Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

3310U30-1

A21-3310U30-1

TUESDAY, 2 NOVEMBER 2021 – MORNING

MATHEMATICS – NUMERACY
UNIT 1: NON-CALCULATOR
INTERMEDIATE TIER

1 hour 35 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 additional page at the back of the booklet. Question numbers must be given for the work written on the additional 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 **3***(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.	**6**	
3.	**8**	
4.	**6**	
5.	**7**	
6.	**8**	
7.	**9**	
8.	**7**	
9.	**4**	
10.	**12**	
Total	**70**	

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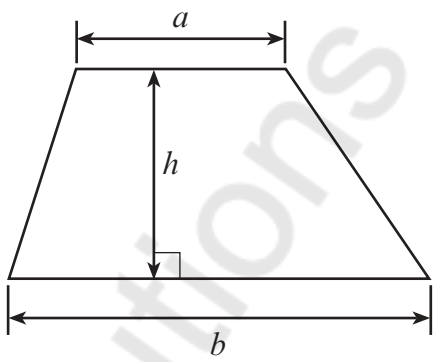
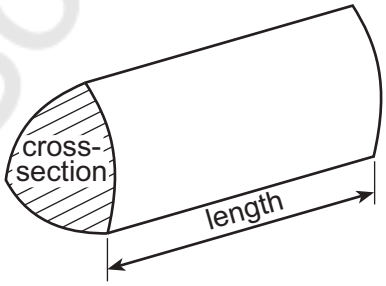
Formula List – Intermediate Tier

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

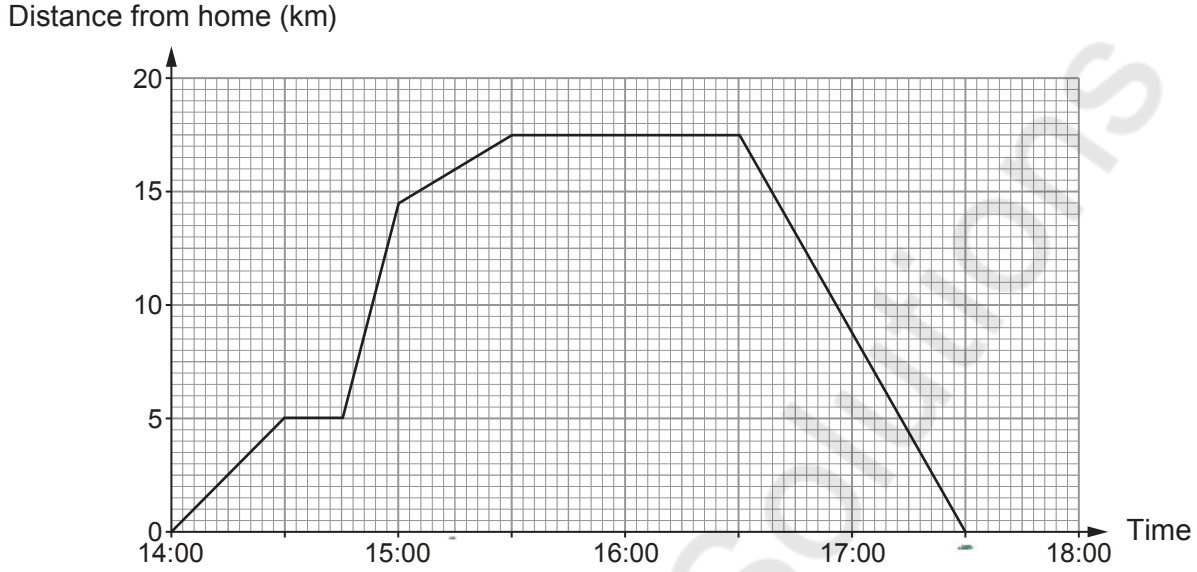


Volume of prism = area of cross-section × length



Examiner only

1. Dean went to the gym yesterday afternoon.
The graph shows the distance Dean was from home during yesterday afternoon.



(a) How far away from home was Dean at 15:15?
Circle your answer. [1]

15·5 km 15 km 16·5 km 16 km 17 km

(b) At what time did Dean arrive back home?
Circle your answer. [1]

5:30 p.m. 5:30 a.m. 5:15 p.m. 5:10 p.m. 5:00 a.m.

