Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2024

Mathematics

StemUp Model Solution

Unit M1
(With calculator)

Foundation Tier

[GMC11]



GMC11

THURSDAY 16 MAY, 9.15 am–11.00 am

TIME

1 hour 45 minutes.

INSTRUCTIONS TO CANDIDATES

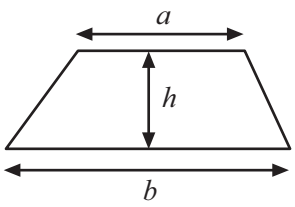
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all thirty** questions.
All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

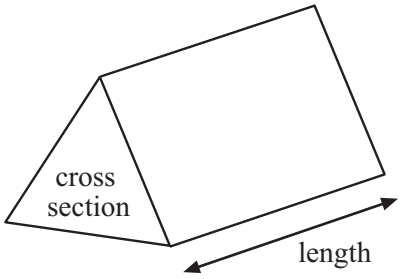
The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

Formula Sheet

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



Volume of prism = area of cross section × length



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1 **(a)** A "day-rider" bus ticket costs £6.25

Tommy bought a "day-rider" ticket on 3 days last week.

How much did he pay for the 3 tickets?

3 × 6.25 = 18.75

Answer £ 18.75 [1]

(b) A "week-rider" bus ticket costs £15

How much would Tommy have saved if he had bought the "week-rider" bus ticket instead of the 3 "day-rider" bus tickets?

18.75 − 15 = 3.75

Answer £ 3.75 [1]

[Turn over

2 Insert the correct word from the list to make each of the statements correct.

square **factor** **multiple** **prime** **cube**

40 is a _____*multiple*_____ of 5

29 is a _____*prime*_____ number

7 is the _____*square*_____ root of 49 [3]

3 The O'Hara family and the McKee family went on holiday.

Each family had 4 bags.

The weights of these bags are shown below.

O'Hara Family	McKee Family
21.45 kg	20.8 kg
18.2 kg	19.35 kg
8.6 kg	7.8 kg
9.05 kg	9.1 kg

Which family's bags weighed more, and by how much?

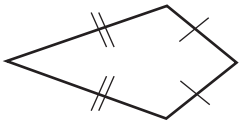
O'Hara: 21.45 + 18.2 + 8.6 + 9.05 = 57.3 kg

McKee: 20.8 + 19.35 + 7.8 + 9.1 = 57.05 kg

57.3 − 57.05 = 0.25 kg

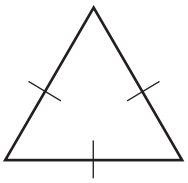
Answer _____*O'Hara*_____ family's bags weighed ___*0.25*___ kg more. [3]

4 **(a)** What is the mathematical name of this quadrilateral?



Answer kite [1]

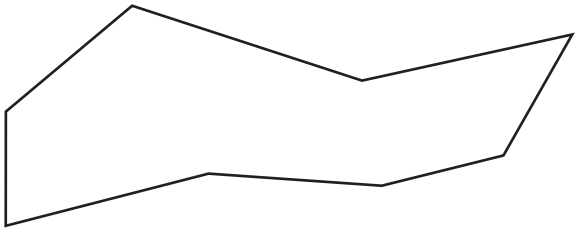
(b) What type of triangle is shown?



Circle the correct answer.

equilateral **isosceles** **right-angled** **scalene** [1]

(c) An octagon is shown.



For each statement tick (✓) True or False.

The shape has 8 vertices.	True	✓	False	
The shape has 1 right angle.	True		False	✓

[2]

[Turn over

5 **(a)** Thomas is the general manager of Gala Inn Hotel.

He buys a 10-litre bottle of shampoo and uses it to fill smaller bottles.



How many millilitres of shampoo are in a full 10-litre bottle?

10 litres = 10 × 1000 ml
= 10000 ml

Answer 10000 ml [1]

(b) The smaller bottles hold 40 ml of shampoo.

How many 40 ml bottles can be completely filled from the 10-litre bottle of shampoo?



