Surname	Centre Number	Candidate Number
Other Names		0

GCSE

3310U30-1

S18-3310U30-1

20 - E

30 - D

40 - C

52 - B

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	3
2.	10	13
3.	5	18
4.	6	24
5.	7	31
6.	4	35
7.	5	40
8.	8	48
9.	4	52
10.	6	58
11.	5	63
12.	5	68
13.	6	74
14.	6	80
Total	80	

E

D

C

B

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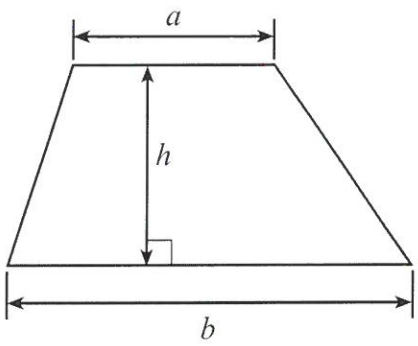
01

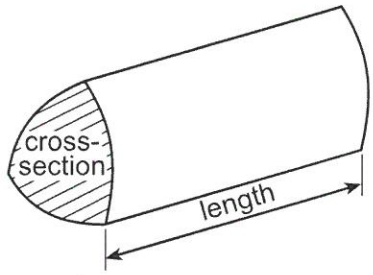
MAY183310U30101

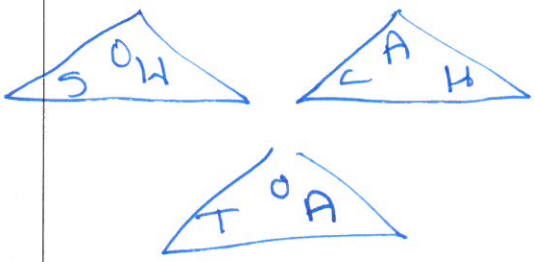
Formula List – Intermediate Tier

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



Volume of prism = area of cross-section × length





$A = \pi r^2$

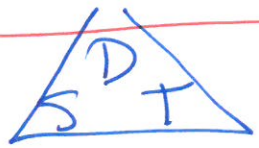
$C = 2\pi r$

$V = \pi r^2 h$

8km ≈ 5 miles

1 Litre ≈ 1.75 Pints

1 kg ≈ 2.2lb



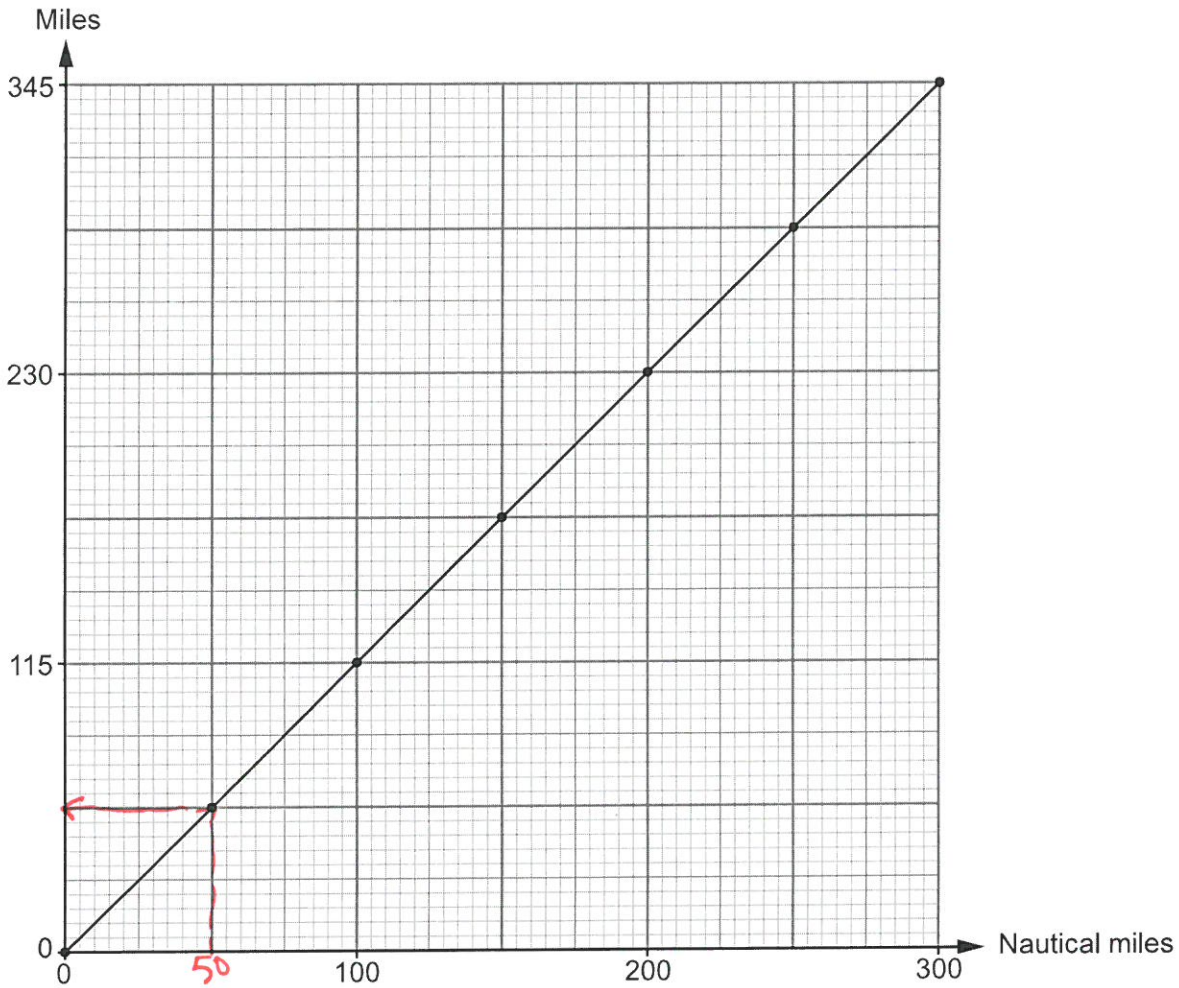
15 min $= \frac{1}{4}$ hr $= 0.25$

30 min $= \frac{1}{2}$ hr $= 0.5$

45 min $= \frac{3}{4}$ hr $= 0.75$

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

57·5
2 | 115·0

B1

(b) Complete the following statement.

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

100 = 115 115

M1

× 8

A1

920

1 4

3310U301
03

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]

Mum 5.60
Dad 5.60
Val 2.30
Theo 2.30
Anton 0.00 +
15.80
1

Change = 20 − 15.80
= £4.20

M1
A1
A1

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]

Standard Adult Charge : £5.60

10% = 56p. B1

Extra Charge should be 5.60
+ 0.56
£6.16 D1

So they are being overcharged by 6.40 − 6.16

= £0.24 B1

(or 24p) OCW +2

(c) The gardens at Castell Gwynhir cover an area of 714 000 m².