(c) Circle the term below that best completes the statement. [1]

"Looking at the travel graph, it is ..... that Dean stopped for more than ten minutes on the way to the gym."

very unlikely unlikely impossible

an even chance very likely

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Turn over.

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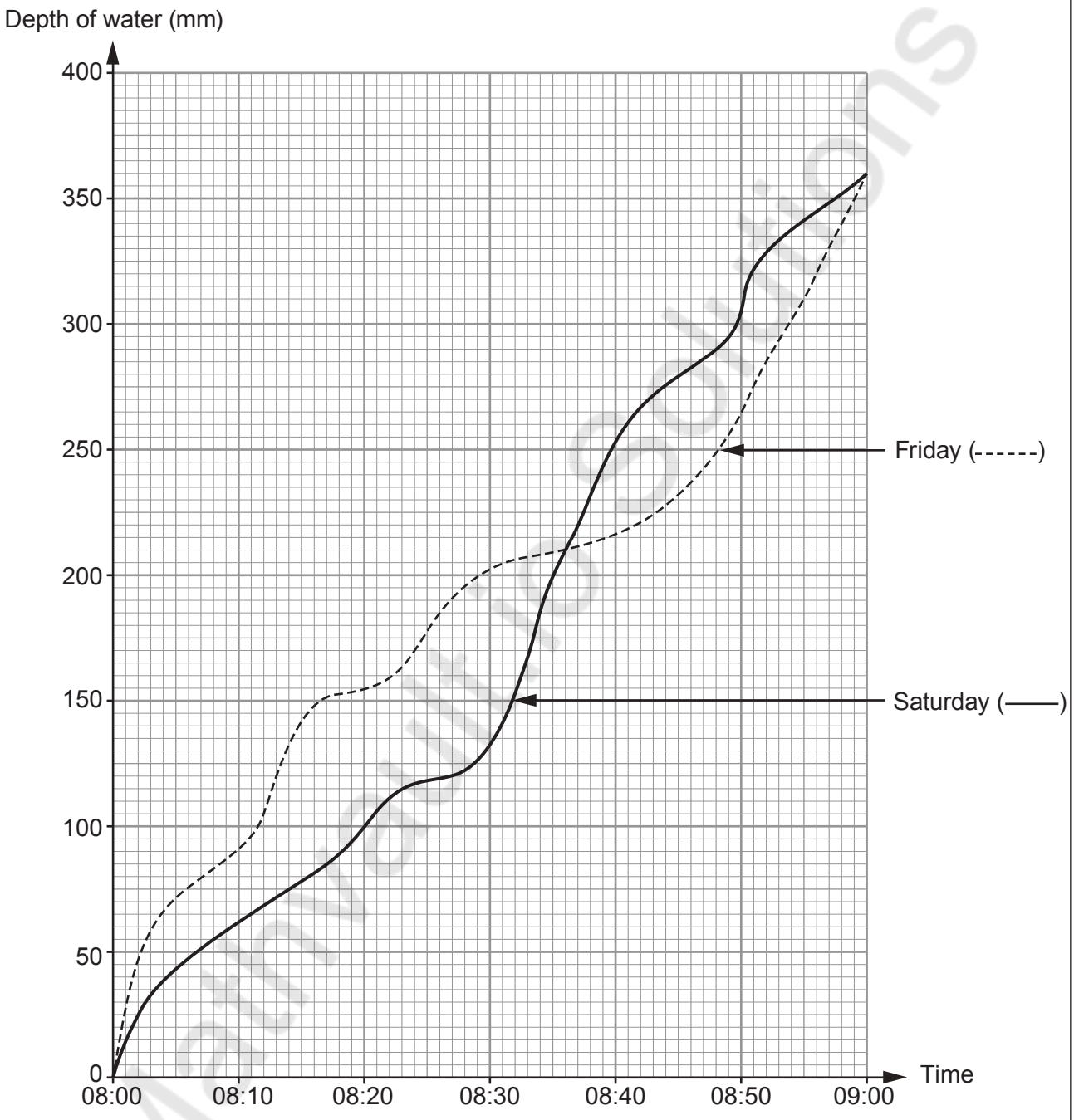
2. A water tank is filled every morning.
The graph below shows the depth of water in the tank between 8:00 a.m. and 9:00 a.m. on Friday and Saturday.



