Surname	Centre Number	Candidate Number
Other Names		0

wjec cbac

GCSE – NEW

3310U40-1

S17-3310U40-1

MATHEMATICS – NUMERACY
UNIT 2: CALCULATOR-ALLOWED
INTERMEDIATE TIER

THURSDAY, 8 JUNE 2017 – MORNING

1 hour 45 minutes

ADDITIONAL MATERIALS

A calculator will be required for this paper.

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 or use the π button on your calculator.

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 **9***(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.	**3**	
3.	**3**	
4.	**2**	
5.	**3**	
6.	**9**	
7.	**5**	
8.	**5**	
9.	**12**	
10.	**3**	
11.	**2**	
12.	**4**	
13.	**8**	
14.	**4**	
15.	**8**	
16.	**6**	
Total	**80**	

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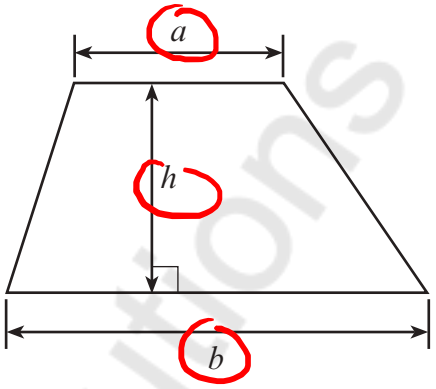
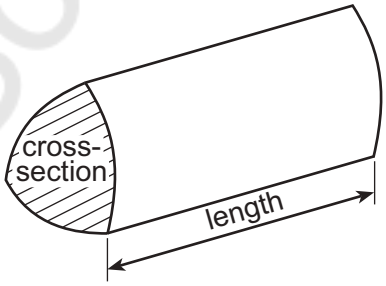
Formula List – Intermediate Tier

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



Volume of prism = area of cross-section × length



Examiner only

1.

Bus timetable from Orme Station to Outlet Village

Only 55 minutes from Orme Station direct to Outlet Village.

Buses leave the station
- every 12 minutes from 8 a.m. until 12 noon
- every 24 minutes from 12 noon until 10 p.m.

(a) At what time does the first bus after 09:00 leave Orme Station?
Circle your answer. [1]

09:05 **09:12** 09:18 09:24 09:30

8 a.m → 8:12 am → 8:24 am → 8:36 am
8:48 am → 9:00 am → 9:12 am

(b) Gwil looks at the timetable shown above.
He decides to take the latest possible bus to be at Outlet Village by 15:00.

At what time will Gwil arrive at Outlet Village? Leave 14:00 Arrive 14:55
You must show all your working. [2]

Start period 12:00 noon
Leave in 24mins 00:24
12:24
Leave in 24mins 00:24
12:48
Leave in 24mins 00:24
13:12
Leave in 24mins 00:24
13:36
Leave in 24mins 00:24
14:00
Leave in 24mins 00:24
14:24
Leave in 24mins 00:24
14:48

72
1hr 12
48
24
72
72-60
1hr
15:00
14:00
+ 55
14:55

48
12

3310U40 03

Examiner only

2. Luigi lives in south Wales.
Rosina lives in west Wales.
For each of the first 65 days of 2017, they recorded whether or not it rained.

Luigi recorded that it rained on 28 of these days.
Rosina recorded that it rained on 40% of these 65 days.

Luigi says,

> 'For the first 65 days of 2017, there were more days with rain where I live than where Rosina lives.'

Is Luigi correct?
You must show all your working. [3]

* Luigi (South wales) | Rosina (West wales)
Total Days = 65 | Total Days = 65
Number of days rained 28 | Number of days rained 40%

Days of rain at Rosina
rained = 40% of Total Days
Rained = $\frac{40}{100} \times 65$
Rained Days = 26 day

Luigi is right because it rained for 28 days at Luigi sides and it rained 26 days at Rosina side