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

Calculate the area covered by water ponds. [2]

$\frac{2}{7} \times 714\,000$

$\frac{1}{7} = 7\overline{)714\,000}$ 102 000 ×2 = 204 000 M1

$\frac{2}{7} =$

Area covered by water ponds is 204 000 m² A1

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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**
2 May 1984	**Wales**		**1 – 0**		**England**
22 May 1984	**Wales**		**1 – 1**		**Northern Ireland**
6 Jun 1984	**Norway**		**1 – 0**		**Wales**
10 Jun 1984	**Israel**		**0 – 0**		**Wales**
12 Sep 1984	**Iceland**		**1 – 0**		**Wales**
17 Oct 1984	**Spain**		**3 – 0**		**Wales**
14 Nov 1984	**Wales**		**2 – 1**		**Iceland**

1985

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

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]

because the range is not an average E1

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]

In 1984 mean = $\frac{5}{8}$ = $8\overline{)5.5^{5}0^{2}0^{4}0}$ = 0.625 M1 A1

In 1985 mean = $\frac{8}{6}$ = $6\overline{)8.3^{2}0}$ = 1.33 A1

So Geraint is correct, in 1985 they were on average score more than 1 goal per game

But in 1984, less than 1 goal per game

(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]

because they have played different teams in the two years. E1

3310U301
07

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.

0913 0930 ~~0950~~ 0910 1st bus arrives 0923 0936

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

B1

.....

.....

(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

B1

.....

.....

.....