10000 ÷ 40 = 250

Answer 250 bottles [2]

6 **(a)** Kyle has a weekend job that pays £8 per hour.

Last weekend Kyle worked 11 hours.

How much did he earn?

11 × 8 = 88

Answer £ 88 [1]

(b) Kyle looked at the rota for the next 4 weekends.

He will work	Weekend 1	14 hours
	Weekend 2	12 hours
	Weekend 3	13 hours
	Weekend 4	10 hours

Kyle wants to buy a new console costing £399

Over the next 4 weekends, will Kyle make enough money to be able to buy the console?

You must show all your working clearly.

14 + 12 + 13 + 10 = 49 hours

49 × £8 = £392

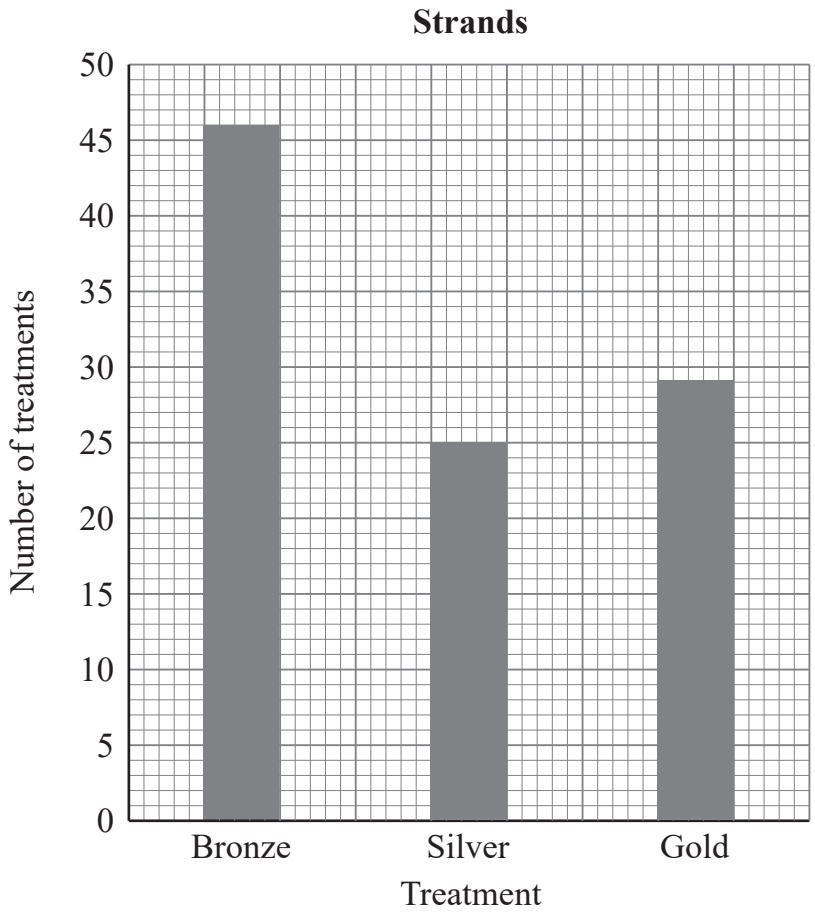
£392 < £399, so not enough money

Answer No [3]

[Turn over

7 Strands is a hair salon, offering Bronze, Silver and Gold treatments.

The bar chart shows the number of treatments carried out last weekend.



(a) Which treatment was the mode?

Bronze has the tallest bar (46)

Answer *Bronze* [1]

(b) What was the total number of treatments carried out?

Bronze 46, Silver 25, Gold 29
46 + 25 + 29 = 100

Answer 100 treatments [1]

(c) Silver treatments cost £30 each.

How much money in total was spent on Silver treatments?

