Surname	Centre Number	Candidate Number
Other Names		0

GCSE

3310U30-1

S18-3310U30-1

MATHEMATICS – NUMERACY
UNIT 1: NON-CALCULATOR
INTERMEDIATE TIER

TUESDAY, 8 MAY 2018 – 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 the 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***(b)*, 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.	**10**	
3.	**5**	
4.	**6**	
5.	**7**	
6.	**4**	
7.	**5**	
8.	**8**	
9.	**4**	
10.	**6**	
11.	**5**	
12.	**5**	
13.	**6**	
14.	**6**	
Total	**80**	

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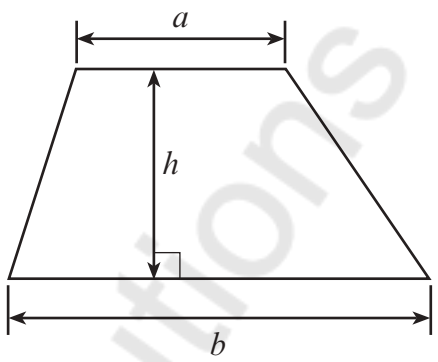
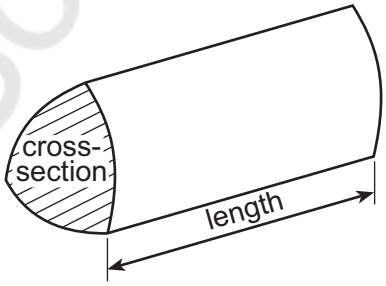
Formula List – Intermediate Tier

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

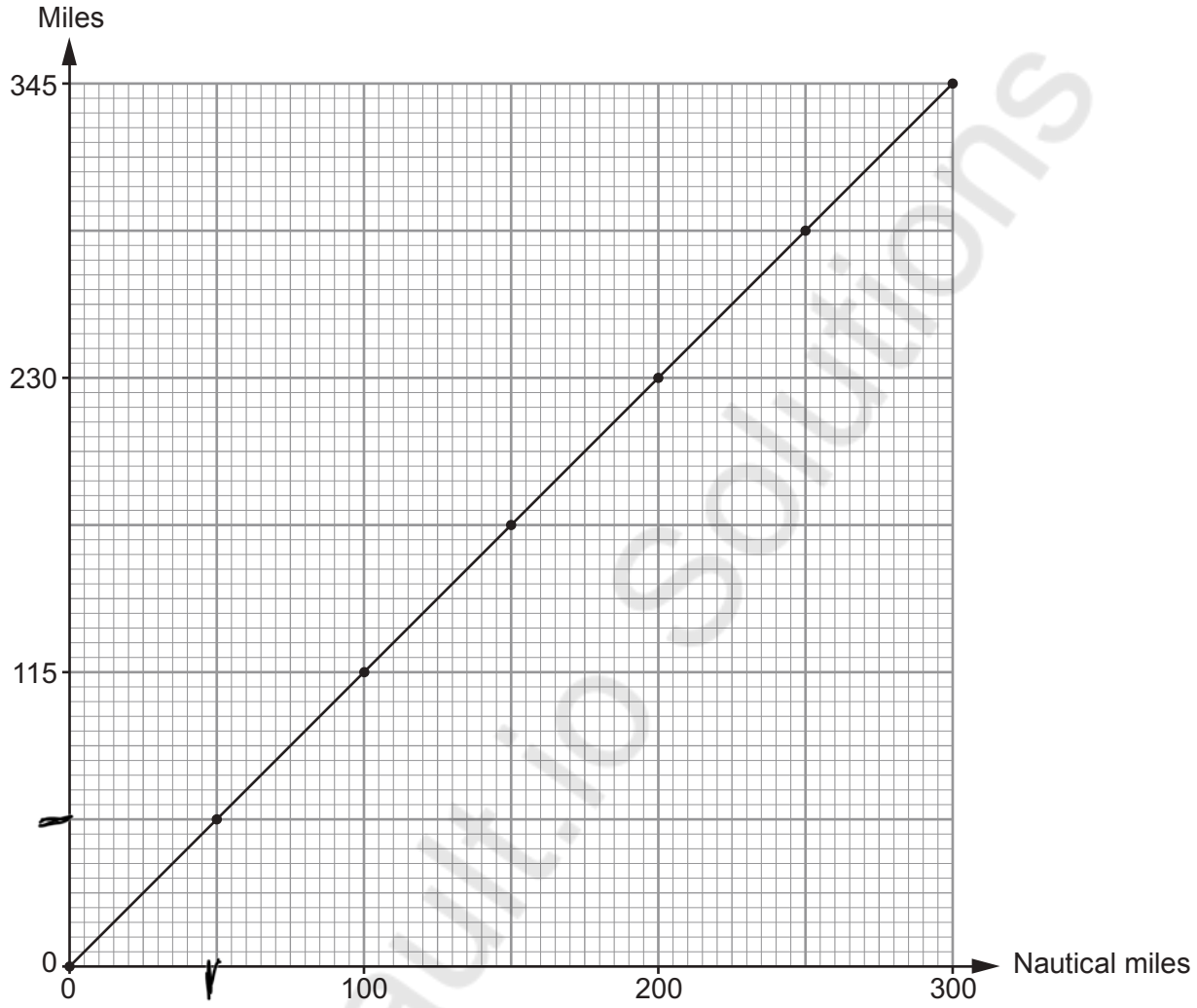


Volume of prism = area of cross-section × length



Examiner only

1. Maxim is doing a project on shipping.
He draws and uses his own conversion graph to convert between nautical miles and miles.