Examiner only

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

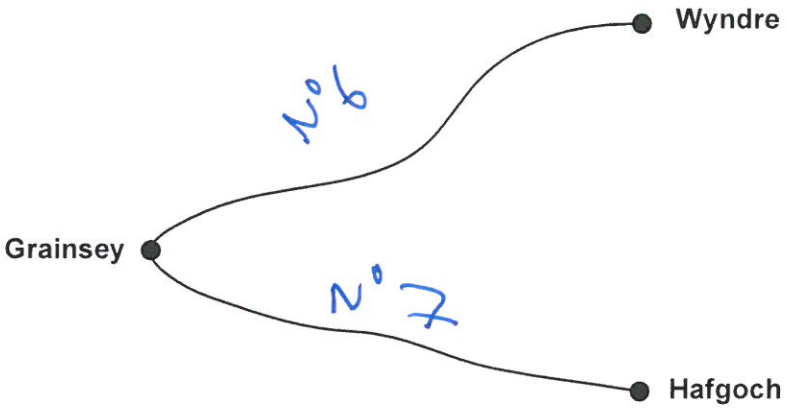


Diagram not drawn to scale

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	Bus 7
1000	1000
1020	1045
1040	1130
1100	1215
1120	1300
1140	
1200	1300
⋮	

B2

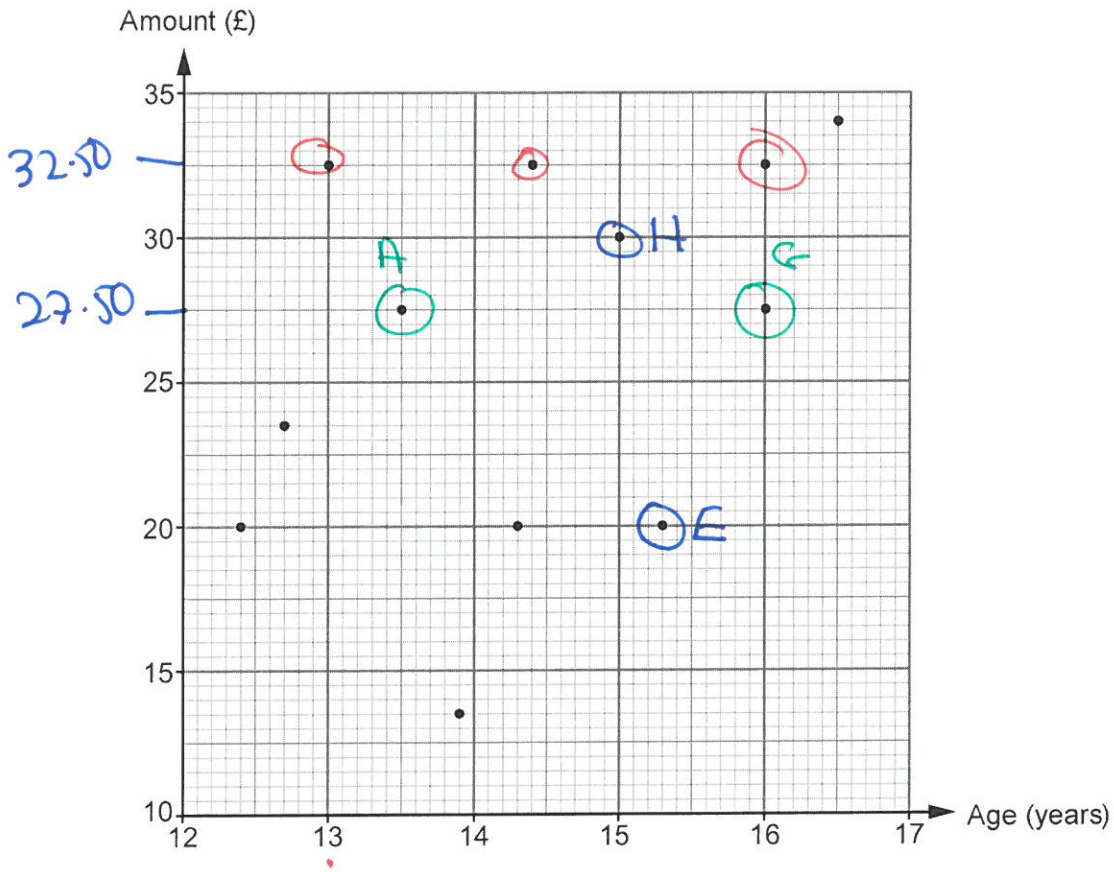
B1

B1

3310U301 09

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.' B1

'Harriet's parents or carers pay £ 30 each month towards her mobile phone bill.' B1