(a) What was the difference between the depth of water on Friday and on Saturday at 8:20 a.m.? [2]

54 − 55 mm

.....

.....

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(b) On both days, the tank filled with water to a depth of 360 mm.
On which day did this happen more quickly?

Friday ☐ Saturday ☐ The same for both days ☑

You must give a reason for your answer. [1]

Both were the same at 9am

(c) Consider the time interval between 8:10 a.m. and 8:50 a.m.
At what time was the depth of the water in the tank the same on both Friday and Saturday? [1]

8:36am

(d) On which day did the water tank fill more quickly between 8:30 a.m. and 8:40 a.m.?

Friday ☐ Saturday ☑ Can't tell ☐

You must give a reason for your answer. [1]

Gradient is more

(e) The tank can hold water to a depth of 400 mm.
On Saturday, at what time was the water in the tank **half** this depth? [1]

$\frac{1}{2}$ of 400 = 200mm

8:28 a.m. 8:20 a.m. 8:35 a.m. 8:12 a.m. 8:30 a.m.

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

The following advertisement appeared in the *Draig Newsletter*.

Mr Chen's guitar lessons.

A single lesson costs £23.

Pay in advance for 5 lessons and get 15% off the cost of these 5 lessons.

Rowena has a guitar lesson with Mr Chen.
She then decides to pay in advance for a further 5 lessons.

How much does Rowena pay in total for these 6 guitar lessons? [4 + 2 OCW]

Cost of first lesson = £23 ; Original cost of 5 lessons = £23 × 5 = £115

Discount = 15% of £115 = 0·15 × 115 = £17·25

Cost of five lessons after the discount = £115 − 17·25 = £97·75

Total cost of first lesson + Cost of 5 lessons after discount

= £23 + £97·75 = £120·75 //

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(b) Dafydd wants to learn to play the saxophone.

Saxophone lessons will cost him a total of £300.
He needs to pay a deposit of £18 to book the lessons.

What percentage of the total cost of the lessons is the deposit? [2]

Deposit = £18 ; Total cost = £300

$\% = \frac{\text{Deposit}}{\text{Total cost}} \times 100$

$\frac{18}{300} \times 100 = 6\%$

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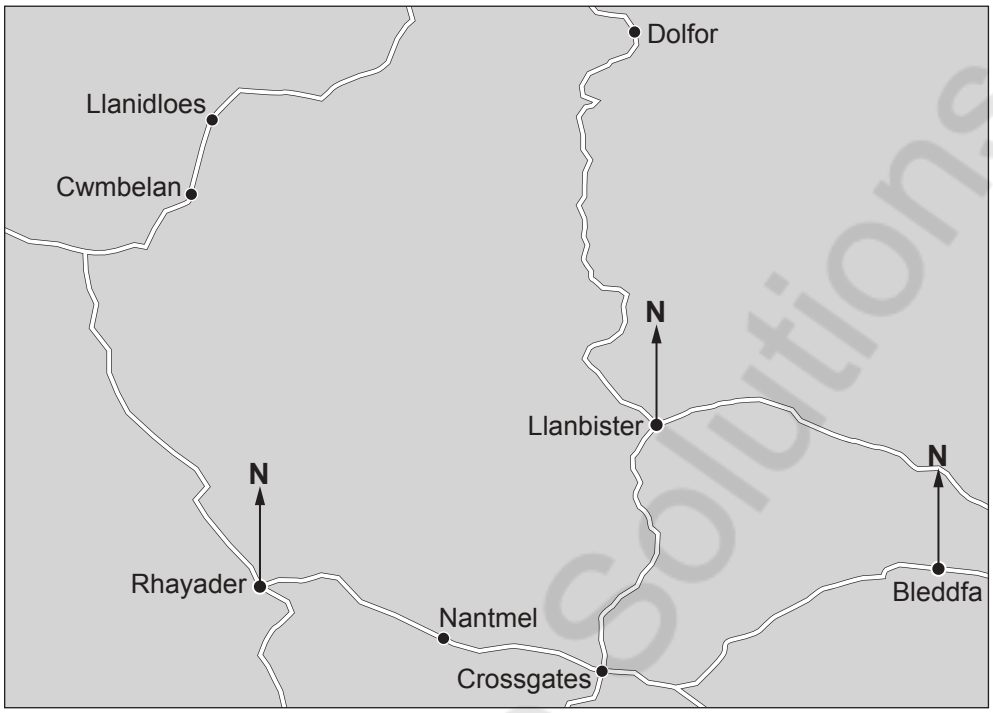
4. Use this section of a map of Wales to answer this question.
The map is drawn to scale.



