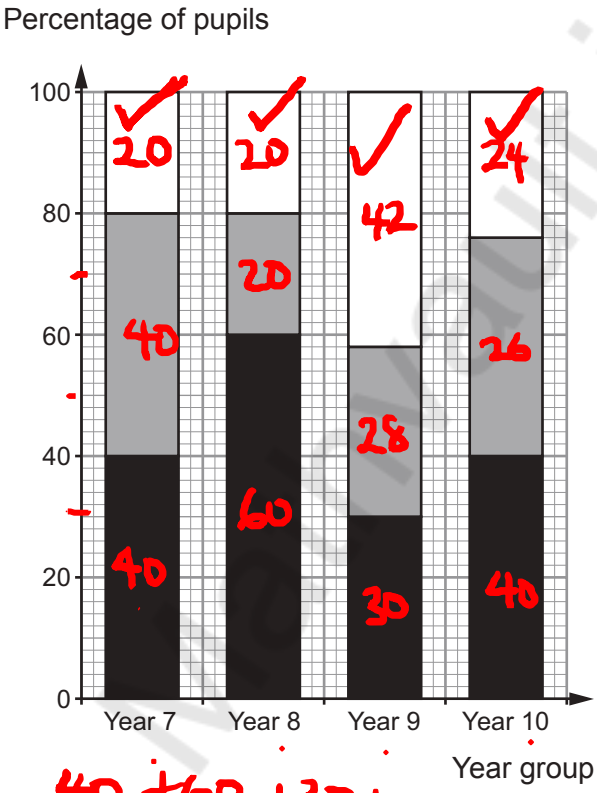
All of the pupils in Years 7 to 10 were surveyed in both of these schools.
They were asked the following questions.

Do you cycle to school?	Yes ☐	No ☐
If you answered 'no', would you like to cycle to school?	Yes ☐	No ☐

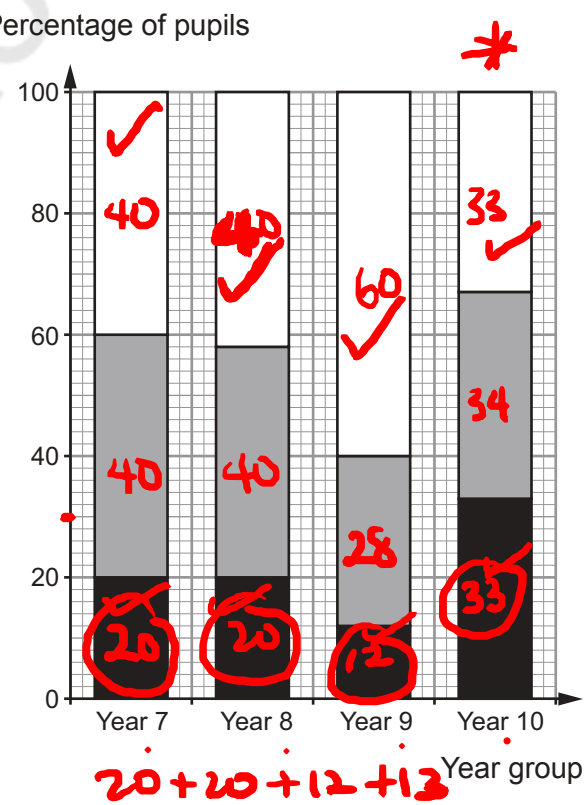
The results were displayed in graphs, as shown below.



Ysgol Fron Isa



Ysgol Caewen



Examiner only

(i) Which school and year group has an approximately equal split between the 3 categories:
- pupils who cycle to school,
- pupils who would like to cycle to school, and
- other pupils? [1]

School: Ysgol Caewen Year Group: 10

(ii) Circle either TRUE or FALSE for each of the following statements. [3]

There are definitely more pupils in Ysgol Fron Isa who cycle to school than in Ysgol Caewen.	TRUE	FALSE
Both schools have pupils in each year group with no interest in cycling to school.	TRUE	FALSE
The questions asked were biased.	TRUE	FALSE
Approximately 20% of the pupils surveyed in Ysgol Caewen cycle to school.	TRUE	FALSE
It is more likely that it is Ysgol Fron Isa that is the small school situated in a town.	TRUE	FALSE

(b) In January 2011, there were 1200 miles of National Cycle Network (NCN) routes in Wales. In January 2016, there were 1400 miles of NCN routes in Wales.