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

'Gwilym is 16 years 0 months old.' B1

'Aled is 13 years 6 months old.' B2

(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 B1

(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 ☐

because only 1 person is being charged more and they are 16. E1

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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 cm : 50 000 cm) ×48
48 cm : 240 000 cm) ×48 B1
÷100
24 000 m
÷1000
48
×5
240
4
24 km B1

8km ≈ 5miles) ×3
24km ≈ 15miles) ×3 M1 A1

So Gareths route ≈ 15miles

No because she only thinks she can ride upto 13 miles E1

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13

Examiner only

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

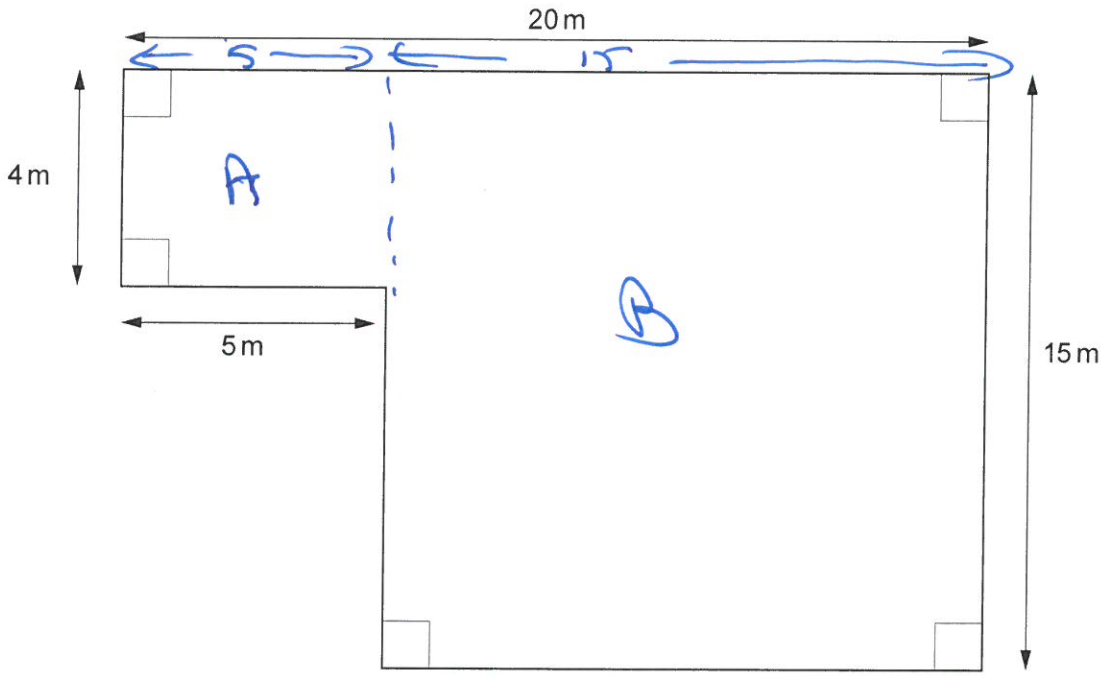


Diagram not drawn to scale

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

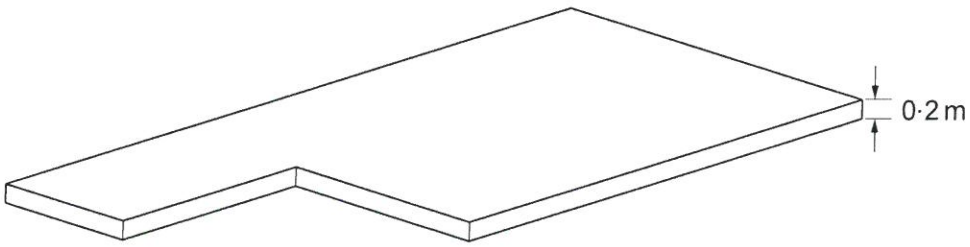


Diagram not drawn to scale

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

Area of A = 4 × 5 = 20

Area of B = 15 × 15 = 225

Total Area = 225 + 20

= 245 m^2

0·1	0·5	1
0·5	2·5	5
2	2·5	

M1

Examiner only

Volume = 245 x 0·2

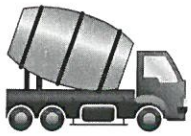
= 490

= 49 m³ A2

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]