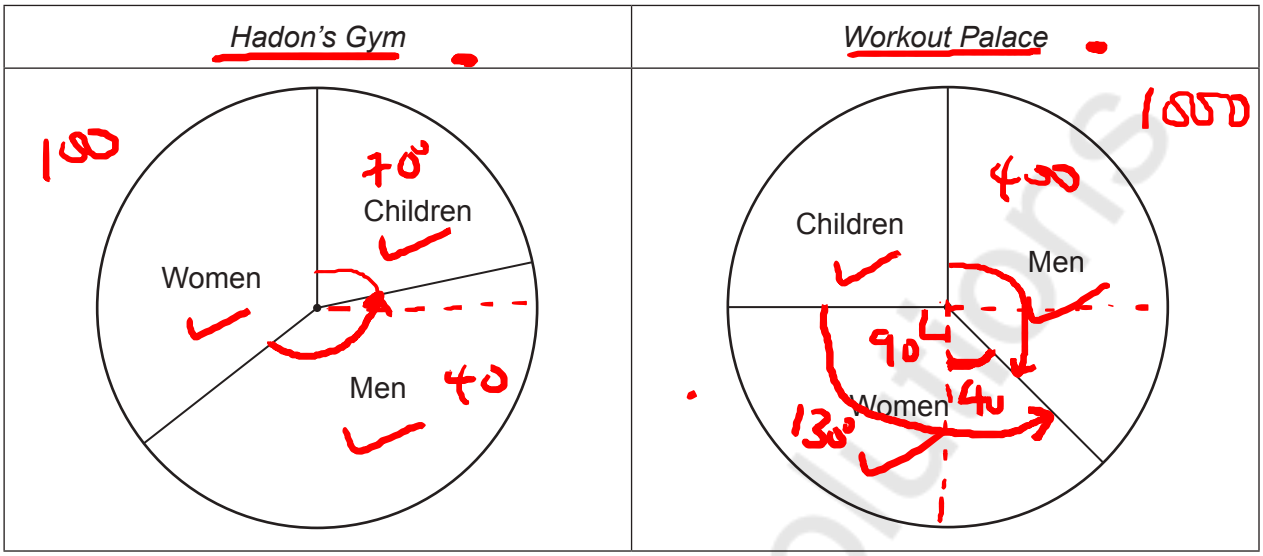
Since $28 > 26$

Therefore, there were more rainfall at Luigi side than Rosina side.

 (3310U40-1)

Examiner only

3. Tomos is looking at gym memberships for *Hadon's Gym* and *Workout Palace*.
Each of these gyms displays its membership in a pie chart.



(a) About what percentage of the members at *Hadon's Gym* are children?
Circle your answer. [1]

10% 20% 30% 40% 50%

% of children = $\frac{70}{360} \times 100 = 19.44\%$
$\equiv 20\%$

(b) Which of the following is the best estimate for the percentage of the members at *Workout Palace* who are women?
Circle your answer. [1]

25% 28% 30% 32% 38%

% of women = $\frac{130}{360} \times 100 = 36\%$
$\equiv 38\%$

(c) Tomos says,
'There are more men with membership at *Hadon's Gym* than at *Workout Palace*.'

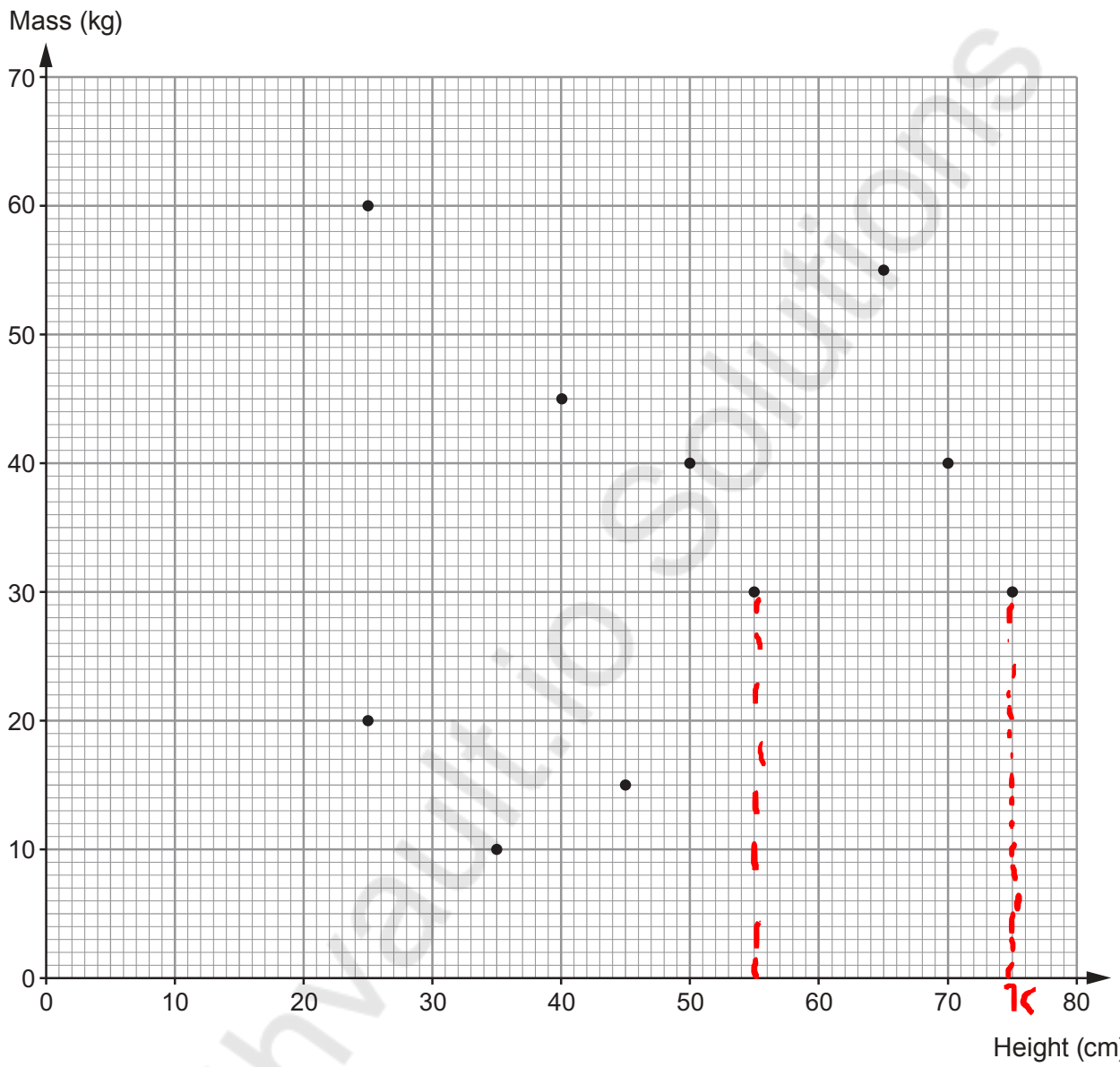
Is Tomos **certain** to be correct?
You must give a reason for your answer. [1]

Yes ☐ No ☑

We don't know the total number of people using each gym.