(a) What is 50 nautical miles converted into miles?
Circle your answer. [1]

55 56·5 57·5 58·5 59·5

50 Nmiles = 57.5 miles

(b) Complete the following statement.

800 nautical miles is equal to 920 miles. [2]

100 Nm = 115 miles,
400 Nm = (8 × 115) miles
= 920 miles

115 × 8 = 920

Examiner only

2.

Mr and Mrs Blanc have 3 children, Valerie, Theo and Anton. The family is visiting Wales.
Valerie and Theo are 14-year-old twins.
Anton is 2 years old.

They visit Castell Gwynhir ruins and gardens.

A copy of the entrance board is shown below.

Castell Gwynhir ruins and gardens		
	Standard charge	Charge with 10% contribution towards improvements
Adult	£5.60	£6.40
Child – age 3 to 16	£2.30	£2.53
Child – under 3	Free	Free

(a) The family decides to pay the standard charges to visit Castell Gwynhir.
How much change will they get from £20?
You must show all your working. [3]

2 adults = 2 × 5.60 = 11.20

2 children given 3–16 = 2 × 2.30
= 4.60

11.20 + 4.60
= £15.80

Change from £20 = £4.20

5.60 × 2 = 11.20

2.30 × 2 = 4.60

20.00 − 15.80 = 4.20

Examiner only

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

Theo looks at the charges with a 10% contribution towards improvements.

Theo says,
'The adult charge with an extra 10% is not right. It is too high!'

By how much is the adult charge too high?
You must show all your working. [3 + 2 OCW]

Adult extra with 10% of £5.60
= £0.56

∴ Adult charge with 10% should be
= 5.60 + 0.56 = £6.16

Adult pays too much by £6.40 − £6.16

So Adult 10% charge is too high
by £0.24 or 24p

(c) The gardens at Castell Gwynhir cover an area of 714 000 m^2.

Water ponds cover $\frac{2}{7}$ of the area of the gardens.

Calculate the area covered by water ponds. [2]

Area by ponds = $\frac{714000}{7} \times 2$

$= 102000 \times 2 = 204000 \text{ m}^2$

Area covered by water ponds is 204 000 m^2

Examiner only

3. The tables below show all of the international football results for Wales in 1984 and 1985.

1984

28 Feb 1984	**Scotland**		**2 – 1**		**Wales**	1
2 May 1984	**Wales**		**1 – 0**		**England**	2
22 May 1984	**Wales**		**1 – 1**		**Northern Ireland**	3
6 Jun 1984	**Norway**		**1 – 0**		**Wales**	4
10 Jun 1984	**Israel**		**0 – 0**		**Wales**	5
12 Sep 1984	**Iceland**		**1 – 0**		**Wales**	6
17 Oct 1984	**Spain**		**3 – 0**		**Wales**	7
14 Nov 1984	**Wales**		**2 – 1**		**Iceland**	8

1985

26 Feb 1985	**Wales**		**1 – 1**		**Norway**	1
27 Mar 1985	**Scotland**		**0 – 1**		**Wales**	2
30 Apr 1985	**Wales**		**3 – 0**		**Spain**	3
5 Jun 1985	**Norway**		**4 – 2**		**Wales**	4
10 Sep 1985	**Wales**		**1 – 1**		**Scotland**	5
16 Oct 1985	**Wales**		**0 – 3**		**Hungary**	6

Geraint says,
'On **average**, the Wales international football team scored more goals per match in 1985 than in 1984.'

(a) In checking the truth of Geraint's statement, why would it **not** be helpful to consider the **range** of the number of goals scored per match in each year? [1]

Reason – The range is not the same as an average or The range will not take all the goals into Consideration

Examiner only

(b) (i) By considering the **mean** number of goals scored per match by Wales each year, is Geraint's statement true?
You must show calculations for each year to support your answer. [3]

Mean for 1984 = $\frac{5}{8}$

Mean for 1985 = $\frac{8}{6}$

So based on the mean goals of both years, 1985 has a higher mean

∴ Yes, Geraint's statement is true

(ii) Give **one** reason why this method does not necessarily show that the Wales international football team results were better in 1985 than in 1984. [1]

Reason = Injuries were not considered

or

= Wales did not play against the exact same teams in both years

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Examiner only

4. *(a)* The towns of Aberglen, Bargwyn, Caerlow and Derwen are on Bus Route 3.
The times buses take to travel between each of the towns are shown on the diagram below.