25 × £30 = £750

Answer £ 750 [1]

[Turn over

8 The table shows details of 8 fitness watches.

Model	Screen size (inch)	GPS	Weight (g)	Battery life (days)	Music storage	Price (£)
iFit A	0.4	yes	17	7	yes	99
WahWay 1	1.2	no	21	30	no	70
Ingram	1.1	no	23	14	no	29
iFit B	1.6	yes	39	7	yes	199
WahWay 2	1.5	yes	27	1	yes	210
iFit C	1.0	yes	58	10	yes	160
Ingram +	1.6	yes	38	11	no	189
WahWay 3	1.6	yes	46	6	yes	225

(a) What model is the cheapest watch with music storage?

Answer iFit A [1]

(b) Darra buys the WahWay watch under 30 g in weight with the largest screen size.

Which model does he buy?

Answer WahWay 2 [1]

(c) Melissa has £175 to spend.

She wants a watch with GPS and a battery that lasts longer than 7 days.

Which model should she buy?

iFit C: GPS, 10 days, £160

Answer iFit C [1]

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9 A company designs and prints badges.

To work out how much to charge customers, they use the rule

Total cost = £15 + (£2 × number of badges)

(a) A sports club ordered 40 badges.

How much was the total cost?

$15 + 2 \times 40$
$= 15 + 80 = 95$

Answer £ 95 [1]

(b) A different sports club paid a total cost of £245

How many badges did they order?

$245 - 15 = 230$
$230 \div 2 = 115$

Answer 115 [2]

[Turn over

10 In a game, players try to hit a target placed in the centre of a board.

The game is scored as follows.

20 points for hitting the target **(target)**

0 points for hitting the board but missing the target **(board)**

–5 points for missing the board **(miss)**

(a) Peter had 8 attempts.

His results were

miss target miss board target target board miss

What was his total score?

$-5 + 20 - 5 + 0 + 20 + 20 + 0 - 5$
$= 60 - 15 = 45$

Answer 45 [2]

(b) Jessica had 5 attempts.

She scored 80 points.

How many times did she hit the target?

$4 \times 20 = 80$ (and 1 board = 0 points)

Answer 4 [1]

11 **(a)** Yuri takes the overnight train from Moscow to St Petersburg.

The train departs Moscow at 21:55 and arrives in St Petersburg at 06:06 the next morning.

How long is the journey?

21:55 → 22:00 = 5 min
22:00 → 06:00 = 8 h
06:00 → 06:06 = 6 min
total = 8 h 11 min

Answer 8 hours 11 minutes [1]

(b) A cargo container is 23 m long, 2.5 m wide and 3 m high.



What is the volume of the cargo container?

23 × 2.5 × 3
= 172.5

Answer 172.5 m^3 [2]

[Turn over

12 **(a)** A meal in Jacob's school canteen costs £3.10

Jacob uses a pre-paid card to pay for his meals.

Jacob has £20 on his pre-paid card.

What is the maximum number of meals he will be able to pay for?

20 ÷ 3.10 = 6.4516...
so 6 meals

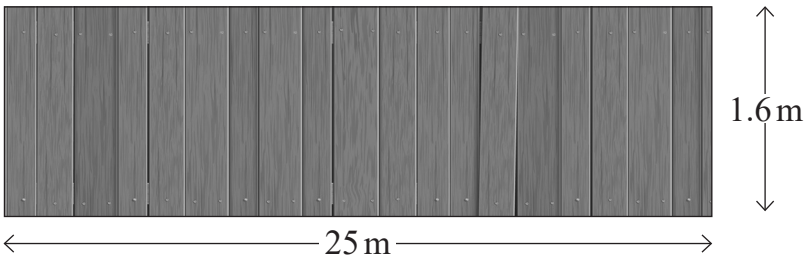
Answer 6 [1]

(b) How much will be left on the card after he has paid for the maximum number of meals?

6 × 3.10 = 18.60
20 − 18.60 = 1.40

Answer £ 1.40 [2]

13 Taylor is planning to paint one side of his rectangular garden fence.



Source: Getty Images/1129547485

The fence is 25 m long and 1.6 m high.