Examiner only

4. A group of friends measured the heights and masses of their pets.
The scatter diagram shows the results.



(a) Describe the correlation shown by this scatter diagram. [1]

No correlation

(b) The friends notice that the tallest pet has the same mass as another pet.
What is the height of this other pet? [1]

55 cm

Examiner only

5. Glenda plans to drive from Flint to Cardiff.

On a long journey, her average speed is usually 42 mph.

Last time she drove from Flint to Cardiff it took her $3\frac{1}{2}$ hours.

Flint → Cardiff

(a) Use this information to calculate the distance between Flint and Cardiff. [2]

A.S = 42mph t = 3.5h

A.S = Distance / time

42 = D / 3.5

D = 42 × 3.5

D = 147 miles

147 miles

(b) Give a possible reason why your answer in *(a)* is only an estimate of the distance between Flint and Cardiff. [1]

The traffic might be different another time

Examiner only

6. *(a)* Gustav is making some scones for his sister's birthday party.

12 scones → 450g

1 scone → 450g / 12

30 scones → 450/12 × 30

Recipe to make 12 scones

450g self raising flour
2 teaspoons of baking powder
75g butter
50g caster sugar
2 eggs
225ml milk

Bake at **428°F** for 10 to 15 minutes

(i) How much self raising flour will Gustav need to make 30 scones?
Circle your answer. [1]

900g 1000g 1100g 1125g 1350g

1,125g

(ii) In the recipe, the temperature of the oven is given in degrees Fahrenheit, *F*.
The temperature gauge on Gustav's oven shows degrees Celsius, *C*.

The formula below is used to convert Fahrenheit into Celsius.

$$C = \frac{5F - 160}{9}$$

At what temperature should Gustav bake the scones?
Give you answer in degrees Celsius. [2]

$\theta = 428°F$ $F = 428$

$C = \frac{5F - 160}{9} = \frac{5 \times 428 - 160}{9} = 220°C$

220 °C

Examiner only

(b) Gustav also makes a birthday cake for his sister.
The top face of the cake is in the shape of a trapezium.

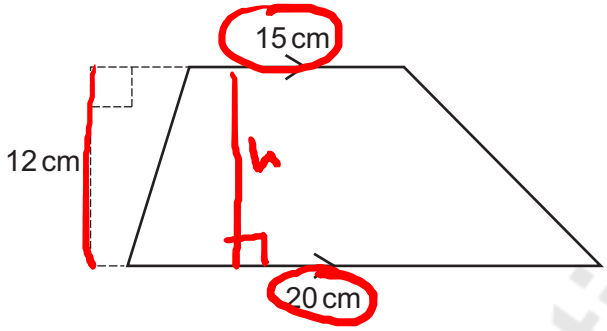


Diagram not drawn to scale

Gustav plans to ice the top face of the cake.
Each packet of icing costs £1.35 and is enough to cover 65 cm^2.
He has to buy complete packets of icing.

(i) Calculate the area of the top face of the cake Gustav has made. [2]

$A = \frac{1}{2}(a+b)h = \frac{1}{2}(15+20)12 = \frac{1}{2} \times 35 \times 12$

$A = 210\,cm^2$

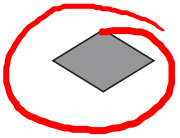
(ii) How much will it cost Gustav to ice the top face of the cake?
You must show all your working. [3]

1 pack of icing = £1.35

Total pack needed = $\frac{210}{65} = 3.23$

So, he needs 4 packs 1.35×4 £5.4

(iii) Gustav also plans to decorate the cake with small pieces of marzipan shaped as shown below.
The top face of each piece of marzipan is a rhombus.
Will these pieces of marzipan tessellate?