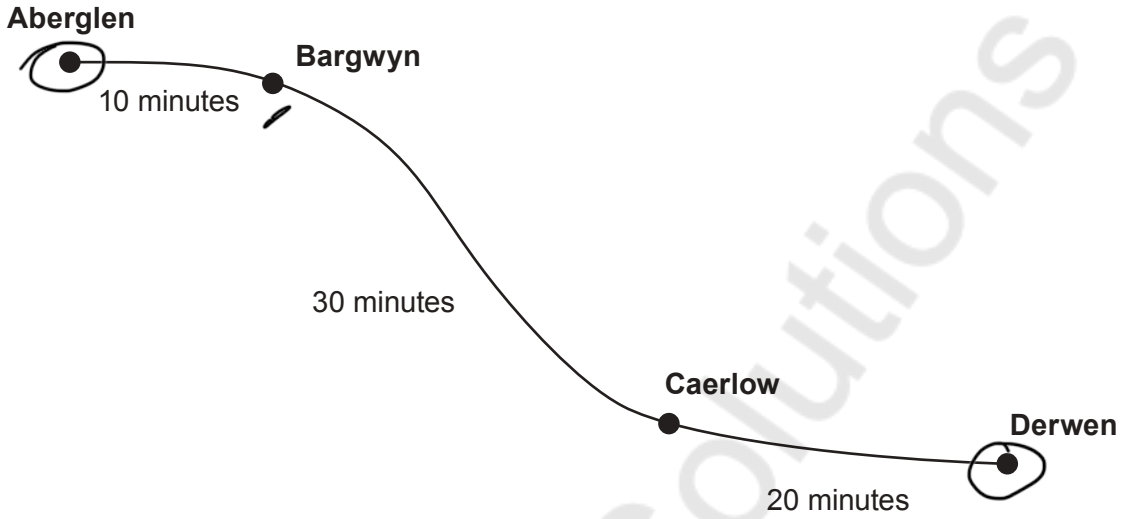


Diagram not drawn to scale

Buses start at Aberglen.
All these buses travel to Derwen, stopping at Bargwyn and Caerlow.

Here is the bus timetable.

Departing from:	Times
Aberglen	First bus leaves at 09:00, then every 13 minutes after this time.

(i) At what time does the 09:13 bus from Aberglen arrive at Derwen?
Circle your answer. [1]

09:23 09:33 09:43 10:53 10:13

10 mins + 30 mins + 20 mins = 60 mins
= 1 hour

(ii) Dilys arrives at the bus stop in Bargwyn at 09:30.
At what time is the next bus?
Circle your answer. [1]

09:32 09:36 09:39 09:49 09:52

Last bus from Aberglen left at 9:26
and will take 10 minutes to get to
Bargwyn so = 9:26 + 10 minutes
= 9:36

Examiner only

(b) From Grainsey, the Number 6 bus runs to Wyndre and the Number 7 bus runs to Hafgoch.

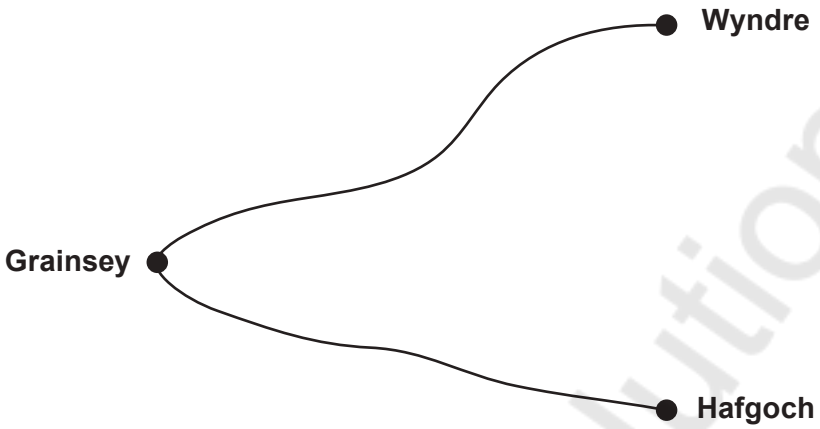


Diagram not drawn to scale

The timetable for these buses is given below:

Bus Number	To	Times
6	Wyndre	First bus leaves at 10:00, then every 20 minutes after this time.
7	Hafgoch	First bus leaves at 10:00, then every 45 minutes after this time.

After 10:00, when will the Number 6 bus and the Number 7 bus next leave Grainsey at the same time? [4]