(a) Complete each of the following statements.

(i) 'The bearing of Llanbister from Rhayader is 068° ± 2°.' [1]

(ii) 'The bearing of Bleddfa from Llanbister is 117° ± 2'.' [1]

(b) Cwmbelan is 2 miles from Llanidloes.

Sioned travelled from Rhayader to Crossgates in 30 minutes.
Calculate her approximate average speed.
Give your answer in miles per hour (mph).
You must show all your working. [4]

Distance = 8 miles to 12 mile

Average Speed = $\frac{8 \text{ to } 12}{0.5} = \frac{8}{0.5} \text{ to } \frac{12}{0.5}$

= 16 to 24 miles per hour

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5. Three different stores sell bananas.

Store	Price of bananas
FruitCo	12 bananas for £1
Quick Fruit	4p per 50 g
Bach Market	85 pence per kg

You can assume that the mass of a banana in each of the stores is 100 g.

Sid needs to buy 24 bananas.

Calculate how much Sid would pay in each of the stores.
In which store will he be able to get 24 bananas for the least amount of money?
You must show all your working. [7]

Fruit Co: Cost of 1 banana = $\frac{£1}{12}$ = £0.0833

Cost of 24 bananas = 0.0833 × 24 = £2.00

Quick fruit: mass of 24 bananas = 24 × 100g = 2400g = 2.4kg

Cost per 50g = 4p

Cost per gram = $\frac{4p}{50g}$ = 0.08p/g

Cost for 2400g = 2400 × 0.08p/g = 192p

= £1.92 //

Bach market: mass of 24 bananas = 24 × 100g = 2400g

= 2.4kg

Cost per kg = 85p

Cost per 2.4kg = 2.4 × 85 = 204p

= £2.04

Sid would pay the least amount of money at Quickfruit, which is £1.92 for 24 bananas

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6.

The skeleton of a dinosaur was found in Wyoming, USA, in 2008.
This skeleton is now on display in a shopping mall in Dubai.

Here are some facts about this skeleton.

- It was transported 7500 miles from Wyoming to Dubai.
- It is over 155 million years old.
- It is 80 feet long and 25 feet tall.

(a) How far was the skeleton transported?
Give your answer in kilometres. [2]

Convert from miles to km, use:
1 mile = 1.6 km

Given: Distance = 7500 miles
7500 miles × 1.6 km
= 12,000 km

12,000 km

(b)

Remember:
1 foot (ft) ≈ 30 cm

Calculate how long and how tall the skeleton is in **metres**. [4]

1 cm = 0.01 metre
80 × 30 = 2400 cm
25 × 30 = 750 cm
Length = 2400 × 0.01 m = 24 m
Height = 750 × 0.01 m = 7.5 m

The skeleton is 24 m long and 7.5 m tall

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(c)

Assume:

- the skeleton had been transported complete in one crate,
- the crate was in the shape of a cuboid.