One tin of paint covers 7 m^2 and costs £9

How much will it cost Taylor for the paint?

Area = 25 × 1.6 = 40 m^2

40 ÷ 7 = 5.714...

so 6 tins needed

6 × £9 = £54

Answer £ 54 [3]

[Turn over

14 (a) The minimum and maximum monthly temperatures, in degrees Fahrenheit, for Dublin last year are given in the table.

Month	Minimum (°F)	Maximum (°F)
January	36	47
February	36	47
March	37	50
April	39	54
May	44	59
June	48	64
July	52	67
August	52	66
September	48	63
October	44	57
November	40	51
December	37	47

What is the **range** of temperatures in June?

64 − 48 = 16

Answer 16 °F [1]

(b) The monthly rainfall, in millimetres, in Dublin last year is shown.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (millimetres)	65	50	55	55	60	65	55	75	60	80	75	75

(i) What is the median monthly rainfall?

50, 55, 55, 55, 60, 60, 65, 65, 75, 75, 75, 80

median = (60 + 65) ÷ 2 = 62.5

Answer 62.5 mm [2]

(ii) The table shows that the wettest **month** last year was October.



Declan says:

The wettest **day** last year must have been in October.



Una says:

The wettest **day** last year may not have been in October.

Who is correct?

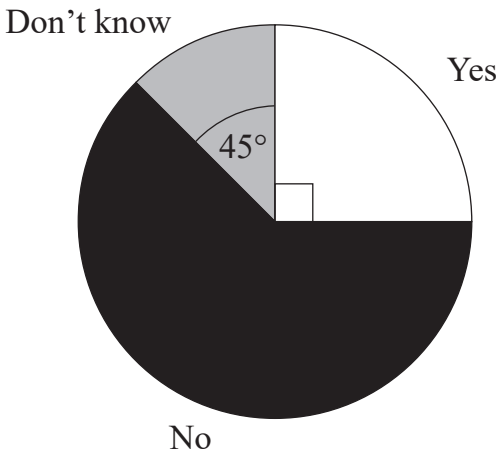
Circle your answer.

Declan **Una** **Declan and Una** **Neither** [1]

[Turn over

15 (a) The results of a survey are displayed.

Are there enough electric vehicle charging points in Belfast?



(i) 30 people surveyed said "Yes".

How many people in total were surveyed?

Yes angle = 90°

360 ÷ 90 = 4

30 × 4 = 120

Answer 120 people [1]

(ii) What fraction of those surveyed said "Don't know"?

Don't know = $\frac{45}{360} = \frac{1}{8}$

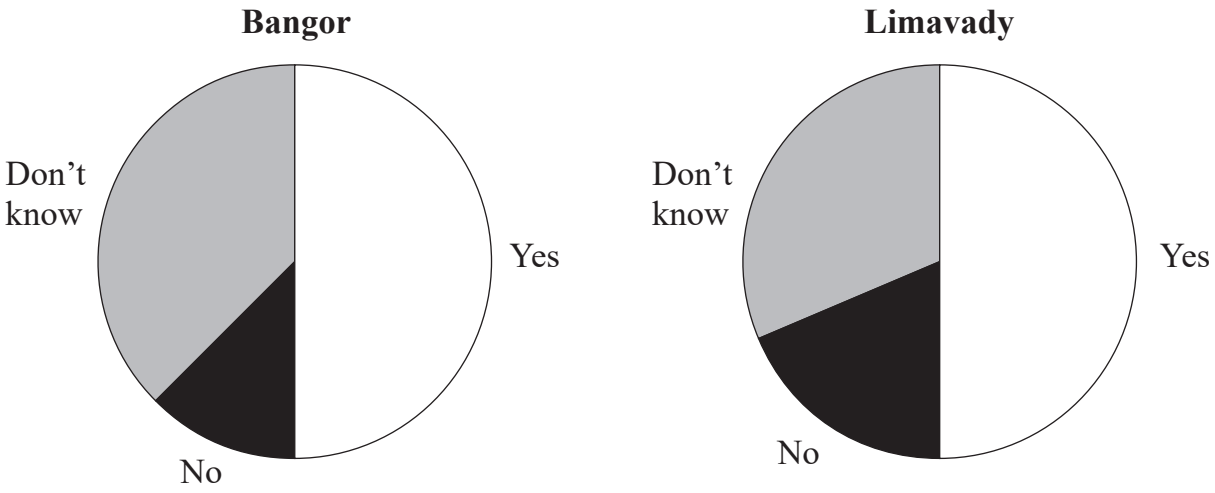
Answer $\frac{1}{8}$ [1]