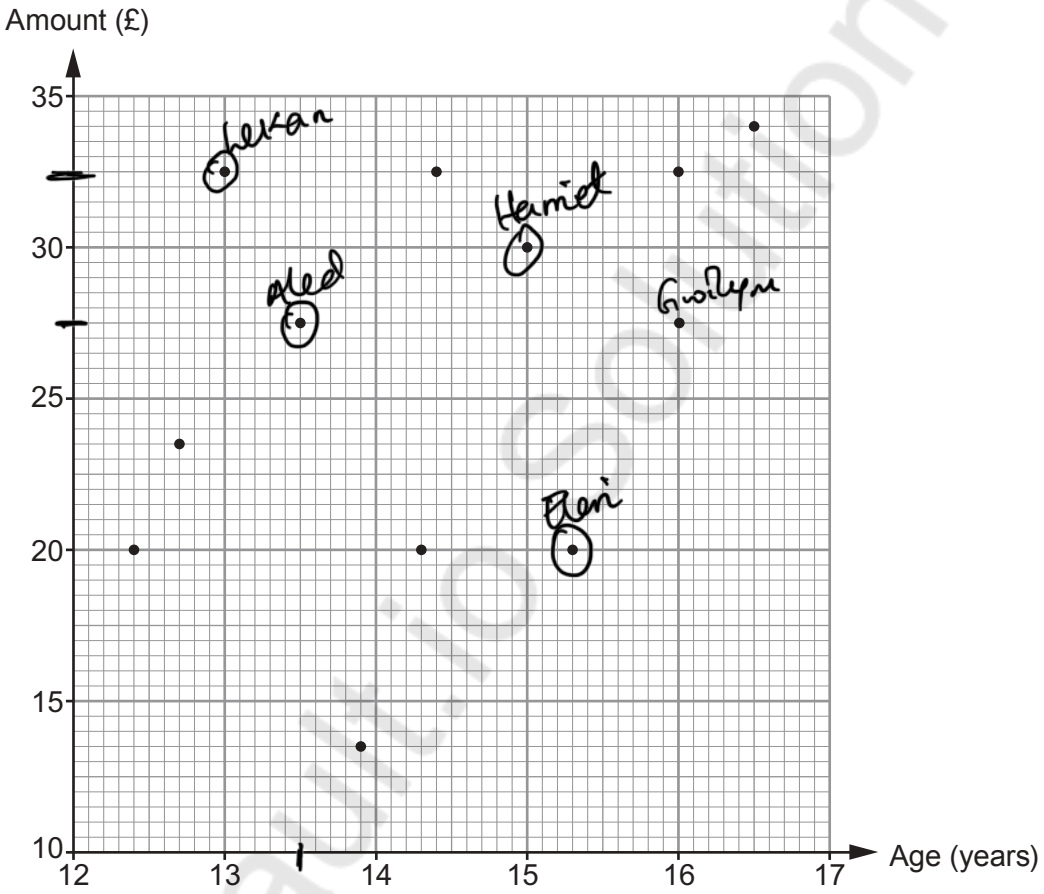
Bus 6
10:00
10:20
10:40
11:00
11:20
11:40
12:00
12:20
12:40
13:00

Bus 7
10:00
10:45
11:30
12:15
13:00

At 13:00 or 1:00pm both buses will leave Grainsey at the same time.

5. Lekan's parents have complained that they are paying too much towards his mobile phone bill each month.

Lekan decides to ask a number of students in school how much their parents or carers pay towards their mobile phone bills each month.
He displays the results in a scatter diagram. These include his own results.



(a) Lekan's parents want to know the names of some of these students.

The two 15-year-old students are Harriet and Eleri.
Eleri is older than Harriet.

Gwilym and Aled's parents each pay £27.50 per month.
Aled is younger than Gwilym.

Examiner only

(i) Complete each of the following statements. [2]

'Eleri's parents or carers pay £ 20 each month towards her mobile phone bill.'

'Harriet's parents or carers pay £ 30 each month towards her mobile phone bill.'

(ii) Complete each of the following statements. [3]

'Gwilym is 16 years 0 months old.'

'Aled is 13 years 6 months old.'

(b) Lekan's parents pay £32.50 per month towards his mobile phone bill.
He is the youngest of the 3 students who receive £32.50 per month towards their mobile phone bill.

(i) How old is Lekan? [1]

13 years old

(ii) Do you think Lekan's parents are right to complain that they are paying too much towards his mobile phone bill each month?
You must use the scatter diagram to give a reason for your answer. [1]

Yes ✓ No

Can be Yes or No

Yes – Reason being that he is the youngest to receive the highest amount

or

– Most parents pay less than what his parents pay

No – Reason being that there is no correlation/relationship between age and bill amount

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Examiner only

6. Sam is making a large pot of cheese sauce for a party.
Sam uses the conversions

- 1 ounce ≈ 28 grams,
- 1 pint ≈ 568 millilitres.

He wants to write the following recipe ingredients in grams and millilitres.

Cheese sauce

Ingredients:

4 ounces of butter

$3\frac{1}{2}$ ounces of flour

3 pints of milk

9 ounces of cheese

Using Sam's conversions, complete the ingredient table below. [4]

Butter = 4 × 28

Flour = 3.5 × 28

Milk = 3 × 568

Cheese = 9 × 28

$\frac{7}{2} \times \overset{14}{\cancel{28}} = 98$

$\begin{array}{r} 28 \\ \times\ 4 \\ \hline 112 \end{array}$

$\begin{array}{r} 568 \\ \times\ 3 \\ \hline 1704 \end{array}$

$\begin{array}{r} 28 \\ \times\ 9 \\ \hline 252 \end{array}$

Cheese sauce

Ingredients:

112 grams of butter

98 grams of flour

1704 millilitres of milk

252 grams of cheese

Examiner only

7. Macy and Gareth are planning a bike ride.
They have a map with a scale of 1:50 000.

Gareth suggests a route that measures a total of 48 cm on the map.

Macy says she could cycle up to 13 miles.
Will Macy be able to cycle the route Gareth is suggesting?
You must show all your working and give a reason for your answer. [5]

1 : 50 000 means
1 cm = 500 m or 0.50 km or $\frac{5}{16}$ miles

48 cm route in miles
$= \frac{5}{16} \times 48^{3} = 15$ miles

So the 48 cm route on the map
= 15 miles

Conclusion = Yes, Macy could push herself to cycle a bit further up to the 15 miles

OR = NO, Macy only wants to cycle 13 miles and the route is 2 miles more.

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Examiner only

8. *(a)* The concrete base of Miss Morgan's new bungalow is shown below.