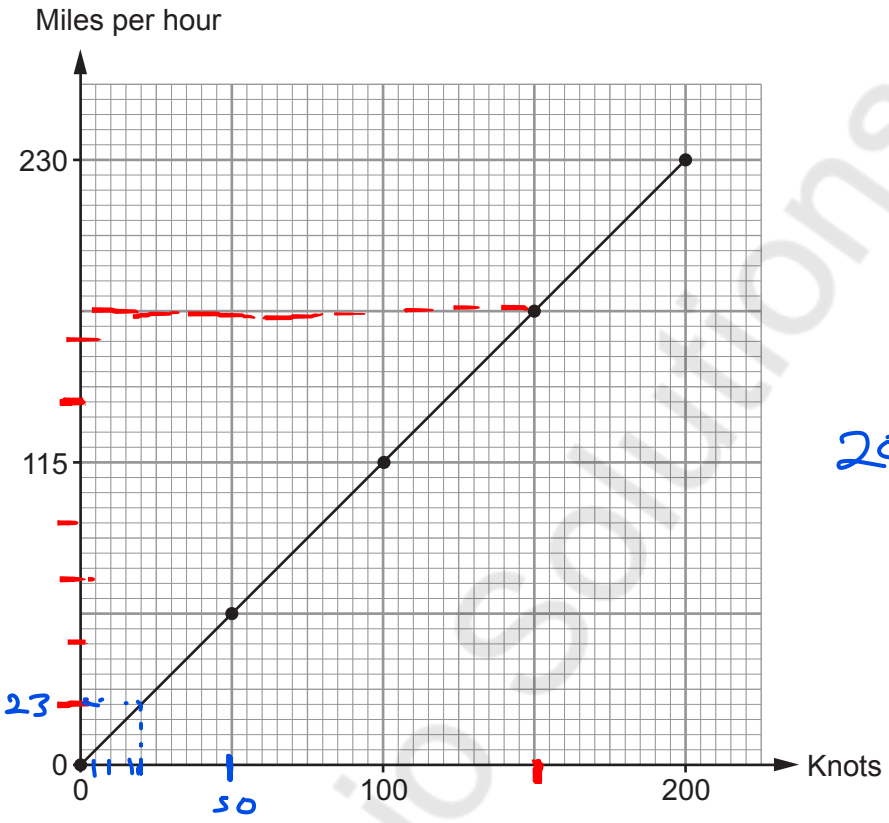


Yes ☐ No ☐

Draw a simple diagram to support your answer. [1]

Examiner only

7. Alun has made his own conversion graph to change knots to miles per hour.



(a) Use Alun's conversion graph to write 150 knots in miles per hour. [1]

$115 + 23 + 23 + \frac{23}{2}$

150 knots → 172.5 mph

Examiner only

(b) Nikita thinks Alun's conversion graph may be inaccurate.

Nikita knows that 1000 knots is 1150.779 miles per hour, correct to 3 decimal places.

Convert 20 knots to miles per hour
- using Alun's conversion graph, and then
- using Nikita's values.

Calculate the difference, in miles per hour, between your answers.
Give your answer correct to 2 decimal places.
You must show all your working. [4]

Nikita's claims 1000 Knots → 1150.779 miles/hour

1000 Knots → 1150.779 miles/hour

1 Knots → $\frac{1150.779}{1000}$ miles/hour

20 Knots → $\frac{1150.779}{1000} \times 20$ miles/hour

20 Knots → 23.02 miles/hour

So, From Alun's conversion graph

20 Knots → 23 miles/hour

Difference = 23.02 − 23

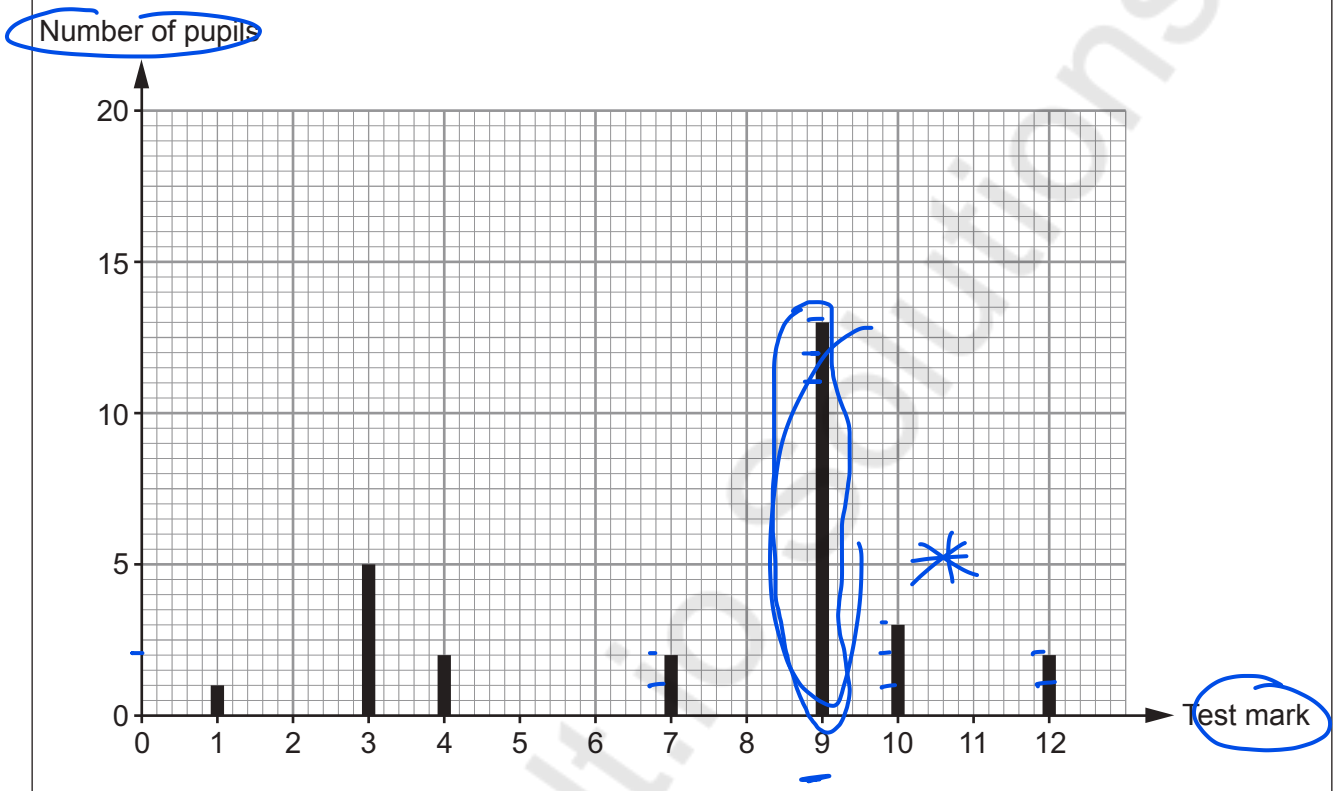
= 0.02 miles/hour

Examiner only

8. *(a)* Miss Rashud gave her Year 9 French class a test on Wednesday.
She asked her class to spell 12 different words.