(b) Other surveys were conducted in Bangor and Limavady.

One of the questions asked was:

Will your next vehicle be fully electric?

The results are shown in these pie charts.



Lewis thinks the same number of people in Bangor and Limavady answered "Yes" to this question.

Explain why Lewis may be wrong.

Answer *There may not have been the same number of people surveyed in Bangor and in Limavady.* [1]

[Turn over

16 Anita is paid £1950 each month.

She saves 10% of her pay each month.

How much will she have saved after 1 **year**?

10% of 1950 = 1950 ÷ 100 × 10 = 195

195 × 12 = 2340

Answer £ 2340 [3]

17 Calculate

(a) $\sqrt{7.84}$

$\sqrt{7.84} = 2.8$

Answer 2.8 [1]

(b) $\dfrac{8.84 + 24.6}{9.2 - 4.8}$

$8.84 + 24.6 = 33.44$

$9.2 - 4.8 = 4.4$

$33.44 \div 4.4 = 7.6$

Answer 7.6 [2]

(c) $5^3 - 2^2$

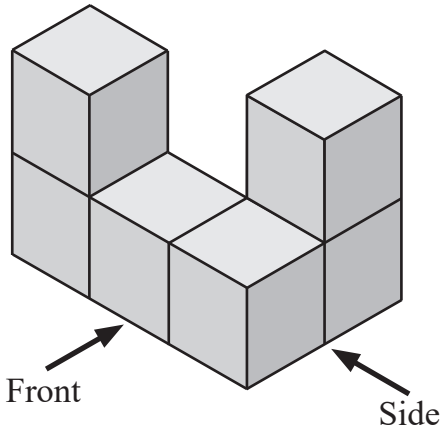
$125 - 4$

$= 121$

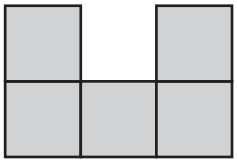
Answer 121 [2]

[Turn over

18 A 3D shape is shown.



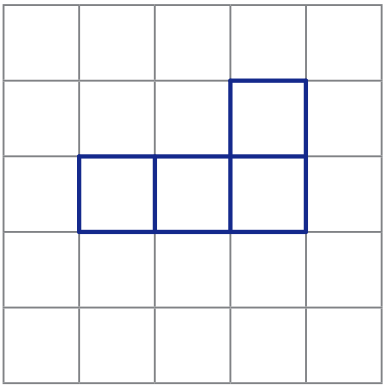
(a) Which elevation is drawn below?



Circle the correct response.

side **front** **neither** [1]

(b) Draw the **plan** of the 3D shape on the grid.



[1]

(c) Rosie is painting the outside of the 3D shape including the base.

How many squares will Rosie have to paint?

Circle the correct response.

13 **26** **30** **31** [1]