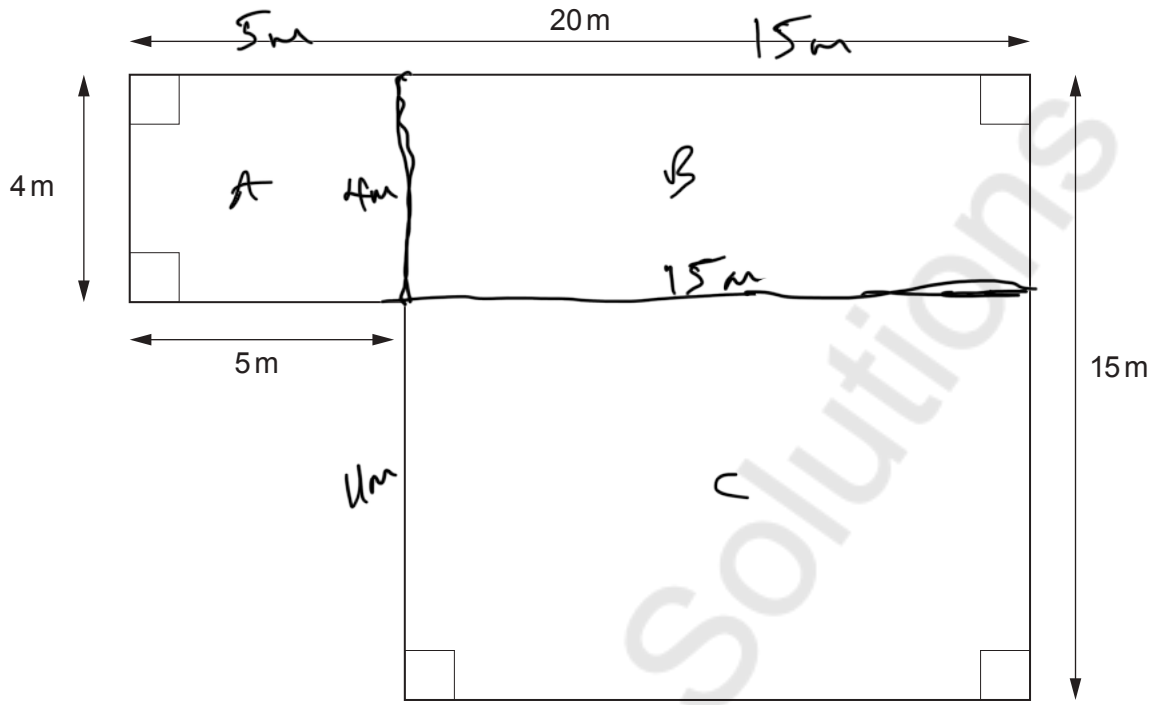


Diagram not drawn to scale

The concrete base of Miss Morgan's bungalow is 0·2 m thick.

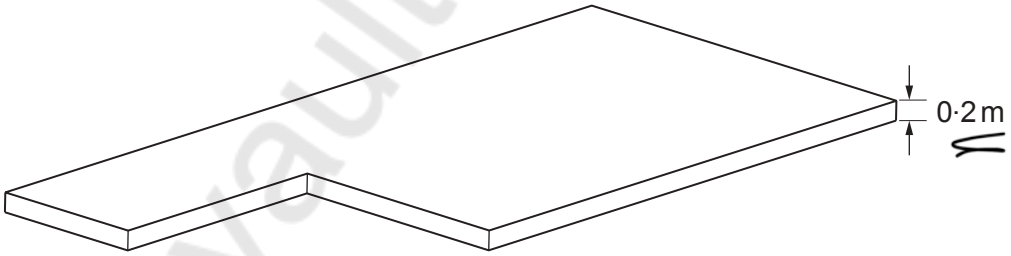


Diagram not drawn to scale

Calculate the volume of the concrete base.
You must show all your working. [4]

Calculate The Total Area for this base = Area of each shape added together.

Examiner only

(5×4) + (5×4) + (5×11)

20 + 60 + 165

= 245 m²

Volume of the base = Total area × Thickness

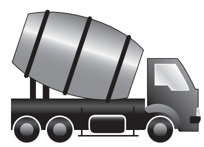
= 245 × 0·2

= 49 m³

215 ×4 = 60; 11 ×5 = 55, 1·5 → 165; 165 + 60 + 20 = 245; 245 × 2/10 = 49

Volume of concrete is 49 m³

(b) Mr Graham is building a garage.



A concrete mixer lorry holds a maximum load of 6 m³ of concrete.
There is a fixed standard delivery charge of £35 per load.
The concrete costs £45 per m³.

Mr Graham orders $\frac{2}{3}$ of the maximum load of concrete for the base of his garage floor.

What is the total cost of Mr Graham's order? [4]

His load order = $\frac{2}{3} \times 6$ m³ = 4 m³

Cost of his load order = 4 × 45
= £180

Add the standard delivery charge
£180 + £35
= £215

45 × 4 = 180; + 35 = 215

Total cost is £ 215

 (3310U30-1) Turn over.

Examiner only

9.

Olga took out a high-interest loan for £400.
She paid back £49 per month for 20 months to clear the loan.
Calculate the total interest that Olga paid as a percentage of the original loan. [4]

Total amount paid back = 49 × 20
= £980

% Interest = $\frac{980 - 400}{400} \times 100$

980
− 400
580

= $\frac{580}{400} \times 100$ = 145

Answer = 145%

 (3310U30-1)

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Examiner only

10. Sara is carrying out a survey of the three villages, Cwm, Allthir and Gwyndir.
The diagram below shows the positions of the three villages.