She displays the results as shown below.

Year 9 results



(i) How many pupils scored **more than 9** in the test? [1]

3 + 2 = 5

(ii) How many pupils are there in Miss Rashud's French class? [1]

1 + 0 + 5 + 2 + 0 + 0 + 2 + 0 + 13 + 3 + 0 + 2 = 28

6 8 10 23 26 28

(iii) What assumption have you made in answering part (ii)? [1]

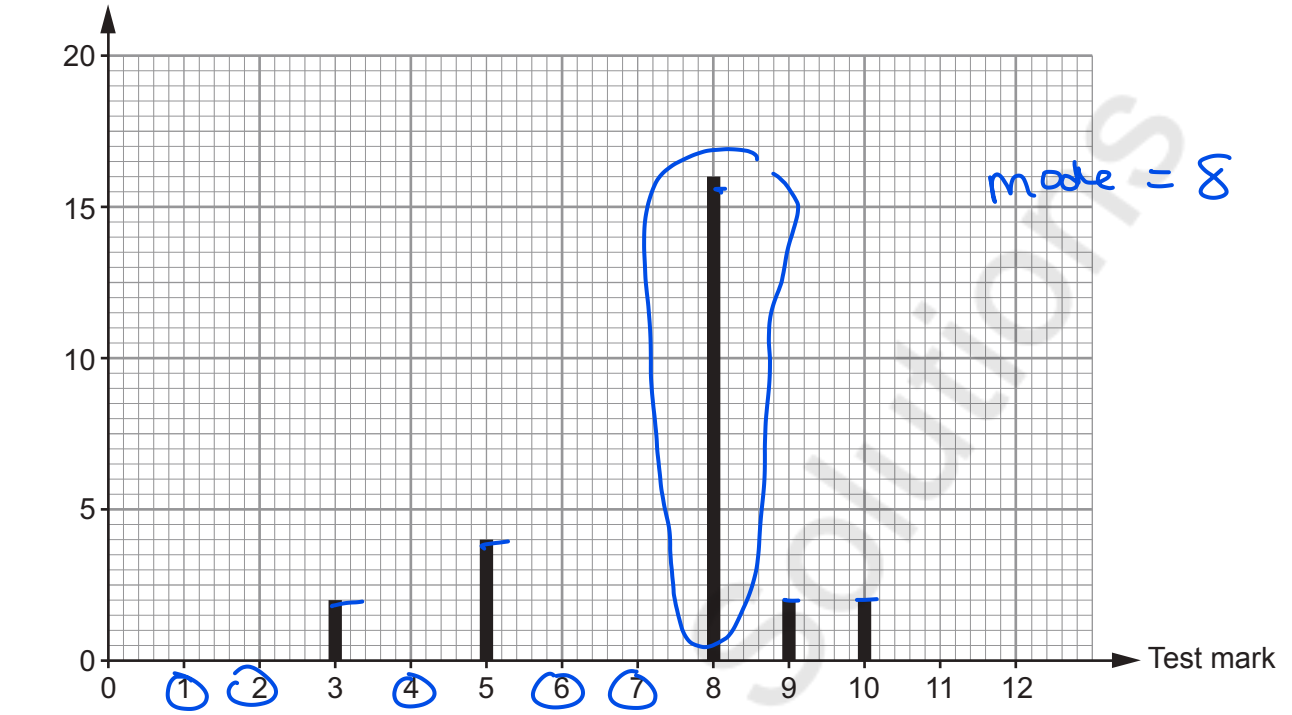
All the student are present and they took the test.

(b) Miss Rashud also gave the same test to her Year 10 French class on Wednesday.
She asked her class to spell the same 12 words.

She displays the results as shown opposite.

Examiner only

Year 10 results



(i) Leon says,

'By looking at the **Year 10** graph, I think there is very little difference between the mode and the mean for these scores.'

Without calculating the mean, explain whether Leon is correct or not. [1]

Correct ☑ Not correct ☐

Since most of scores are 8 i.e Since 16 children out of 26 scored 8 and the mode is 8. Then the mean is also approximately 8.

(ii) Catrin looks at the two sets of data Miss Rashud has displayed.
She says,

'Year 10 are better at spelling than Year 9.'

Is Catrin's statement correct?
You must give values to support your answer. [1]

Catrin is correct ☐ Catrin is incorrect ☒

Since the mode of year 9 is 9 and the mode of year 10 is 8. So, the average of year 9 student is better than the average of year 10 student
mode of year 9 > mode of year 10

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Examiner only

9. *(a)* *Organics4U* is planning to have its headquarters in Wales.
The manager has instructed Ffion to look for a site for the headquarters.

Here are the instructions that Ffion has been given by her manager.

'Find the point that is
- an equal distance between Wrexham and Aberporth, and
- an equal distance between Caernarfon and Swansea.

The new headquarters needs to be within 20 miles of this point.'