19 Calculate angle x.

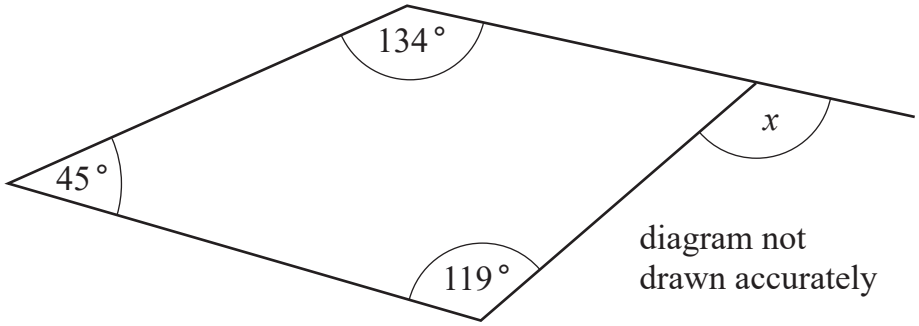


diagram not drawn accurately

Angles in a quadrilateral add up to 360°

134 + 45 + 119 = 298

360 − 298 = 62°

Angles on a straight line add up to 180°

x = 180 − 62 = 118°

Answer x = 118 ° [3]

[Turn over

20 Gavin ordered carpet for his living room and bedroom.

The living room carpet cost £37.20 per square metre.

He ordered 24.5 square metres of living room carpet.

The bedroom carpet cost £14.30 per square metre.

He paid a total price of £1068.70

How much bedroom carpet did he order?

24.5 × 37.20 = 911.40

1068.70 − 911.40 = 157.30

157.30 ÷ 14.30 = 11

Answer 11 square metres [4]

21 Stacey is going to invite some friends round for a pizza party.

To work out how many pizzas to order, she uses the formula

$$p = \frac{ne}{s}$$

where

p = number of pizzas to order

n = number of people at the party

e = number of slices each person gets

s = number of slices per pizza

How many pizzas, each with 8 slices, are needed if there are 16 people at the party and each person gets 3 slices?

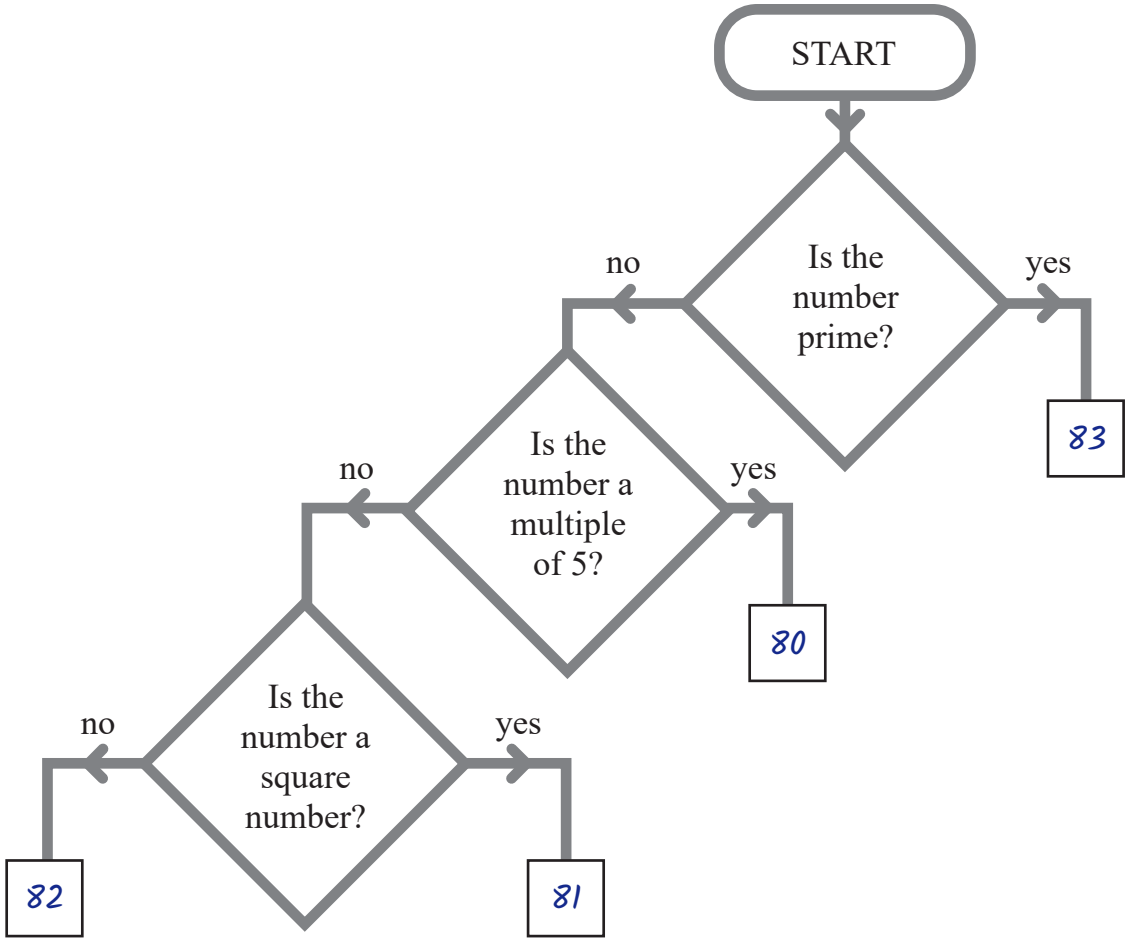
$p = \frac{16 \times 3}{8} = \frac{48}{8} = 6$