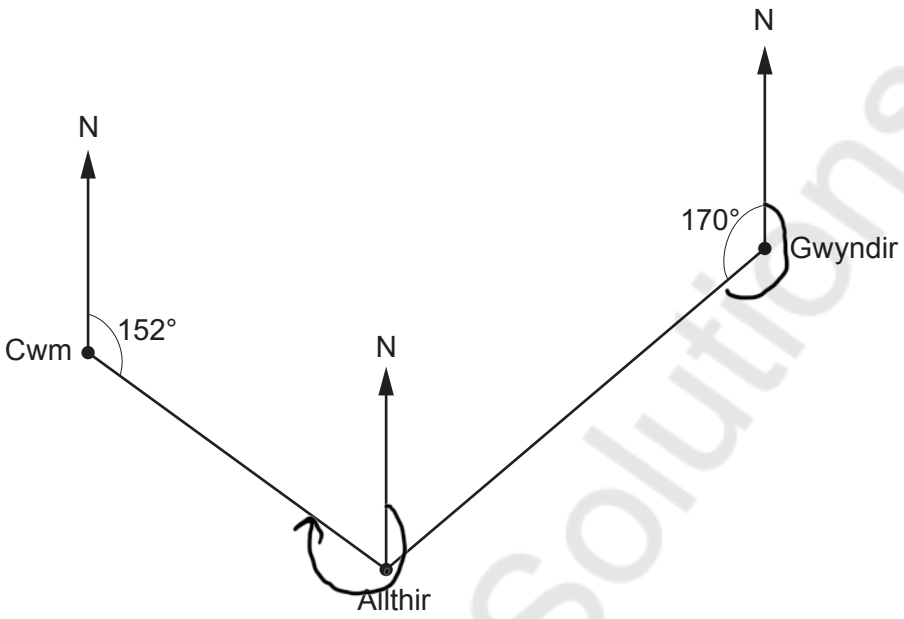


Diagram not drawn to scale

(a) What is the bearing of Allthir from Gwyndir?
Circle your answer. [1]

010° 170° 180° 190° 200°

360 − 170

360
− 170
190

(b) What is the bearing of Cwm from Allthir?
Circle your answer. [1]

028° 152° 242° 332° 352°

180 + 152 = 180
152
332

Examiner only

(c) The area of the land covered by the three villages is 200 km^2.
The total population of the three villages is 8400 people.

(i) What is the population density of the three villages?
Give your answer in population/km^2. [2]

Pop. density = Population / Area = 8400 / 200 = 42

= 42 population / km^2

(ii) The populations of Cwm, Allthir and Gwyndir are in the ratio 3 : 4 : 5.
Calculate the population of Gwyndir. [2]

3 : 4 : 5 = total ratio = 12

C : A : G

Pop of Gwyndir = $\frac{5 \times 8400}{12}$ = 5 × 700

= 3500 people

Examiner only

11. *(a)* Kingsley invests £3000 in an account that pays 2% compound interest per annum. He does not make any further payments into his account. He does not withdraw any money from his account.

How much will Kingsley have in his account after **two years**? [3]

Compound Interest + Principal Amount
= Amount in the account post each yr

$2\% \times 3000 + 3000$

$= \frac{2}{100} \times 3000 = 60 + 3000 = £3060$ (1st year)

$2\% \times 3060 + 3060$

$= 0.02 \times 3060 + 3060$

$= £3121.20$ (2nd year)

Amount in Kingsley's account after two years is £ 3121.20

Examiner only

(b) Kingsley buys a portable *Bluetooth* speaker.
The speaker has been reduced by 20% in a sale.
He pays £72 for the speaker in the sale.
What was the original price of the speaker? [2]

72 ÷ 80 × 100

80s out of 100%

20% is out for the discount price

$\frac{72 \times 100}{80}$

= £90

Original price of the speaker is £ £90

12. Michelle owns a café.
She stacks coffee mugs as shown in the diagram below.

Michelle measures the height of each coffee mug as 12 cm, **correct to the nearest centimetre**.
Each stacked coffee mug creates 4 cm extra height, **correct to the nearest centimetre**.