Which of the following would be the best estimate of the volume of the crate?
Circle your answer. [1]

20 000 ft^3 20 000 ft^2 2000 ft^2 200 000 ft^3 2000 ft^3

L = 80ft , H = 25ft

Estimate width as 10ft

Calc Volume:

L × H × W = 80 × 25 × 10

= 20,000 ft^3

(d) Which of the following is 155 million written in standard form?
Circle your answer. [1]

15·5 × 10^7 1·55 × 10^4 1·55 × 10^6 155 × 10^6 1·55 × 10^8

155,000,000

1·55 × 10^8

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7. *(a)* Penystrad is a mountain village.
The daily rainfall for April 2021 is given in the table below.

Daily rainfall, r (mm)	Number of days	Midpoint
$0 \leqslant r < 6$	15	3
$6 \leqslant r < 12$	11	9
$12 \leqslant r < 18$	3	15
$18 \leqslant r < 24$	1	21
	30	

$\frac{0+6}{2}$ $\frac{6+12}{2}=\frac{18}{2}$ $\frac{12+18}{2}$ $\frac{18+24}{2}$

(i) Wesley asks,

During April 2021, on how many days did it **not** rain in Penystrad?

Explain why it is not possible to answer Wesley's question using the table shown above. [1]

Not possible to answer because the table only shows days when rainfall was greater than 0mm. No info about days with no rain at all

(ii) Calculate an estimate for the mean daily rainfall for the 30 days of April. [4]

midpoint × frequency = product

3 × 15 = 45

9 × 11 = 99

15 × 3 = 45

21 × 1 = 21

210

mean = $\frac{\Sigma(\text{freq} \times \text{midpoint})}{n}$

$= \frac{210}{30} = 7$ mm

Examiner only

(b) Glanwen is a different village.

During the first 25 days of April in Glanwen, the mean daily rainfall was 4·4 mm.
It did not rain in Glanwen during the last 5 days of April.
Calculate the mean daily rainfall in Glanwen for April.
Give your answer correct to 3 significant figures. [4]

Total rainfall for first 25 days = $25 \times 4.4 = 110$ mm

Add rainfall for last 5 days = $5 \times 0 = 0$ mm

Over 30 days = 110 to = 110 mm

Mean over 30 days = $\frac{110}{30}$

$= 3.666 \approx 3.67$ mm

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8. Sara makes and sells handmade chocolates.

(a) She makes boxes for her chocolates in the shape of a tetrahedron.
Sara uses thin card to make each box.
The length of each edge of the box is 5 cm.

What is the total length of the edges of one box?
Circle your answer. [1]

15 cm (30 cm) 40 cm 45 cm 60 cm

each edge = 5cm a tetrahedron has 6 edges

Total length = 6 × 5 = 30cm

(b) Each box contains 4 chocolates.
Each chocolate costs Sara 7p to make.
She can make 25 boxes from thin card for 50p.
Sara makes just enough chocolates and boxes to sell 150 boxes of chocolates.

Sara makes 20% profit from selling all 150 boxes of chocolates.
How much profit does Sara make?
You must show all your working. [6]

Cost per box = 4 × 7 = 28p

Total cost for 150 boxes = 150 × 28 = 4200p

Cost of boxes (thin card):

25 boxes cost 50p

So, 1 box = $\frac{50}{25}$ = 2p

Cost for 150 boxes = 150 × 2 = 300p or £3

Total cost = 4200p + 300p = 4500p or £45

20% of 45 = $\frac{20}{100}$ × 45 = £9

900p or £9

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9. A fast food restaurant has staff name badges in the shape of a star.
Each badge has a pin across the back, as shown in the diagram.
Members of staff choose the size of badge they want to wear.
The badges are mathematically similar.