amount of concrete bought = $\frac{2}{3}$ x 6 M1

$\frac{1}{3}$ of 6 = 2, $\frac{2}{3}$ = 2 x 2 = 4 m³ A1

Cost of concrete = 45 x 4 = £180

Total Cost = 180 + 35 M1

= 215

Total cost is £ 215 A1

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 repayments = $49 \times 20 = £980$ M1 A1

total interest = $980 - 400 = £580$

$\frac{580}{400} \times 100 = \frac{58000}{400}$ M1

$4 \overline{)5^{1}8^{2}0}$ → 145

A1

145%

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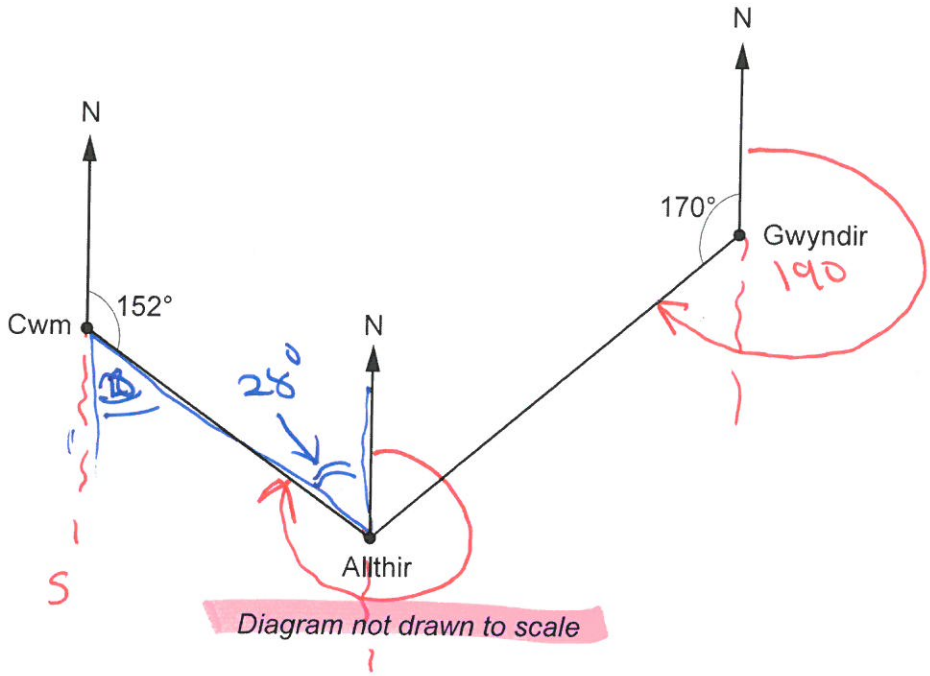
Examiner only

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.



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

010° 170° 180° 190° 200°

360 − 170 = 190

B1

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

028° 152° 242° 332° 352°

360 − 28 = 332

B1

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]

$\frac{8400}{200} = 42$ M1 A1

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

C A G
3 : 4 : 5 12 equal parts M1

$\times 700$ ↓ 700
12 | 8400 A1

~~4~~
3500

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]

at end of Y1 = 3000 + 600 = 3600

at end of Y2 = 3600 + 720 = 4320

3600 + 720 = 4320 (1)

3060 + 61.20 = 3121.20 (1)

At end of Y1 = 3000 + 60 = £3060 M1

At end of Y2 = 3060 + 61.20 = M1

A1

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

1% of 3000 = 300 1% = 30

2% of " = 600 2% = 60

1% of 3600 = 360 1% = 30.60

2% " " = 720 2% = 61.20

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]

He pays 80% of original = 72

÷8 ÷8

10% = £9

×10 ×10

100% £90

M1

A1

Original price of the speaker is £ .....