Answer 6 pizzas [3]

[Turn over

22 Look at the diagram below.

Place the numbers **80**, **81**, **82** and **83** in the correct boxes on the diagram.



[2]

23 (a) Two farmers grow apples.

Farmer Jack's apples have a mean weight of 116.85 g and a range of 19.1 g.

Farmer Brown weighs ten of his apples, picked at random.

Their weights, in grams (g), are

113.2 114.5 116.7 118.1 114.0 116.9 115.3 117.3 114.6 115.7

Whose apples are heavier on average?

You must give a mathematical reason with your answer.

Brown: total = 1156.3 g
mean = 1156.3 ÷ 10 = 115.63 g
Jack: mean = 116.85 g
116.85 > 115.63
Brown range = 118.1 − 113.2 = 4.9 g

Answer Farmer *Jack* because *his mean weight is greater (116.85 g > 115.63 g)* [3]

(b) A supermarket prefers their apples to be similar in size.

Why might this supermarket prefer to buy Farmer Brown's apples?

Answer *The range of his apples is smaller (4.9 g < 19.1 g), so they are more similar in size* [1]

[Turn over

24 Claire wants to buy a new watch.

She looks at special offers for this watch in two different shops.

Shop	Normal price	Special offer
Every Second	£135	15% discount
Minutes Matter	£174	$\frac{1}{3}$ off all prices

Which shop is now selling the watch at the cheapest price?

You must show working to explain your answer.

Every Second: 135 ÷ 100 × 15 = 20.25

135 − 20.25 = £114.75

Minutes Matter: 174 ÷ 3 = 58

174 − 58 = £116

£114.75 < £116

Answer *Every Second* [4]

25 A car travels at an average speed of 30 miles per hour for one hour.

It then travels at an average speed of 54 miles per hour for half an hour.

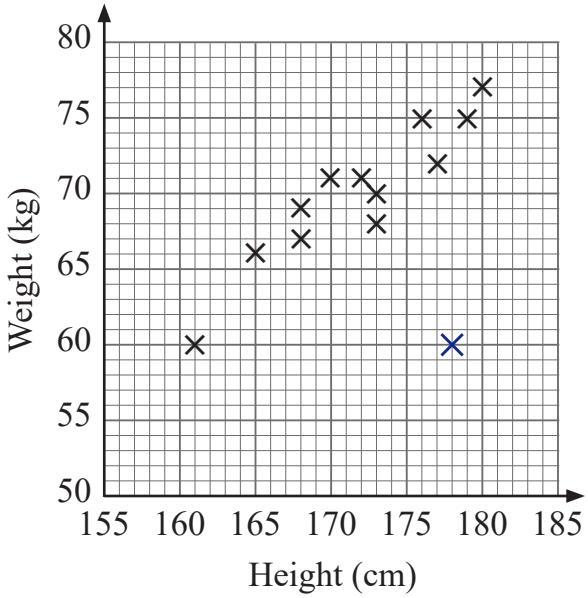
Calculate the average speed for the **whole** journey.