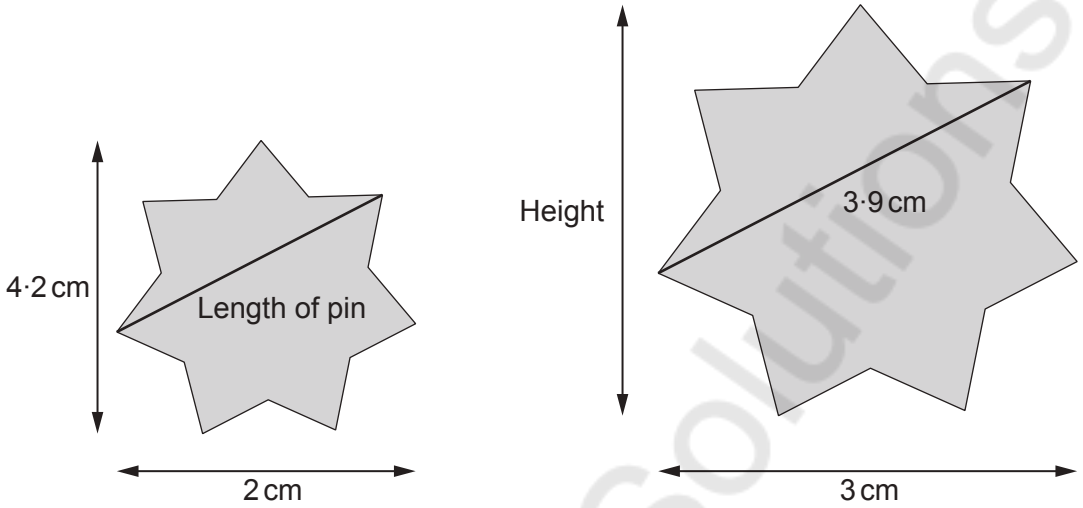

Diagram not drawn to scale

The length of the pin on the larger badge is 3·9 cm.

Calculate the height of the larger badge and the length of the pin on the smaller badge. [4]

Badge	Width	Height	Pin length
Smaller	2	4·2	?
Larger	3	?	3·9

Find the scale factor
Use widths of the badges =

$$\text{Scale factor} = \frac{\text{Larger width}}{\text{Smaller width}} = \frac{3}{2} = 1.5$$

Calc height of larger badge = $1.5 \times 4.2 = 6.3$ cm

$$\text{Smaller badge pin length} = \frac{3.9}{1.5} = 2.6$$

Height of the larger badge ..... 6·3 ..... cm

Length of the pin on the smaller badge ..... 2·6 ..... cm

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10. Bethan works as an office manager at a medical centre.

Last Monday, 60 patients each had an appointment with a doctor.
Bethan recorded how long each patient's appointment lasted.
Her results are given in the table below.