(i) If the number of miles of NCN routes in Wales were to continue to increase by the same number of miles per year, how many miles of cycle routes would there be in January 2018? [2]

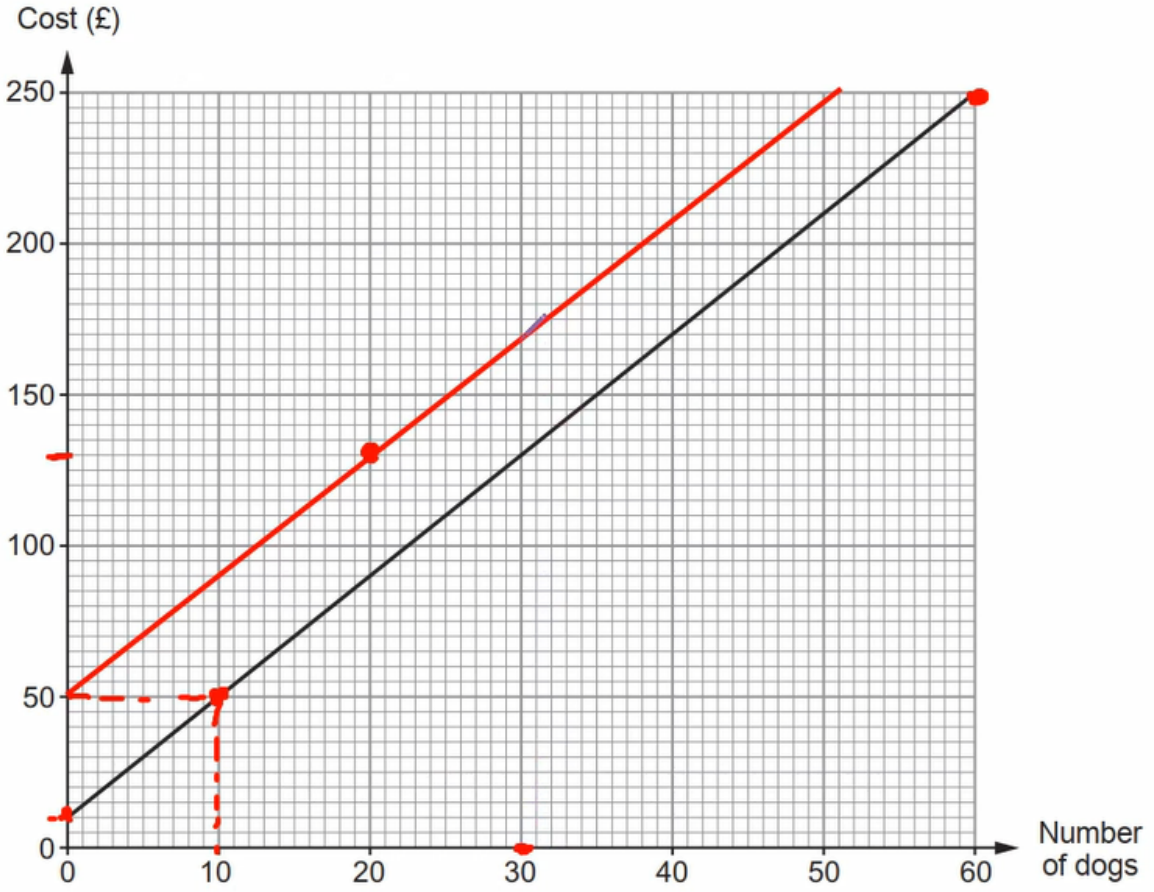
In 2011 → 1200miles
In 2016 → 1400 miles
Increase in 5 years is 1400 − 1200 = 200
Increase per year = 200/5 = 40
In 2016 → 1400
2017 → 1440
2018 → 1480
1480 miles *

(ii) Why is your answer in (i) unlikely to be an accurate estimate of the number of miles of NCN routes in Wales in January 2018? [1]

If cycling becomes popular, then the rate will increase.