On the map below, shade the region, **in Wales**, that Ffion should identify for her manager. [4]

Examiner only

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

Organics4U has 16 vehicles on the road every working day.
The company has 6 vans and 10 trucks.

Ffion has the following information for each type of vehicle.

Type of vehicle	Average distance travelled per litre (km per litre)	Average distance travelled per day (km per day)
Van	8	256
Truck	5·5	704

The fuel used by all of the 16 vehicles costs £1.10 per litre.
Use this information to calculate the **total** fuel bill for 1 working day.
You must show all your working. [6 + 2 OCW]

Total vehicles → 16 vehicles

6 vans 10 trucks

✓ Van → 8 km/litre → 256 km/day

✓ Truck → 5·5 km/litre → 704 km/day

Cost of fuel → £1·10/litre

Van → 8 km/litre

* Total distance Travel for Van = 256 km

Fuel used by van = $\frac{256}{8}$ = 32 litres

Total fuel used by van = 32 × 6 = 192 litres

Truck → 5·5 km/litre

Total distance Travelled by Truck = 704 km

Fuel used by Truck = $\frac{704}{5.5}$ = 128 litres

Total fuel used by truck = 128 × 10 = 1280 ltr

Total Fuel used by vehicles = 192 + 1280 = 1472 litres

1 litre cost £1.10

1472 litres → 1·1 × 1472 = £1619.20

Examiner only

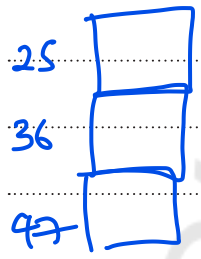
10. Mali's scooter depreciated (decreased) in value by 24% in the **first** year.
In all further years, her scooter depreciated by 13% of its previous year's value.
She originally paid £850 for her scooter.
Calculate the value of Mali's scooter after 7 years. [3]

depreciation → 24% in first year
depreciation → 13% after first year
Original price = £850.
First year depreciation → 24% of 850
→ $\frac{24}{100} \times 850 = £204$
New value after first year = £646
So, the next six years; depreciation is 13% = 0.13
$A = P(1-r)^t$
$A = 646(1-0.13)^6 = 646 \times 0.87^6 = £280.12$

After 7 years, the value of Mali's scooter was £ 280.12

11. Sanjay stacks three boxes in a pile.
The heights of the boxes are 25 cm, 36 cm and 47 cm.
They are all measured correct to the nearest centimetre.
What is the greatest possible height of the stack of the three boxes? [2]

25.499999...
25.50



25cm → 24.5cm to 25.5cm
36cm → 35.5cm → 36.5cm
47cm → 46.5cm → 47.5cm

25.5 + 36.5 + 47.5

Greatest possible height of the stack of three boxes is 109.5 cm

109.49999 cm

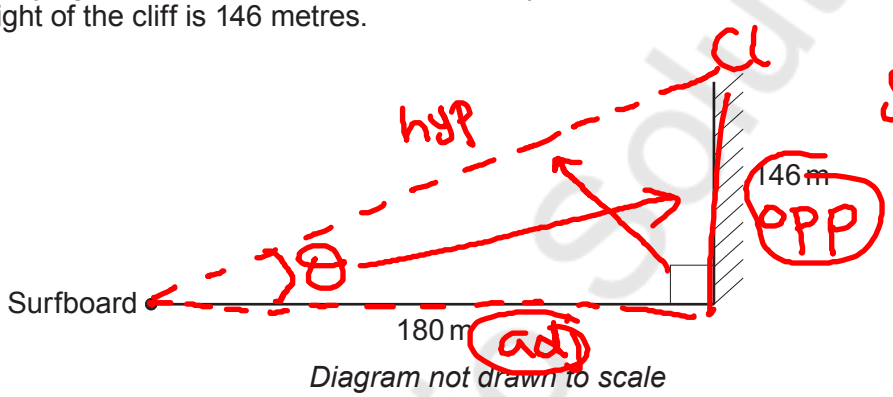
*109.49
Don't write this

109.50cm

Examiner only

12.

Ursula is lying on her surfboard 180 metres away from the foot of a vertical cliff.
The height of the cliff is 146 metres.



SOH CAH TOA

Diagram not drawn to scale

Ursula was told that if the angle of elevation of the top of the cliff from her lying position is between 42° and 45°, it is safe for her to attempt to stand on her surfboard.

Calculate the angle of elevation of the top of the cliff from Ursula's position lying on her surfboard.

State whether it is

- safe for Ursula to attempt to stand, or
- not safe as she is too near the cliff, or
- not safe as she is too far out at sea.

[4]

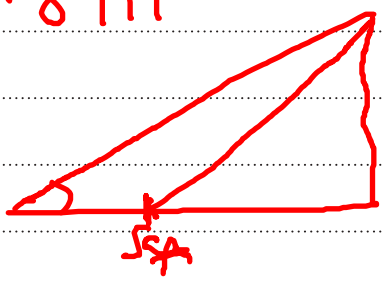
$\tan\theta = \frac{opp}{adj} = \frac{146}{180} = 0.8111$

$\tan\theta = 0.8111$

$\theta = \tan^{-1}(0.8111)$

$\theta = 39.05°$

$\theta = 39.05°$.



Safe angle is between 42° and 45°

Not safe as she is too far out at sea Or she is far from the cliff.