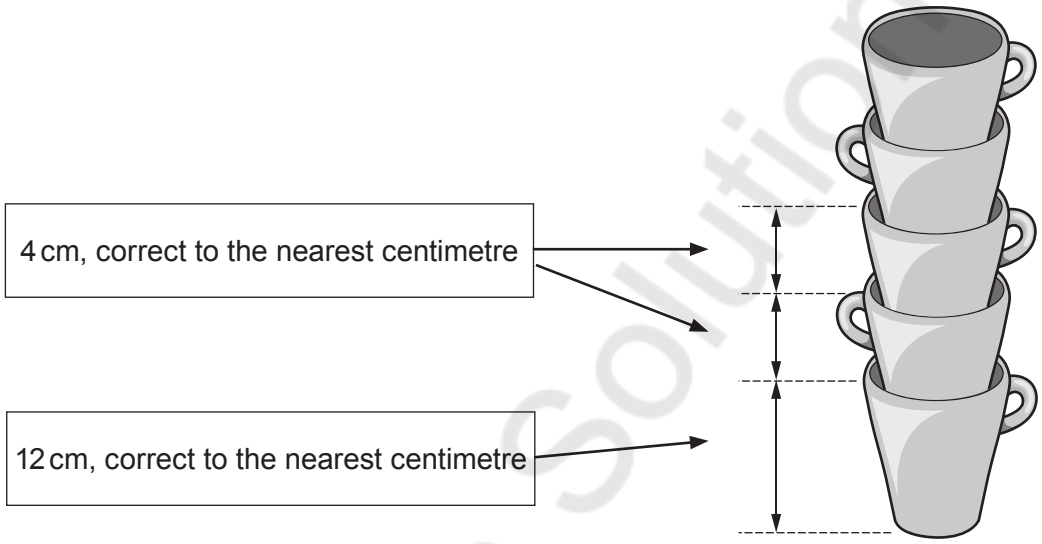


Diagram not drawn to scale

Michelle knows that the vertical height between two shelves is exactly 39 cm, as shown below.

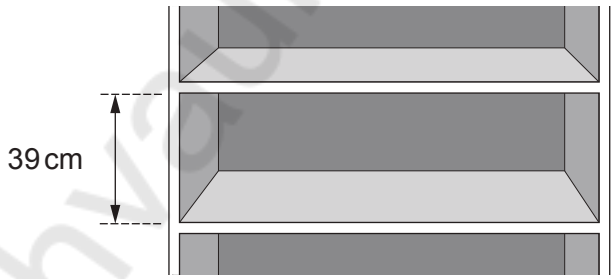


Diagram not drawn to scale

Examiner only

Can Michelle be certain that she will be able to place one stack of 7 coffee mugs between the two shelves?
Give a reason for your answer.
You must show all your working. [5]

Maximum cup height = 12.4 cm (recall, correct to the nearest cm was given)
Maximum gap = 4.5 cm

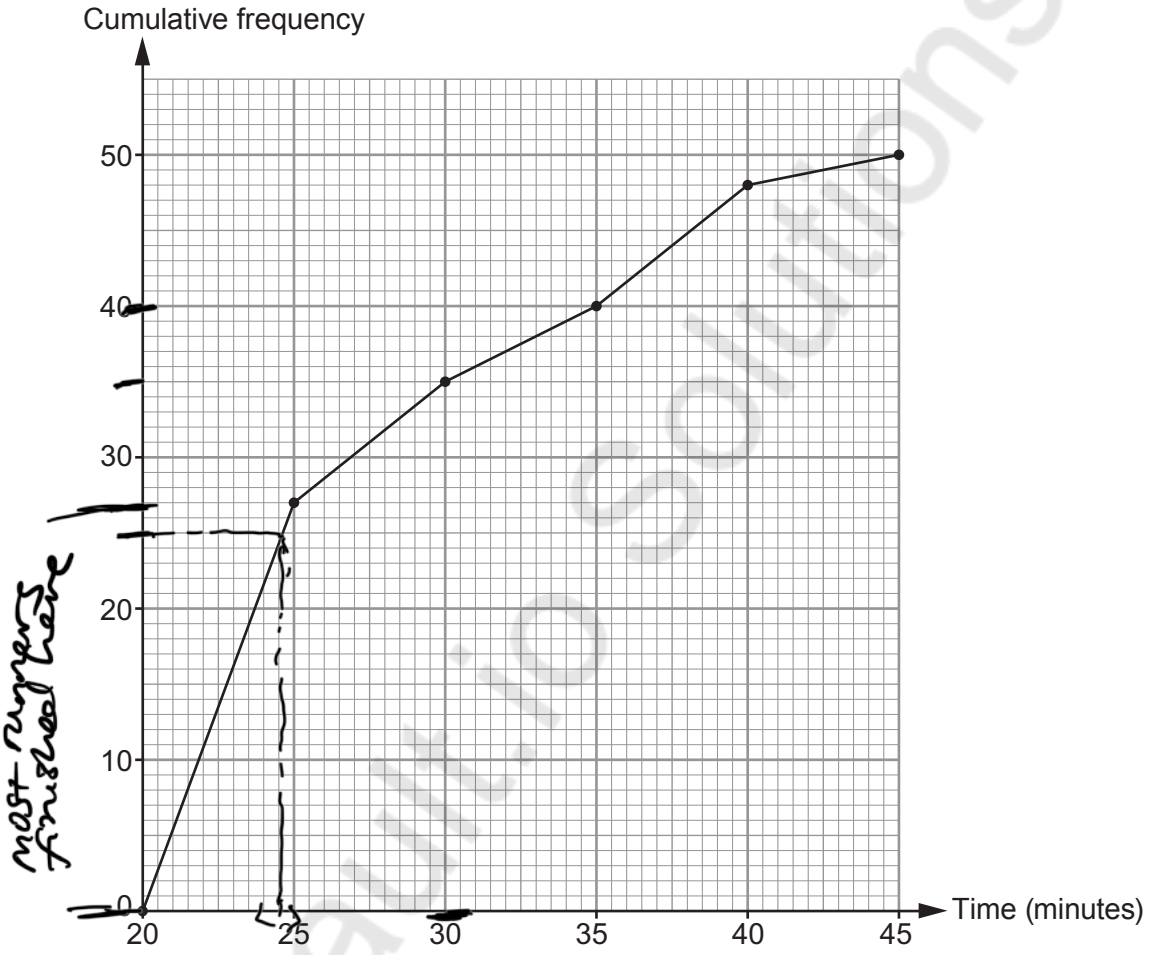
Maximum height for 7 mugs
$= 12.5 + 6 \times 4.5$
$= 39.5$ cm

Conclusion = Michelle cannot be certain that the stack of 7 coffee mugs will fit into the 39 cm shelves because 39.5 cm > 39 cm.