Examiner only

9. William owns and runs dog kennels.
His costs depend on the number of dogs in the kennels.
The running costs for one day are shown on the graph below.



Point 1
x_1 y_1
(10, 50)

Point 2
x_2 y_2
(0, 10)

(a) Why does the graph not pass through (0, 0)? [1]

The reason why the graph did not pass through (0,0) is because there is a fixed cost that must be paid.

Examiner only

(b) What is the increase in the daily running costs for each additional dog that is kept in the kennels? [2]

[2]

Increase = Gradient = $\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

Gradient = $\frac{60 - 50}{0 - 10} = \frac{£40}{£10} = 4$

Gradient = €4 / day

(c) (i) Freda also runs a dog kennels.
The cost of keeping 20 dogs in her kennels for one day is £130.
She knows that as the number of dogs increases, the overall cost increases at the same rate as in William's kennels.

Display this information on the graph paper opposite. [2]

Cost of keep 20 dogs = €130

(x, y) = (20, 130)

Gradient of William = Gradient of Fred

(ii) Find the cost of keeping 30 dogs for one day in Freda's kennels. [1]

£ 168

Freds Line and find Cost for 30dogs

Examiner only

10.

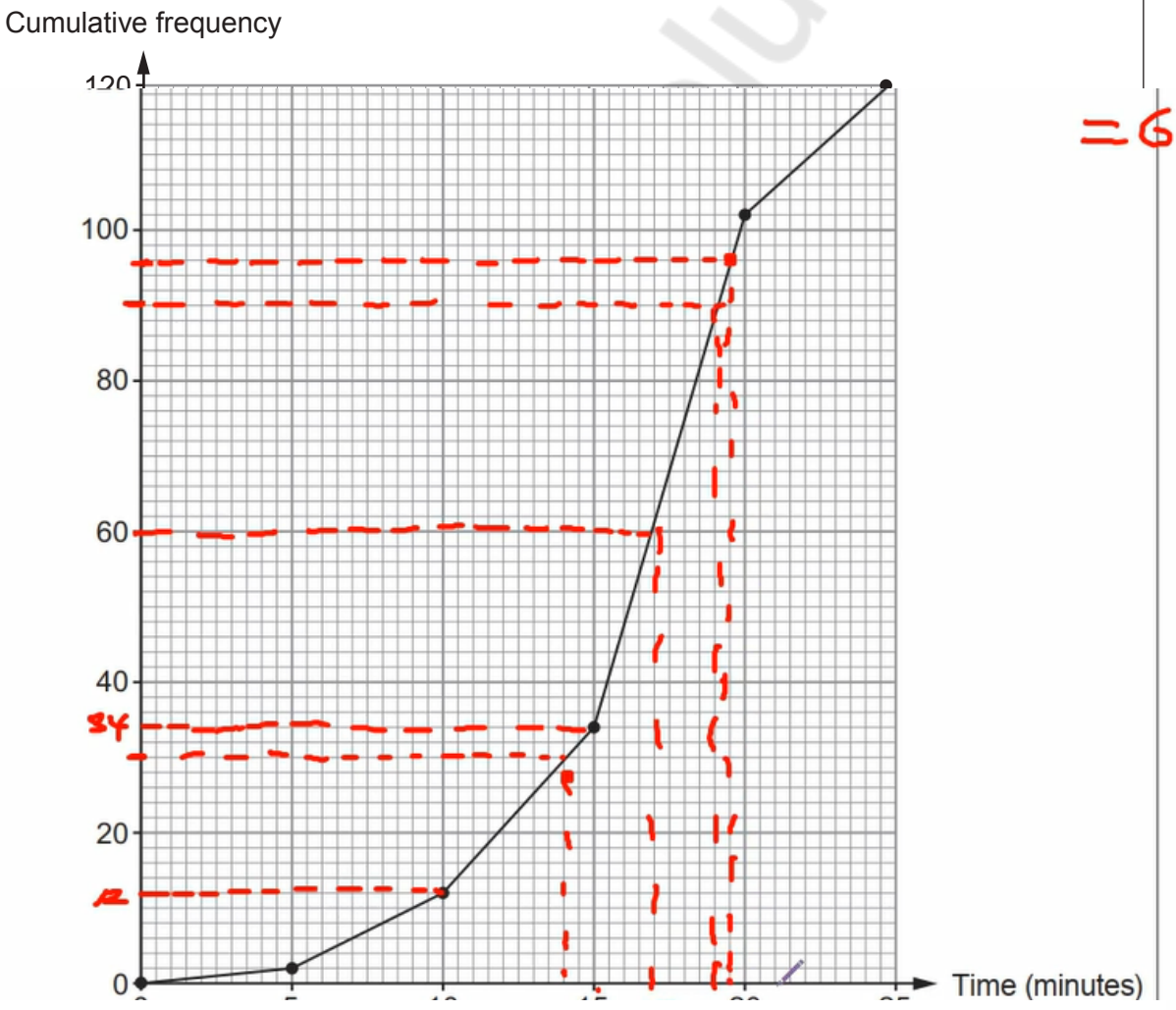
Meirion's Window Cleaning Business

No job too small!

Email: meirion@mwcb.cymru

Meirion is a window cleaner.
From Monday to Friday, he records how long he spends cleaning windows for each of his customers.

He draws a cumulative frequency diagram to display the findings.



$= 60^{th}$

$Q_1 : \frac{25}{100} \times 120 = 30^{th}$

$Q_1 = 14$

$Q_3 : \frac{75}{100} \times 120 = 90^{th}$

NOTE: Q_3 occurs at 75% of CF

Q_1 occurs at 25% of CF

Examiner only

(a) (i) Use Meirion's cumulative frequency diagram to find the median and interquartile range of the times he spends cleaning windows for each of his customers. [3]