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.**

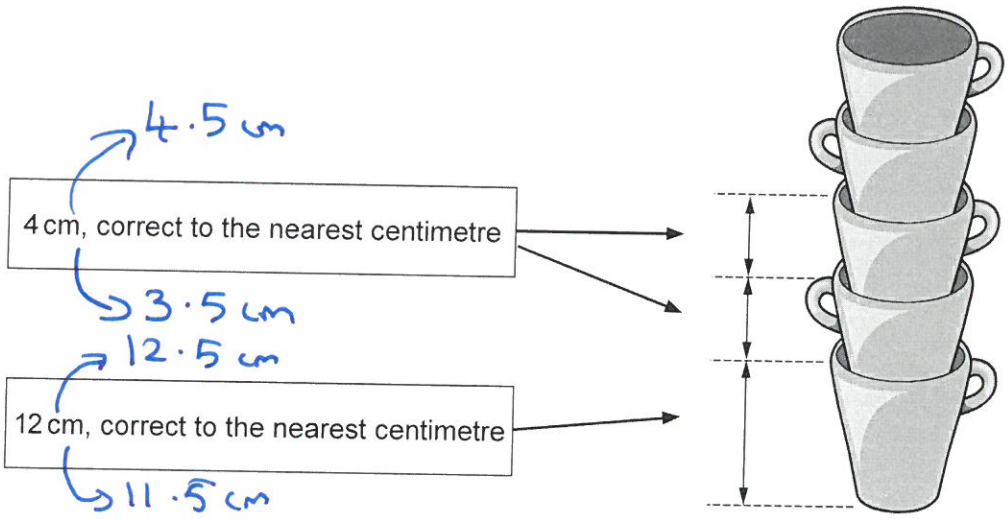


Diagram not drawn to scale

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

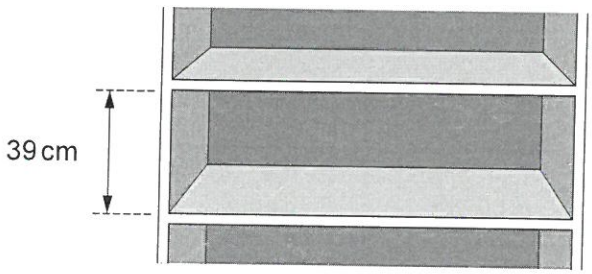


Diagram not drawn to scale

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]

Worst case if all mugs are actually MAX

$12.5 + \underbrace{4.5 + 4.5}_{9} + \underbrace{4.5 + 4.5}_{9} + \underbrace{4.5 + 4.5}_{9}$

M2

$12.5 + 27$

39.5 cm

A1

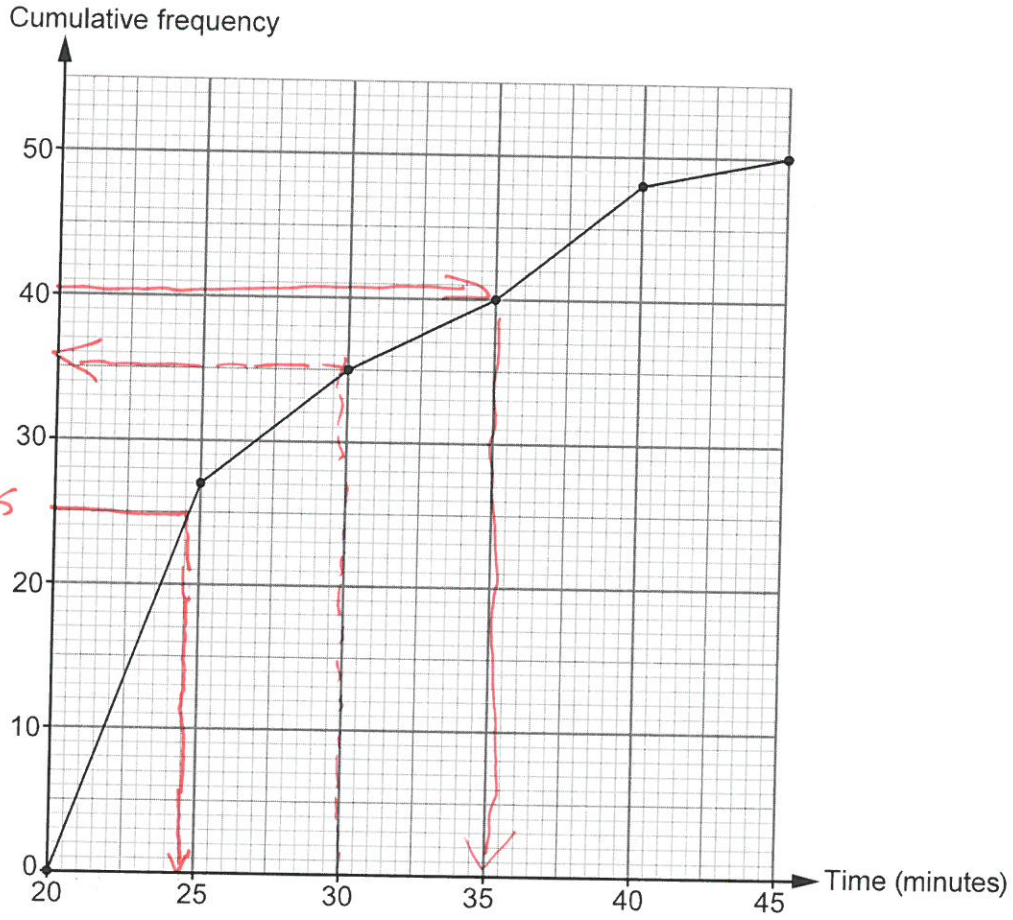
So she can't be certain because the stack could be up to 39.5 cm tall.