Distance = 30 × 1 + 54 × 0.5
= 30 + 27 = 57 miles
Time = 1 + 0.5 = 1.5 hours
Average speed = 57 ÷ 1.5 = 38

Answer 38 miles per hour [3]

[Turn over

26 The scatter graph shows the heights and weights of players on a rugby squad.



(a) Describe the relationship between the heights and weights of the players.

Answer *as height increases, weight increases (positive correlation)* [1]

(b) Jack Morris joins the squad.

The manager records Jack's height as 178 cm.

The manager records Jack's weight as 60 kg.

Plot this information on the scatter graph above. [1]

(c) The manager made an error in reading Jack's weight.

Use the scatter graph to say whether Jack's weight is likely to be lower or higher than 60 kg.

Answer *higher* [1]

27 A wedding venue has circular tables of diameter 2 m.

The bride wants to put ribbon round the edge of each table.

There are 15 tables.

The ribbon is only sold in a **whole number of metres** and costs £1.25 per metre.

What is the minimum total cost of the ribbon?

Circumference = π × 2 = 6.283185307... m

6.283185307 × 15 = 94.24777961 m

so 95 m needed

95 × £1.25 = £118.75

Answer £ 118.75 [4]

[Turn over

28 Steve bought a box of 200 hats for £120

He decided to sell them at a local market.

It cost him £20 to hire a stall at the market.

Steve sold 70% of the hats at £3 each.

He sold a quarter of the hats at £2.50 each.

The remaining hats were sold at £1 each.

How much profit did Steve make?

70% of 200 = 140 hats: 140 × 3 = £420

a quarter of 200 = 50 hats: 50 × 2.50 = £125

remaining = 200 − 140 − 50 = 10 hats: 10 × 1 = £10

income = 420 + 125 + 10 = £555

costs = 120 + 20 = £140

profit = 555 − 140 = £415

Answer £ 415 [5]

29 Solve the equation $5(2y + 3) = 79$

$5(2y + 3) = 79$

$10y + 15 = 79$

$10y = 64$

$y = 64 \div 10 = 6.4$

Answer $y =$ 6.4 [3]

[Turn over



30 A primary school has a Choir (**C**) and a Drama Club (**D**).

The school has 80 pupils.

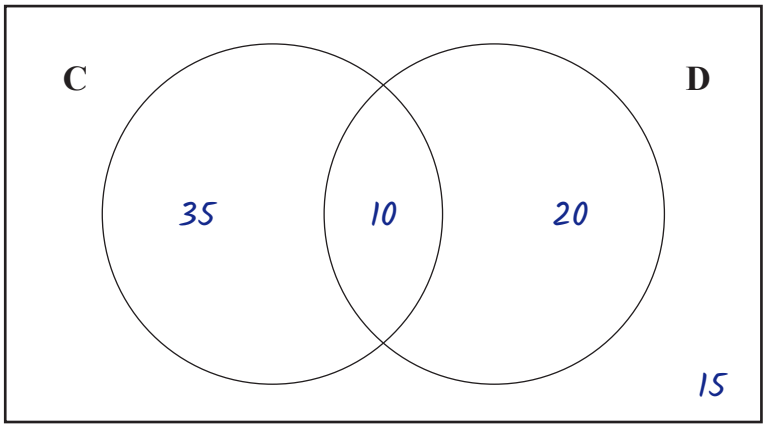
45 pupils attend Choir.

30 pupils attend Drama.

15 pupils attend neither.

(a) Complete the Venn diagram using this information.

$80 - 15 = 65$
$45 + 30 = 75$
both $= 75 - 65$
$= 10$



[3]

(b) What fraction of the pupils attend **only** the Drama Club?

Drama only $= \frac{20}{80} = \frac{1}{4}$

Answer $\frac{1}{4}$ [1]

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