Median 17minutes minutes

$IQR = Q_3 - Q_1 = 19 - 14 = 5$

5

Interquartile range ..... minutes

(ii) Meirion looks back at his raw data.
He finds that the median is actually 17 minutes 30 seconds.
Why is there a difference between the median from his cumulative frequency diagram and the actual median from his raw data? [1]

Median = 17mins 30sec

Instead Median = 17 mins.

This is different because the data has been grouped, some information or time has been lost due to this.

34
12
22

(b) Meirion is looking at the time it took to clean individual customers' windows.
Find the number of customers whose windows took between 10 and 15 minutes to clean. [2]

Number of customer that took 0 to 10mins = 12 customer

Number of customer that took 0 to 15mins = 34 customers

So customer between 10 to 15mins = 34 − 12 = 22 customers

(c) Meirion thinks that for approximately 80% of his customers, he cleaned their windows in less than 20 minutes.
Is Meirion correct?
You must show all your working. [3]

12
8
1
96

Thinking: He took 20 minutes to clean 80% of his customer windows CF

Find 80% of his customer (120)

$\frac{80}{100} \times 120 = 96^{th}$ position

Time at 96th position = 19min 30sec

Meirion is correct because he took less than 20 minutes to clean 80% of his customer windows

Examiner only

11. Megan Pugh's electricity bill is shown below.
It covers the period May, June and July 2017.

Megan Pugh
203 Stryd Bryntor
Maesgwyn

13900 − 13450

Period	Previous meter reading	Present meter reading	Number of units of electricity used
May, June and July 2017	13450	13900	450

Charge for electricity: 450 units at **20p per unit**	£90.00
Standing charge: 3 months at **£7.60 per month**	£22.80
Total charges:	£112.80