Examiner only

13. This year, 50 runners took part in a 5 km race in the Brecon Beacons.
All 50 runners finished the race.

The cumulative frequency diagram below shows the times taken by the runners to finish the race.



(a) Which is the modal group?
Circle your answer. [1]

20 to 25 minutes 25 to 30 minutes 30 to 35 minutes

35 to 40 minutes 40 to 45 minutes

Because within 20 - 25 minutes most runners finished the race

Examiner only

(b) Is it certain that the last runner's finish time was 45 minutes?
You must give a reason for your answer. [1]

Yes ☐ No ☑

The graph shows data for groups not individuals
OR
the last 2 runners took between 40 - 45 minutes, so it's not certain.

(c) The organisers hoped that 80% of the runners would finish the race within 30 minutes.

Complete the following two statements. [2]

'70 % of runners finished the race within 30 minutes.'

'80% of runners finished the race within 35 minutes.'

at the 30 mins mark, about 35 people had finished ≈ 70%
at 35 minutes, 40 people finished ≈ 80%

(d) Last year, the median finish time was 26 minutes.
By how many minutes was the median time better this year?
You must show all your working. [2]

Median finish time for this year
= 24.5 - 24.8 minutes (range because it's grouped data)

Difference = 26 mins (last year) - (24.5 to 24.8)

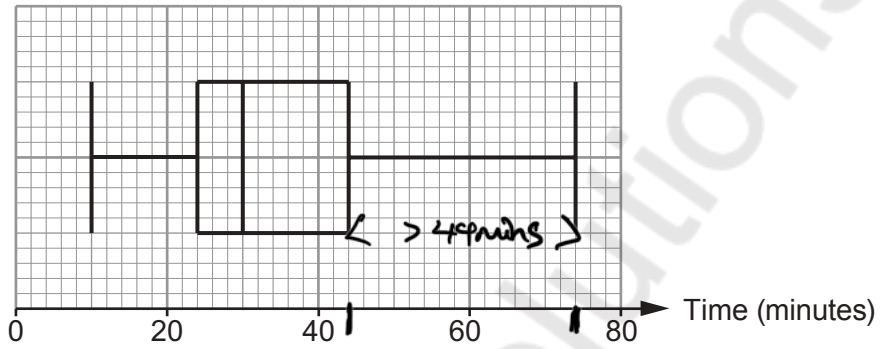
Answers = 1.2 to 1.5 minutes

ie 1 minute 12 seconds to 1 minute 30 seconds

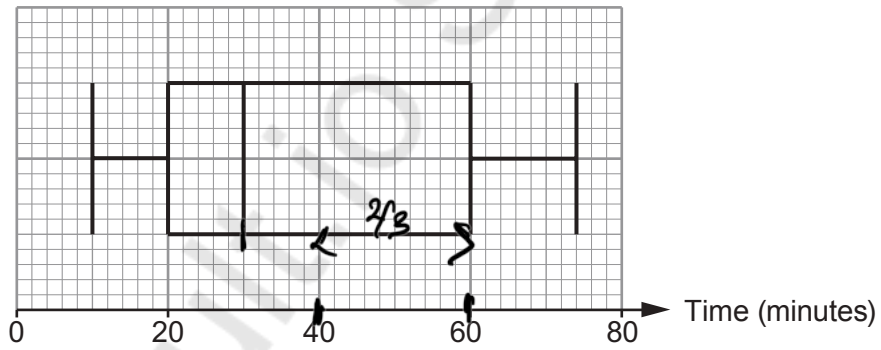
Examiner only

14. There are two entrances to a stadium, North Entrance and South Entrance.
At each entrance, 3000 people queued to pass through security.
The length of time each of these people spent in the queue was recorded.
The box-and-whisker diagrams show the results.

North Entrance



South Entrance



(a) At the **North Entrance**, how many people had to queue for more than 44 minutes?
You must show all your working. [2]

Corresponds to 25% of the People
= 25% of 3000
$= \frac{25}{100} \times 3000 = 750$ people

Number of people is 750

Examiner only

(b) For the **South Entrance**, calculate an estimate of the number of people who had to queue there for between 40 and 60 minutes.
You must show all your working. [3]

$\frac{2}{3} \times 25\% \times 3000$

$= \frac{2}{3} \times \frac{25}{100} \times 3000^{10}$

$= 500$ people

Number of people is 500

(c) At which entrance did the security team seem to be more effective at getting people into the stadium quickly?
You must give a reason for your answer. [1]

North Entrance ☐ South Entrance ☐

Unambiguously

North Entrance;- Reason = The upper quartile is less than that of the South Entrance

It could also be South Entrance = Because 25% People in 20 minutes at the South Entrance Compared with 25% minutes at the North Entrance

END OF PAPER

Thank you !!

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

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