Examiner only

13. Marta buys a new television.

(a) Marta wants to fit the television in a bookcase on the wall.
In the shop she forgot to write down the length of the television.
She did write down the height and the diagonal of the screen.

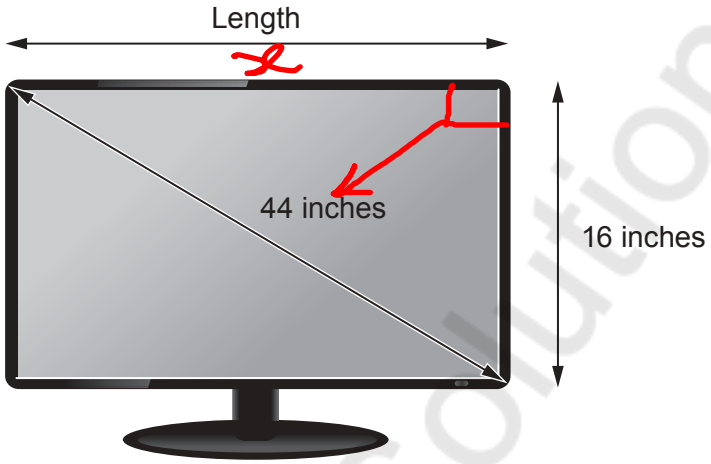


Diagram not drawn to scale

Marta needs to know the length of the screen before she opens the box, in case she wants to return the television.
Calculate the length of the screen.
Give your answer correct to 2 significant figures. [4]

Apply Pythagoras theorem

$c^2 = a^2 + b^2$

$44^2 = x^2 + 16^2$

$1936 = x^2 + 256$

$-256 \quad -256$

$1680 = x^2$

$x^2 = 1680$

$x = \sqrt{1680} = 40.99$

$x = 41$ inches to 2 s.f

Length is 41 inches, correct to 2 significant figures.

Examiner only

(b) The television was reduced in the sale by 26% of its original price.
It cost Marta £710.40 in the sale.
What was the original price of the television? [2]

Discount = 26% of its original price
Marta pays £710.40
Original price. = x
Original Price = Marta Price Pay + Discount
$x = 710.40 + \frac{26}{100} \times x$
$x = 710.40 + 0.26x$
$x - 0.26x = 710.40$
$0.74x = 710.40$
$x = \frac{710.40}{0.74}$
$x = £960$

Original price £ 960

(c) A television uses 1 unit of electricity every 10 hours.
A unit of electricity costs 9.8 p.

(i) Calculate the cost of having a television turned on for 24 hours.
Circle your answer. [1]

£23.52 £2.35 40.83 p 23.52 p 2.45 p

10 hours → 1 unit
1 hour → $\frac{1}{10}$ unit
24 hours → $\frac{1}{10} \times 24$ unit
24 hours → 2.4 unit

1 unit → 9.8p
2.4 unit = 9.8 × 2.4
2.4 unit = 23.52p

(ii) On average, Marta watches 4 hours of television each day.
On average, how much **a week** does it cost her to watch television?
Circle your answer. [1]

27.44 p £27.44 £39.20 39.2 p 10.78 p

4 hours / day → watch
1 day → 4 hours
1 week → 7 days
1 week = 4 × 7 = 28 hours
1 hr → $\frac{1}{10}$ unit
28 hours → $\frac{1}{10} \times 28$ unit = 2.8 unit

1 unit = 9.8p
2.8 unit = 9.8 × 2.8
= 27.44p

Examiner only

14. Elin's old fish tank is leaking.

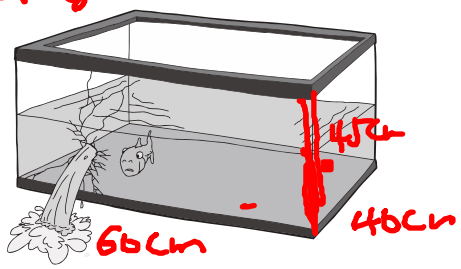


Diagram not drawn to scale

This old fish tank is in the shape of a cuboid.
The base of this tank measures 60 cm by 40 cm.
Before the leak, the height of the water level in Elin's old fish tank was 45 cm.

Elin decides to replace her fish tank with a cylindrical one.

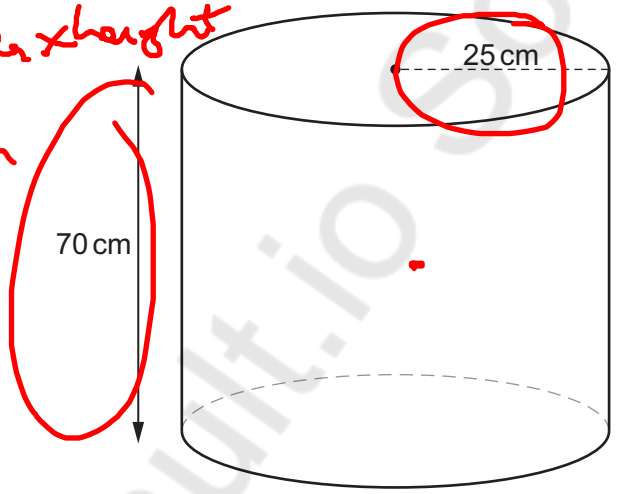


Diagram not drawn to scale

She selects a new cylindrical fish tank that has a radius of 25 cm and a height of 70 cm.