VAT at 5%: 5% of £112.80	£5.64

Amount to pay: £112.80 + £5.64 = **£118.44**

(a) On 1 August 2017, the charge per unit for electricity was increased by 5%.
What is the increased cost per unit of electricity?
Circle your answer. [1]

20.5p 21p 21.5p 22p 22.5p

5% increase of 20p = $\frac{5}{100} \times 20 = \frac{100}{100} = 1$p

20p + 1p = 21p *

(b) Megan wants to calculate her next 3-monthly electricity bill.
She knows the following:

- Her meter reading on 31 October 2017 was 14400.
- The charge per unit for electricity has increased by 5% since her last bill.
- The standing charge has increased by 20p **per month** since her last bill.
- VAT remains at 5%.

On 31 October 2017, Megan had £470 in her bank account.

After paying her next 3-monthly electricity bill, will Megan be able to buy a new washing machine costing £330?
You must show all your working. [9]

Examiner only

New meter reading → 14 400
Previous meter reading → −13 900
500

Unit used for 3 months = 500 units.
New cost of electricity per unit = 21p
Previous standing charge = €7.60
Increase by 20p
New standing charge = €7.60 + 20p
= €7.80p ✓

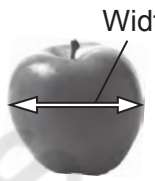
VAT = 5%

Cost of 500 units electricity = 500 × 21 = 10500p
= €105
€1 = 100p
Standing charge for 3 months = 7.80 × 3 = €23.40
Total cost = €105 + 23.40 = €128.40
VAT: 5%
VAT = 5% of 128.40 = $\frac{5}{100}$ × 128.40
VAT = €6.42
Total cost (with VAT) = 128.40 + 6.42
= €134.82 ✓

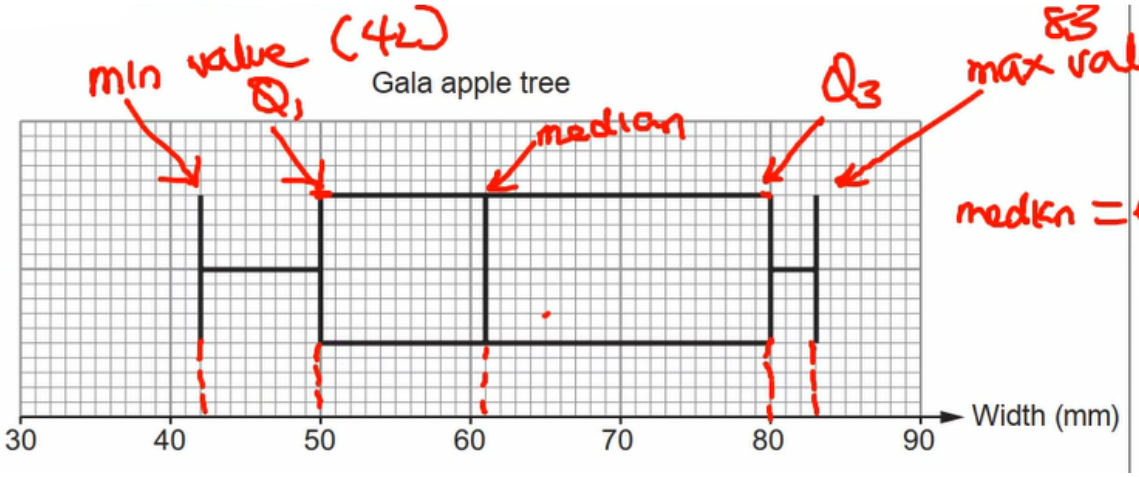
Cost of washing machine = €330
Total expenses = 330 + 134.82
= €464.82
Bank account = €470
Current bank account after expenses
470 − 464.82
left = €5.18 //