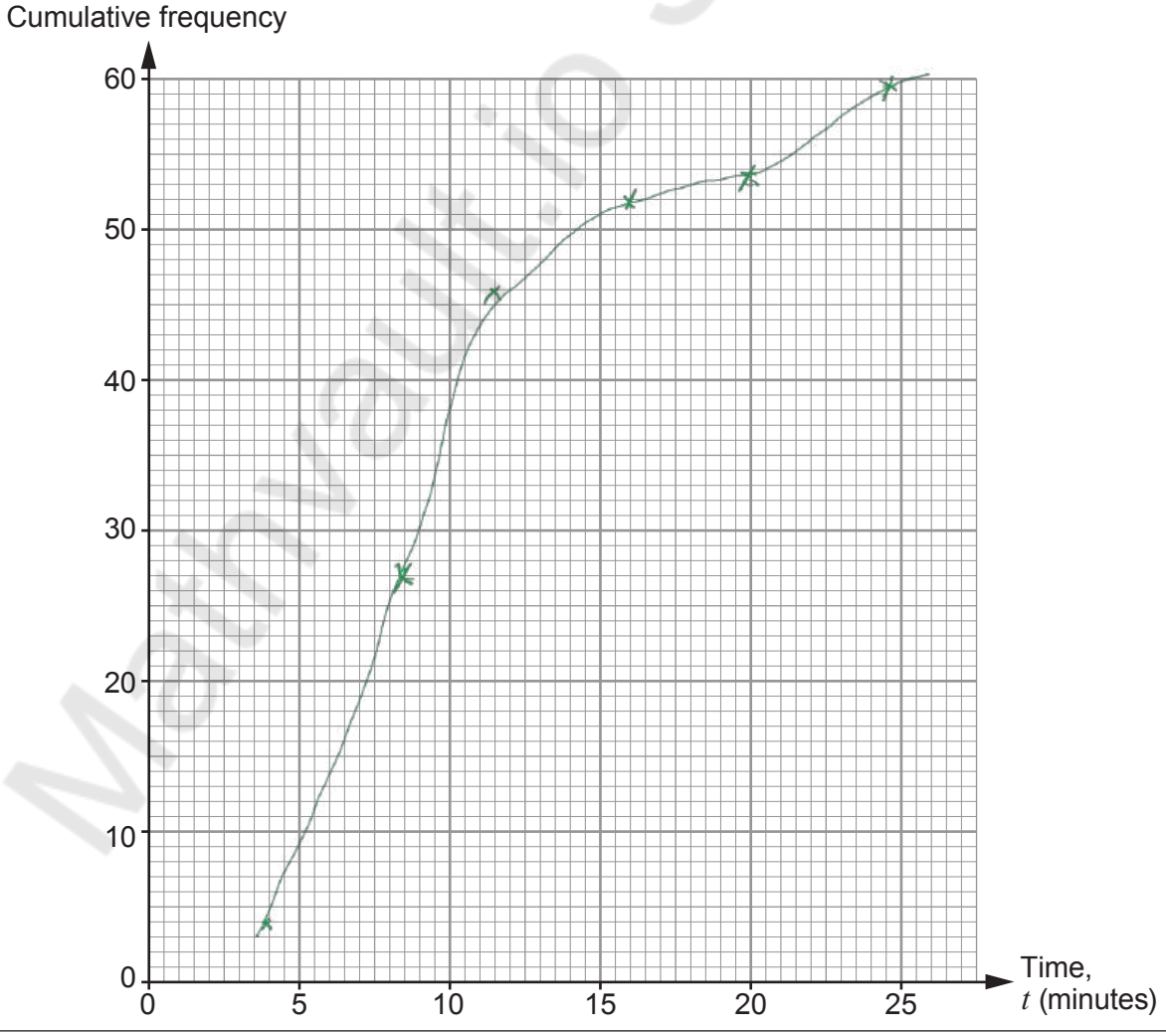
Length of time, t (minutes)	$0 < t \leqslant 4$	$4 < t \leqslant 8$	$8 < t \leqslant 12$	$12 < t \leqslant 16$	$16 < t \leqslant 20$	$20 < t \leqslant 24$
Number of patients	4	24	18	6	2	6

4 4+24 28+18 46+6 52+2 54+6

(a) Complete the following cumulative frequency table. [1]

Time, t (minutes)	$t \leqslant 0$	$t \leqslant 4$	$t \leqslant 8$	$t \leqslant 12$	$t \leqslant 16$	$t \leqslant 20$	$t \leqslant 24$
Cumulative frequency	0	4	28	46	52	54	60

(b) On the graph paper below, draw a cumulative frequency diagram to show this information. [2]



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(c) Each patient is given 10 minutes for their appointment.
Use your graph to give the best estimate for the number of appointments that lasted longer than 10 minutes.
Give your answer correct to the nearest whole number of appointments. [2]

60 (Total no. of patients) − 37 = 23 Patients appointments

(d) Of the patients seen last Monday, what percentage spent longer than 20 minutes with the doctor? [2]

Total no. of pts = 60
pts who spent up to 20 mins = 54
60 − 54 = 6 ; $\frac{6}{60} \times 100 = 10\%$

(e) The median length of the appointments last Tuesday was 11·5 minutes.
How much shorter was the median length of the appointments on Monday?
Give your answer correct to the nearest minute. [2]

30th patient lies btw 8 – 12 mins
8 mins
$8 + \frac{8}{18} = 8 + 0.44 = 8.44$ mins
11·5 − 8·44 mins
= 3·06
≈ 3 mins

(f) Bethan is considering changing the time given for each patient's appointment to 12 minutes.
She would set a target of 80% of patient appointments taking less than or equal to 12 minutes.
Would this target have been met last Monday?
You must show all your working. [3]

80% of 60 = 0·8 × 60 = 48 patients
So Beth's target of 80% was not met
46 out of 60 pts = 76·7%, not 80%

END OF PAPER

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

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