E1

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

.....

.....

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 ☑

because the data is grouped

B1

(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.' B1

'80% of runners finished the race within 35 minutes.' B1

80% of 50

10% = 5

80% = 40 runners,

(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]

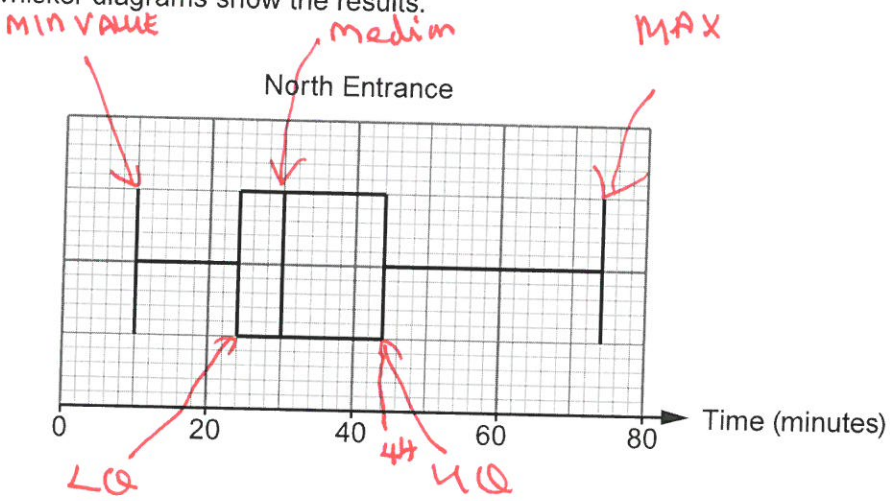
this year median = 24.5

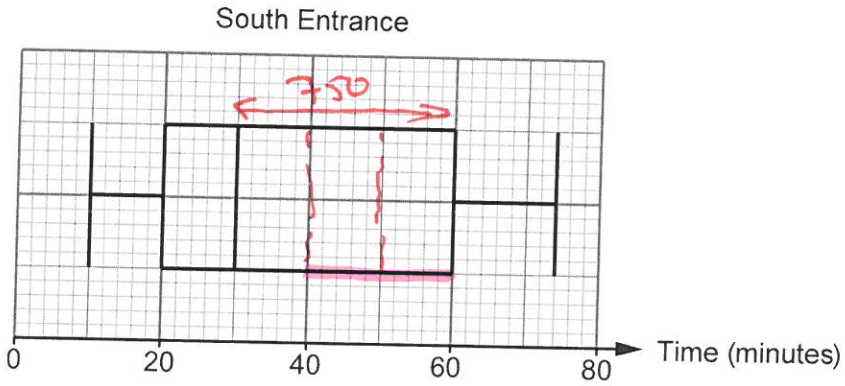
last year median = 26

So 1½ minutes better. M1 A1

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.





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

$\frac{1}{4} \times 3000 = 750$ M1 A1

Number of people is .....

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]

$\frac{2}{3} \times 750$ M1

$2 \times 250 = 500$ M1

A1

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 ☐

E1

because $\frac{3}{4}$ of people enter within 44 min compared to 60 min in South

END OF PAPER