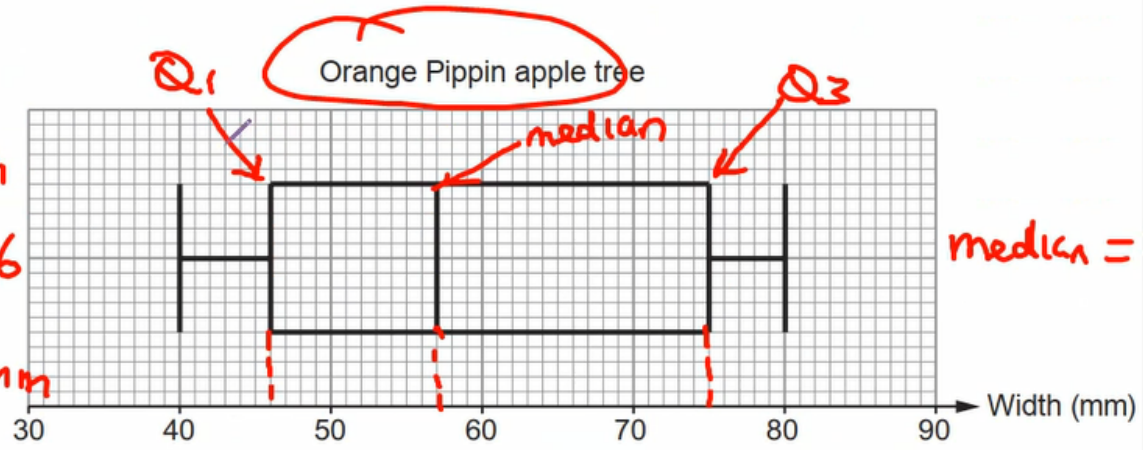
Examiner only

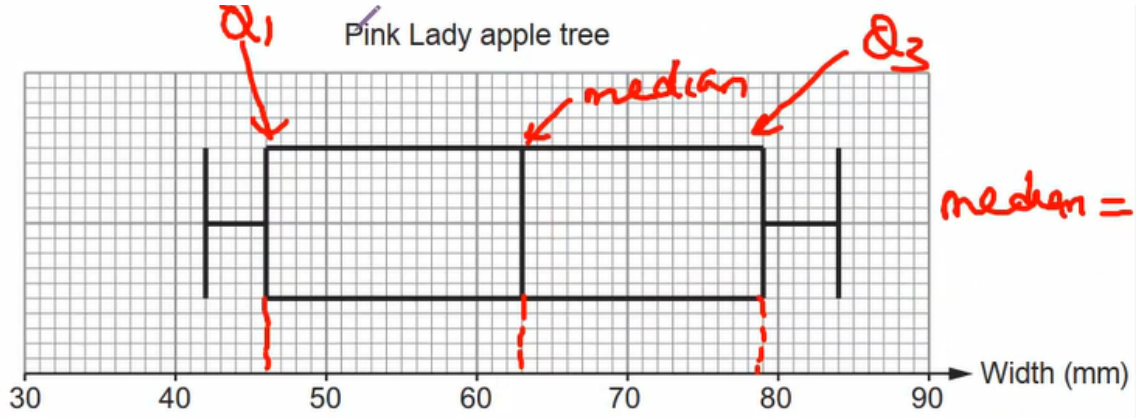
12. Lena has three apple trees in her garden.
She has one Gala apple tree, one Orange Pippin tree and one Pink Lady tree.
She picks 50 apples from each of the 3 trees.
She records the width of each apple, as shown.



Lena constructs box and whisker diagrams for the widths of the apples collected from each of the three trees.







Examiner only

(a) Complete each of the following statements.

(i) 'Apples from the Orange Pippin apple tree have the least median width.

The median width of apples recorded for this tree is 57 mm.' [1]

83
−42
41 mm

(ii) 'The range of the widths of apples recorded for the Gala apple tree

is 41 mm.' [1]

Range = Highest value − Minimum Value = 83 − 42

(iii) 'The .... apple tree has apples with the greatest interquartile range of widths.