Will all the original contents, including the water and the fish, fit into this cylindrical tank?
You must show all your working. [4]

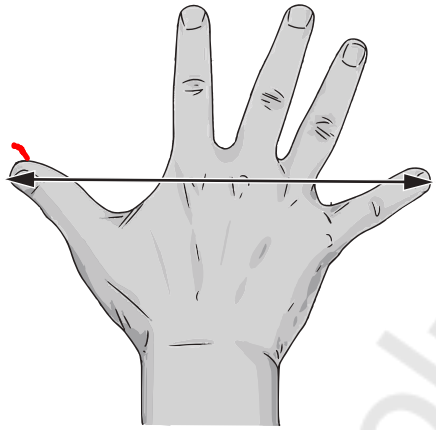
Volume of the original content
$V_{cuboid} = l \times b \times h = 60 \times 40 \times 45$
$V_{cuboid} = 108{,}000\ cm^3$
$V_{cylinder} = \pi r^2 h = 3.14 \times 25^2 \times 70$
$V_{cylinder} = 137{,}375\ cm^3$
The content of the original box will fit into the cylinder because the cylinder has more volume.

Examiner only

Examiner only

15. Simon plans to make gloves.

(a) One morning, Simon decided to carry out a survey to find the mean hand span of people in Wales.



He decided to sample systematically.
He decided to sample from the first 240 people who pass him in the street during the morning.

He wanted to take 20 people's hand span measurements.
Explain how Simon could use systematic sampling to obtain 20 measurements. [1]

First 240 people
Sample is 20 people
So, the sample technique will be
$\frac{240}{20} = 12$
So, Simon needs to sample 1 person from the first 12 people he meets

Examiner only

(b) Yesterday morning, Simon only managed to sample 10 people.
He calculated the mean hand span of these 10 people to be 22·8 cm.

Yesterday afternoon, Simon recorded the hand spans of a **further** 20 people.

The results for these 20 people are shown in the frequency table below.

Hand span, to the nearest mm	Frequency
20·0 cm to 20·8 cm	2
20·9 cm to 21·7 cm	3
21·8 cm to 22·6 cm	10
22·7 cm to 23·5 cm	5

x cm	$f \times x$ cm
20·4	40·8
21·3	63·9
22·2	222
23·1	115·5

Calculate an estimate of the mean of all **30 hand spans** that Simon measured yesterday. [6]

mean of 10 people = 22·8 cm

mean = $\frac{\text{Total length of hand } (x)}{\text{Total number of people}}$

$10 = \frac{x}{22.8}$

Total length of hand of first 10 people = 228 cm

Total length of hand of the next 20 people = 442.2

Total length of the 30 people' hand = 670.2 cm

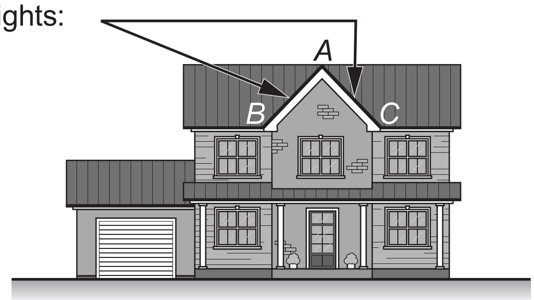
$\bar{x} = \frac{670.2}{30} = 22.34$ cm

(c) What could Simon do to improve his estimate of the mean hand span of people in Wales? [1]

He can repeat the experiment many time and also increase the sample space i.e ask more people.

Examiner only

16. The diagram below shows where Levi wants to attach a string of lights to his house.



Levi wants to attach a single string of lights from *B* to *A* and then from *A* to *C*.
The diagram below shows the measurements Levi has taken.

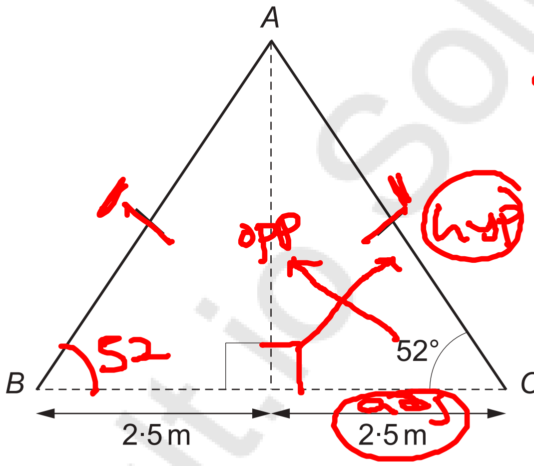


Diagram not drawn to scale

SOH CAH TOA

$\cos\theta = \frac{adj}{hyp}$

He spends £410 at the electrical store buying a string of lights.
After putting up the lights, Levi finds he has 6 metres of the string of lights left over at one end.

How much did the electrical store charge Levi, per metre, for the string of lights? [6]

Cost £410

left over = 6m of string

$\cos\theta = \frac{adj}{hyp}$

$\cos 52 = \frac{2.5}{Ae}$

$Ae = \frac{2.5}{\cos 52} = \frac{2.5}{0.6157}$ is

Ae = 4.06m

AC = AB

Total length of string is

4.06 + 4.06 = 8.12m

Total string bought

8.12m + 6m

= 14.12m

14.12m → £410

 (3310U40-1)

1m → 460 / 14.12

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£29.04 / metre

= £29 per metre

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

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