The interquartile range of the widths of apples recorded for this tree

is .... mm.' [2]

IQR = $Q_3 - Q_1$

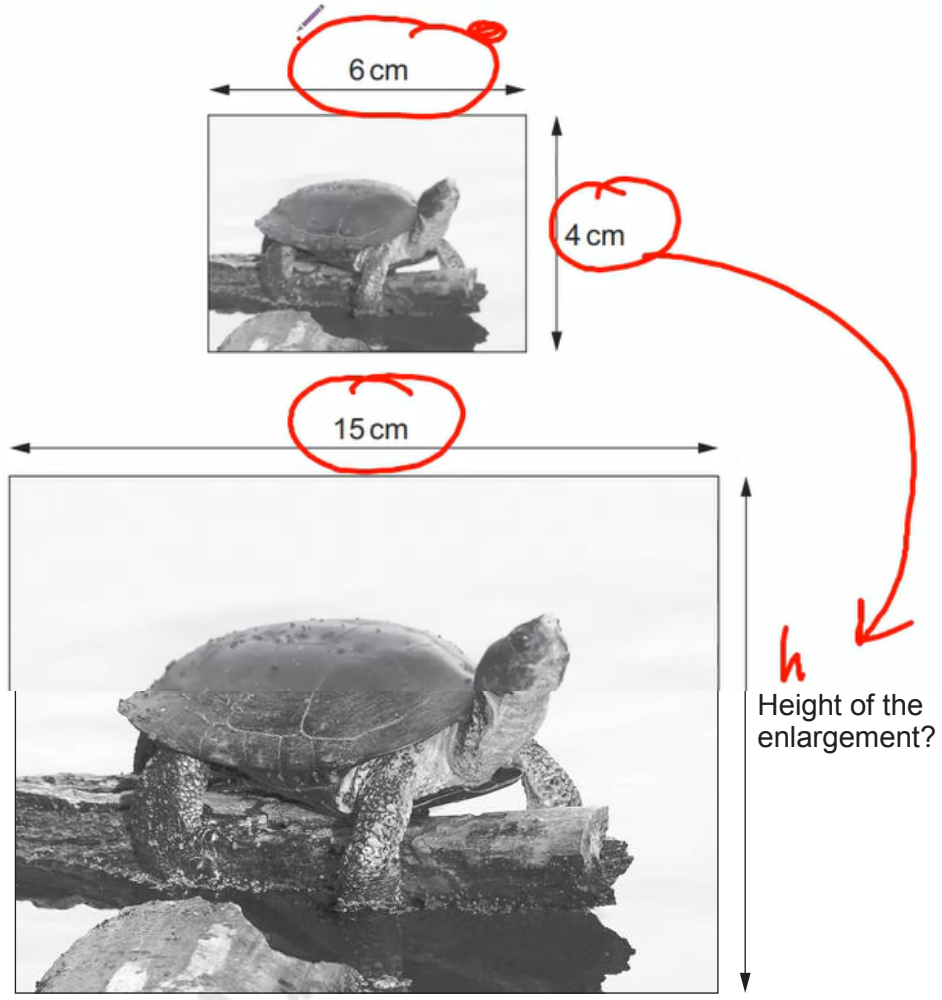
(b) Which tree has a higher proportion of larger apples?
You must give a reason for your answer. [1]

So, we can use the median to discuss about averages. Since the Pink Lady apple tree has the highest median. Then it has apples of larger proportion.

 (3310U30-1) Turn over.

Examiner only

13. Emlyn has a photograph that he wants to enlarge.
A diagram of the original photograph and a diagram of the enlargement are shown below.



Diagrams not drawn to scale

Calculate the height of the enlarged photograph. [2]

Lenght will be proportional

6cm ⟶ 15cm

1cm ⟶ $\frac{15}{6}$ cm

4cm ⟶ $\frac{15}{6} \times 4$ cm $= \frac{60}{6}$ cm

$= 10$cm

END OF PAPER

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

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

Examiner only

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE