Rewarding Learning

General Certificate of Secondary Education

Centre Number

Candidate Number

Mathematics

StemUp Model Solution

Unit M2
(With calculator)
Foundation Tier



[GMC21]
Assessment

GMC21

Assessment Level of Control:
Tick the relevant box (✓)

Controlled Conditions	
Other	

TIME

1 hour 45 minutes.

INSTRUCTIONS TO CANDIDATES

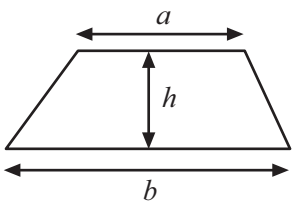
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all twenty-seven** 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

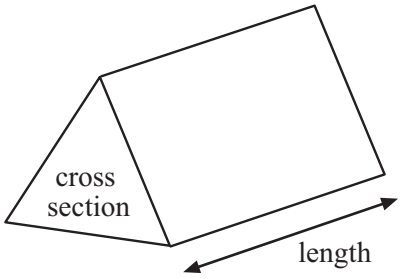
Functional Mathematics is assessed in this unit.
The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on page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

Formula Sheet

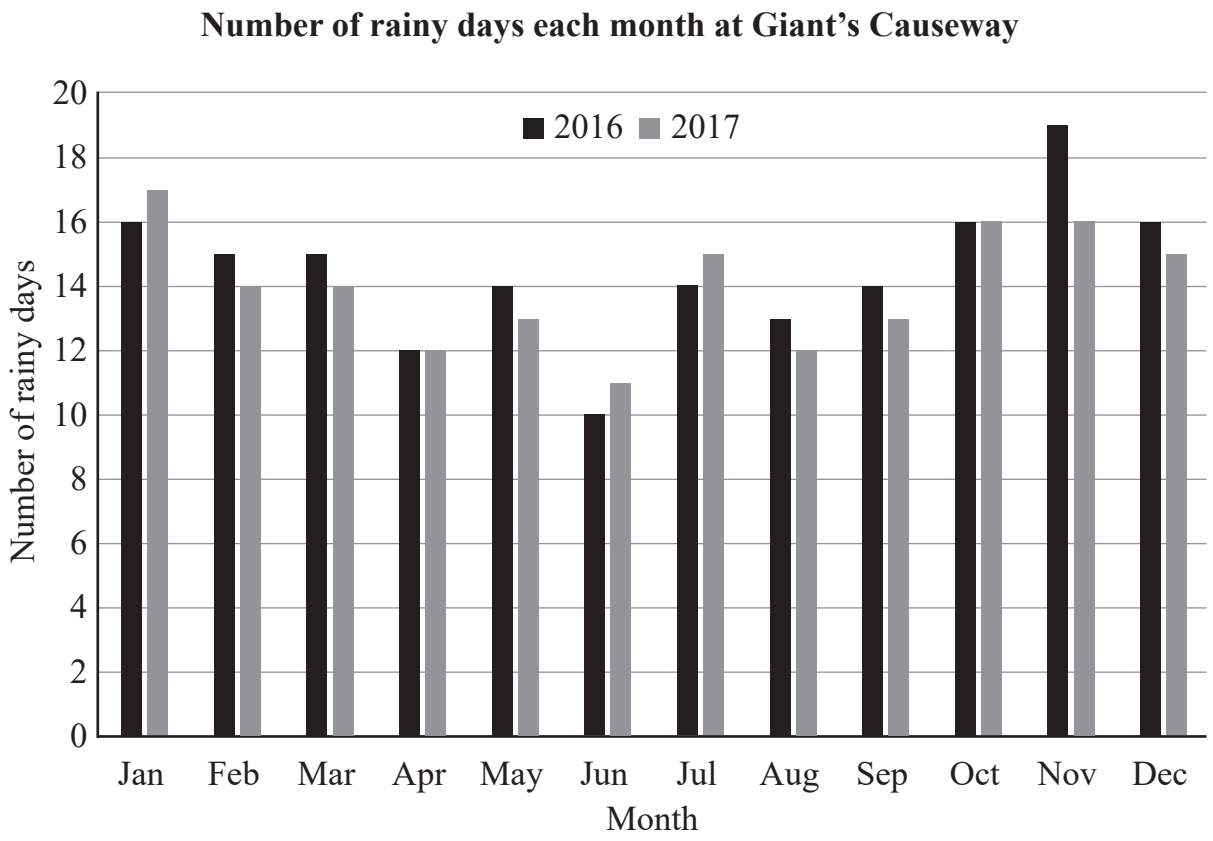
Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross section × length



1 The chart shows the number of rainy days each month over two years at Giant's Causeway.



There is only one month that had rain on exactly half of its days.

Which month and year is this?

Answer Month _____*February*_____

Year _____*2017*_____ [1]

[Turn over

2 Five basketball players have the shoe sizes shown below.

$$14 \qquad 10 \qquad 10\frac{1}{2} \qquad 13 \qquad 12\frac{1}{2}$$

(a) What is the range of the shoe sizes?

14 − 10 = 4

Answer 4 [1]

(b) Calculate the mean shoe size.

14 + 10 + 10.5 + 13 + 12.5 = 60

60 ÷ 5 = 12

Answer 12 [3]

3 A supporters' club can buy match tickets for £7.50 each.

They have £200 to spend.

(a) What is the greatest number of tickets they can buy?

200 ÷ 7.50 = 26.666...

so 26 tickets

Answer 26 [3]

(b) How much money will be left?

26 × 7.50 = 195, 200 − 195 = 5

Answer £ 5 [2]

(c) At the match there is food and drink for sale.

Burger	£3.50
Hot Dog	£2.20
Pastie	£1.60
Chips	£2.40
Soft Drink	£1.30

Graeme has a £10 note.

He buys three items and gets £4.70 change.

What three items did he buy?

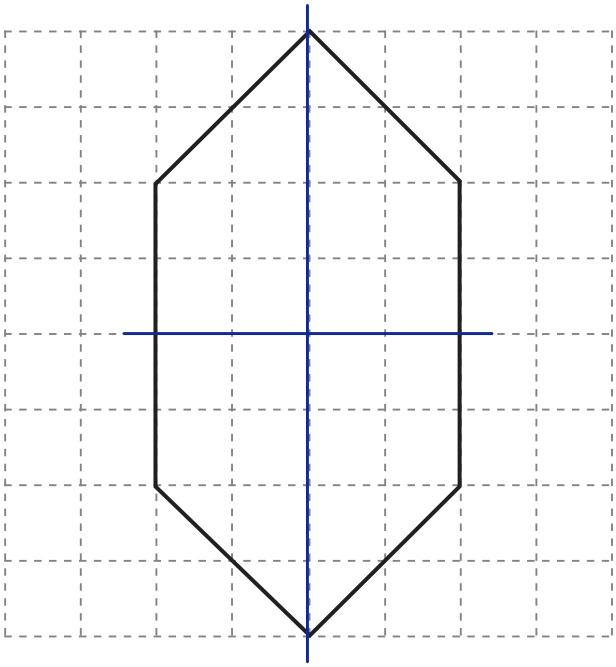
£10 − £4.70 = £5.30

1.60 + 2.40 + 1.30 = 5.30

Answer Pastie , Chips , Soft Drink [2]

[Turn over

4 A shape is drawn on a centimetre squared grid as shown below.



(a) Work out the area of the shape.

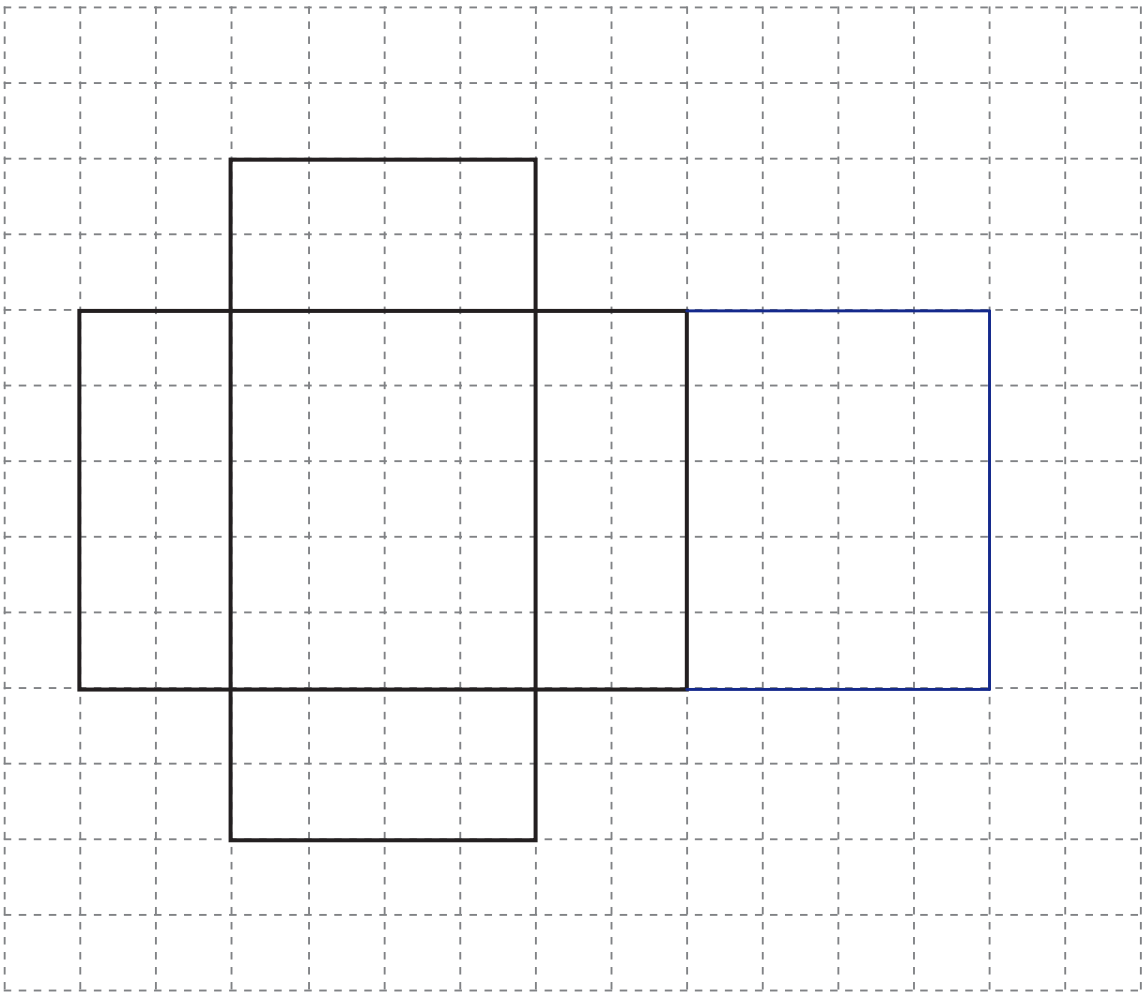
Rectangle: 4 × 4 = 16
Triangles: 2 × ½ × 4 × 2 = 8
16 + 8 = 24

Answer 24 cm^2 [1]

(b) Draw all the lines of symmetry on the shape. [1]

5 Part of the net of a cuboid is drawn on centimetre squared paper.

One face is missing.



(a) Complete the net by drawing the missing face. [1]

(b) The net is folded up to make a cuboid.

Work out the volume of the cuboid.

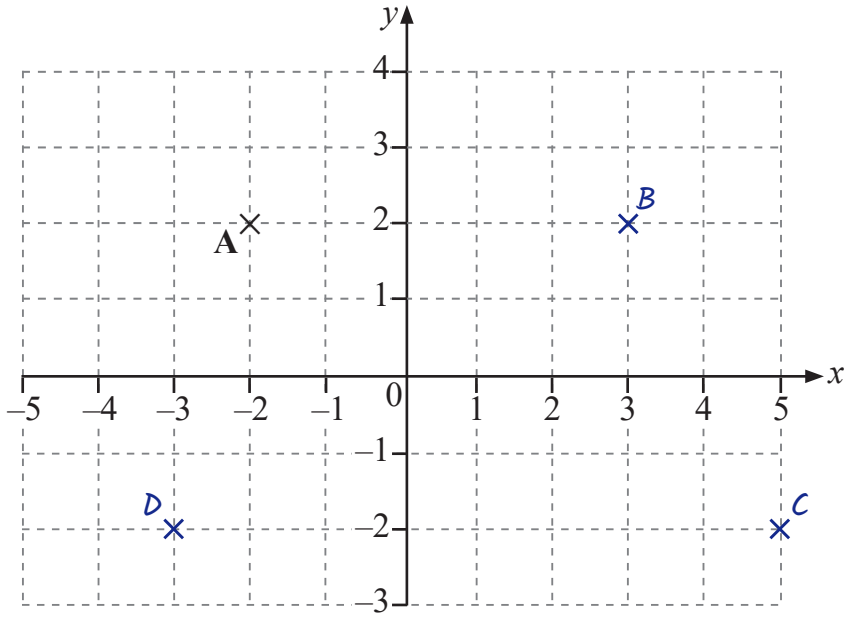
Dimensions 5 cm, 2 cm and 4 cm

V = 5 × 2 × 4 = 40

Answer *40* cm^3 [3]

[Turn over

6



Look at the coordinate grid above.

The point A (–2, 2) has been plotted for you.

(a) Plot and label the points B (3, 2) and C (5, –2) on the grid. [2]

(b) Plot and label a point D on the grid so that ABCD is a trapezium. [1]

7 James and Zach are trying to find the value of $3 + 4 \times 5$

James says it is 35

Zach thinks it is 23

Who is correct?

Give a reason for your answer.

4 × 5 = 20 (multiply before adding)

3 + 20 = 23

Answer Zach because × is done before +, so 3 + 20 = 23 [2]

8 Solve the equations

(a) $5w = 80$

$w = 80 \div 5$

Answer $w =$ 16 [1]

(b) $\frac{t}{8} = 4$

$t = 4 \times 8$

Answer $t =$ 32 [1]

(c) $30 = c + 18$

$c = 30 - 18$

Answer $c =$ 12 [1]

(d) $9n - 2 = 52$

$9n = 52 + 2$

$9n = 54$

$n = 54 \div 9$

Answer $n =$ 6 [2]

9 A sports team recorded information about whether players were able to play on Saturday only, Sunday only, or both.

(a) Complete the two-way table below.

	Saturday only	Sunday only	Both Saturday and Sunday	
Defenders	5	2	0	7
Midfielders	4	1	3	8
Attackers	2	3	1	6
	11	6	4	21

[2]

(b) The team decides to play on Saturday.

How many midfielders are able to play?

4 + 3 = 7

Answer 7 [1]

10 Simplify the expression

$$6e - 5w + 2e - 4w$$

6e + 2e = 8e

−5w − 4w = −9w

Answer 8e − 9w [2]

[Turn over

11 Jake earns £1400 each month.

Every month he pays 4% of his earnings into a savings scheme.

How much money will he have paid into this scheme after three months?

4% of 1400 = 1400 ÷ 100 × 4

= 56

56 × 3 = 168

Answer £ 168 [3]

12 Martin asks 20 workers how many hours they normally work in a week.

The results are shown in the stem and leaf diagram below.

0	8								
1	3	7							
2	2	5	8						
3	2	2	4	6					
4	0	0	2	4	4	4	7	8	
5	1	3							

Key 4 | 2 means 42 hours

(a) For the data above, work out

(i) the range,

53 − 8 = 45

Answer 45 hours [1]

(ii) the median.

10th = 36, 11th = 40, (36 + 40) ÷ 2 = 38

Answer 38 hours [1]

(b) Another worker normally works 39 hours in a week.

This value is added to the stem and leaf diagram.

Circle the correct word or words to make each of the following statements correct.

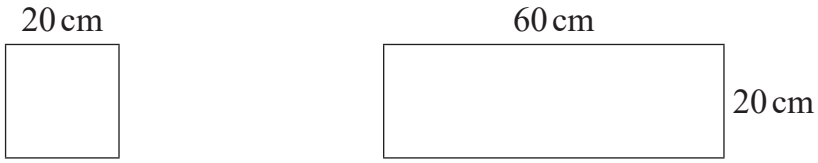
(i) The mode will increase / decrease / (stay the same) [1]

(ii) The range will increase / decrease / (stay the same) [1]

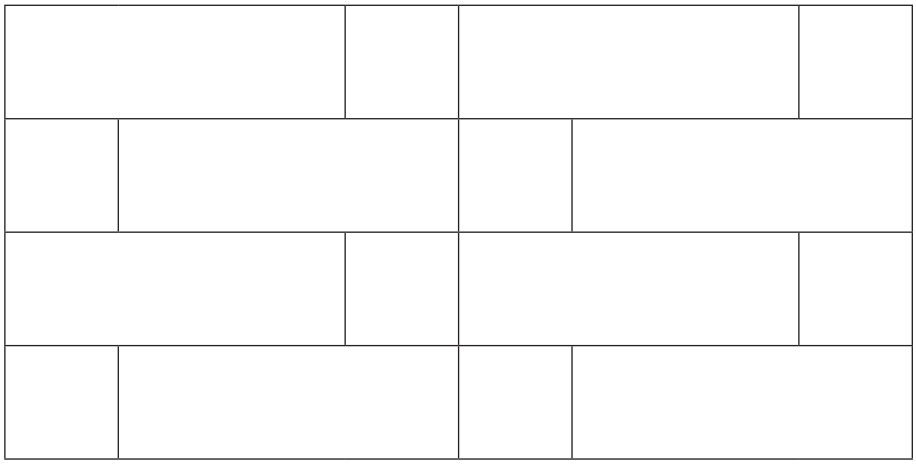
(iii) The median will (increase) / decrease / stay the same [1]

[Turn over

13 A garden table is tiled using square tiles and rectangular tiles, as shown below.



The tiled table looks like this.



Work out the **perimeter** of the table.

Give your answer in **metres**.

Length = 60 + 20 + 60 + 20 = 160 cm

Width = 4 × 20 = 80 cm

Perimeter = 160 + 80 + 160 + 80 = 480 cm

480 cm ÷ 100 = 4.8 m

Answer 4.8 m [3]

14 Louise normally works 38 hours per week and is paid £9.80 per hour.

If she works any extra hours, she is paid at the overtime rate of £14.50 for each extra hour.

Last week her total earnings were £473.90

How many **extra** hours did she work last week?

Normal pay: 38 × 9.80 = £372.40

Overtime: 473.90 − 372.40 = £101.50

101.50 ÷ 14.50 = 7

Answer 7 [3]

[Turn over

15 Wayne wants to travel from Glasgow to Carlisle by train.

Glasgow	Depart	17:42
Carlisle	Arrive	20:11

How long will this journey take?

17:42 → 18:00 = 18 min

18:00 → 20:00 = 2 h

20:00 → 20:11 = 11 min

Total = 2 h 29 min

Answer 2 hours 29 minutes [3]

16 Suzie notices this sign in her local takeaway.

5% charge on card payments
for orders under £15

She orders food costing £12.80 and decides to pay by card.

How much will she have to pay in total?

5% of 12.80 = 12.80 ÷ 100 × 5 = 0.64

12.80 + 0.64 = 13.44

Answer £ 13.44 [3]

BLANK PAGE

DO NOT WRITE ON THIS PAGE

(Questions continue overleaf)

17 A group of 10 people sat their driving theory test.

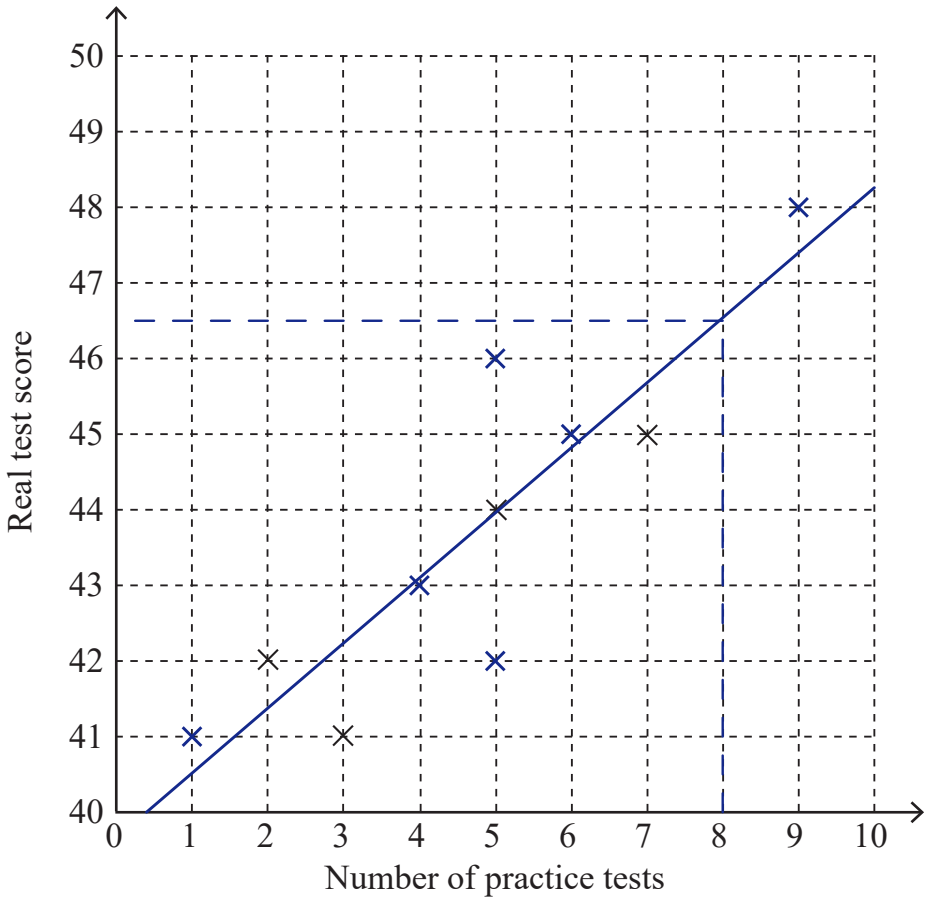
Their driving instructor recorded how many practice tests they did and their score in the real test.

The information is recorded in the table below.

Person	A	B	C	D	E	F	G	H	I	J
Number of practice tests	**2**	**5**	**3**	**7**	4	1	9	6	5	5
Real test score	**42**	**44**	**41**	**45**	43	41	48	45	46	42

(a) Show this information on the scatter graph below.

The first four points have been plotted for you. [2]



(b) The pass mark for the test is 44

How many of the 10 people passed the test?

Answer 5 [1]

(c) Complete the statement:

"In general, the more practice tests completed,

the higher the test score." [1]

(d) Draw the line of best fit. [1]

(e) Another person completed eight practice tests.

Use the graph to estimate their real test score.

Answer 46.5 [1]

[Turn over

18 A cinema ticket for an adult costs £t

A cinema ticket for a child costs £3

James bought four adult tickets and seven child tickets.

The total cost was £49

(a) Write down an **expression** for the cost of the four adult tickets.

Answer 4t [1]

(b) **(i)** Form an equation that can be solved to find the cost of an adult ticket.

Child tickets: 7 × 3 = 21

Answer 4t + 21 = 49 [1]

(ii) Solve your equation to find the cost of an adult ticket.

4t + 21 = 49

4t = 49 − 21 = 28

t = 28 ÷ 4

Answer t = 7 [2]

19 Bob is going to pave a patio. He needs 480 paving slabs.

He looks in three different stores.

Garden Store	**Perfect Patio Store**	**Quinn's Paving Store**
32 slabs in a box	**80 slabs in a box**	**16 slabs in a box**
Box price = £27	**Box price = £70**	**Box price = £17**
	10% discount on 5 or more boxes	Buy 5 boxes, get one extra box free

Which store will be the cheapest for him to buy the slabs in?

Show all your working.

Garden Store: 480 ÷ 32 = 15 boxes

15 × £27 = £405

Perfect Patio: 480 ÷ 80 = 6 boxes

6 × £70 = £420

10% of 420 = 42, 420 − 42 = £378

Quinn's Paving: 480 ÷ 16 = 30 boxes needed

buy 25 boxes, get 5 free = 30 boxes

25 × £17 = £425

£378 < £405 < £425, so Perfect Patio is cheapest

Answer *Perfect Patio Store* [6]

[Turn over

20 Factorise $3x + 6$

Answer 3(x + 2) [1]

21

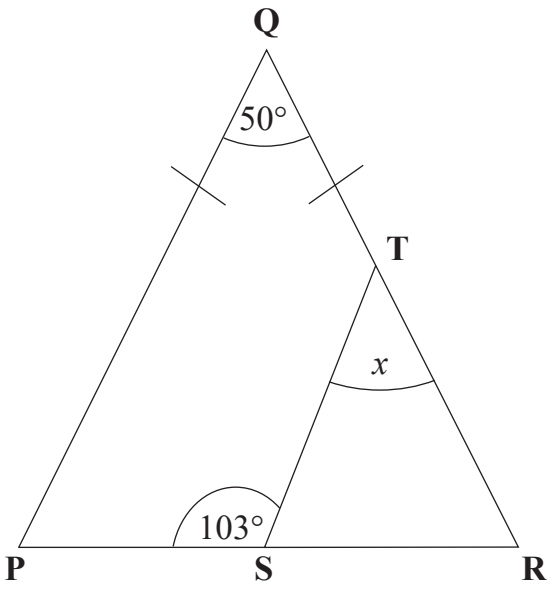


diagram
not drawn
accurately

Triangle PQR is isosceles with PQ = QR.

(a) Calculate the size of angle x

Angle QPR = angle QRP = (180 − 50) ÷ 2 = 65°
Angle TSR = 180 − 103 = 77° (angles on a line)
x = 180 − (77 + 65) = 38°

Answer 38 ° [3]

(b) Hence decide if the lines PQ and ST are parallel.

No because angle QPS + angle PST = 65° + 103° = 168°
≠ 180°, so the co-interior angles do not add to 180° [2]

[Turn over

22 Solve $2(3x - 1) + 5 = 4(x + 2)$

$6x - 2 + 5 = 4x + 8$

$6x + 3 = 4x + 8$

$6x - 4x = 8 - 3$

$2x = 5$

$x = 5 \div 2$

Answer $x =$ 2.5 [3]

23 Data on the weights of 16 players on a sports team is recorded in the grouped frequency table.

Weight (W kg)	Frequency	Midpoint	Midpoint × f
$60 < W \leq 70$	1	65	65
$70 < W \leq 80$	5	75	375
$80 < W \leq 90$	4	85	340
$90 < W \leq 100$	6	95	570

The manager states that "the estimated mean weight of the team lies within the median class".

Is his statement correct? **You must justify your answer fully.**

16 players: median is between 8th and 9th values

Cumulative: 1, 6, 10, 16, so median class is $80 < W \leq 90$

Total = 1 × 65 + 5 × 75 + 4 × 85 + 6 × 95 = 1350

Mean = 1350 ÷ 16 = 84.375 kg

$80 < 84.375 \leq 90$, so the mean is in the median class

Yes, his statement is correct.

[4]

[Turn over

24 Which of these numbers is prime?

Explain your reasoning clearly for each number below.

Number	11	111	1111
Yes/No	Yes	No	No
Reason	only factors are 1 and 11	111 = 3 × 37, divisible by 3	1111 = 11 × 101, divisible by 11

[2]

25 A caravan depreciates in value by 15% each year.

Two years ago Malcolm bought a new caravan costing £24 000

(a) What is its value now?

Year 1: 24 000 × 0.85 = 20 400

Year 2: 20 400 × 0.85 = 17 340

Answer £ 17 340 [2]

(b) Malcolm states his caravan has depreciated by 30% over the two years.

Is he correct?

Explain your answer clearly.

No.

Depreciation = 24 000 − 17 340 = £6660

6660 ÷ 24 000 × 100 = 27.75%

27.75% ≠ 30%, so he is not correct.

(Year 2's 15% is of a smaller value.)

[3]

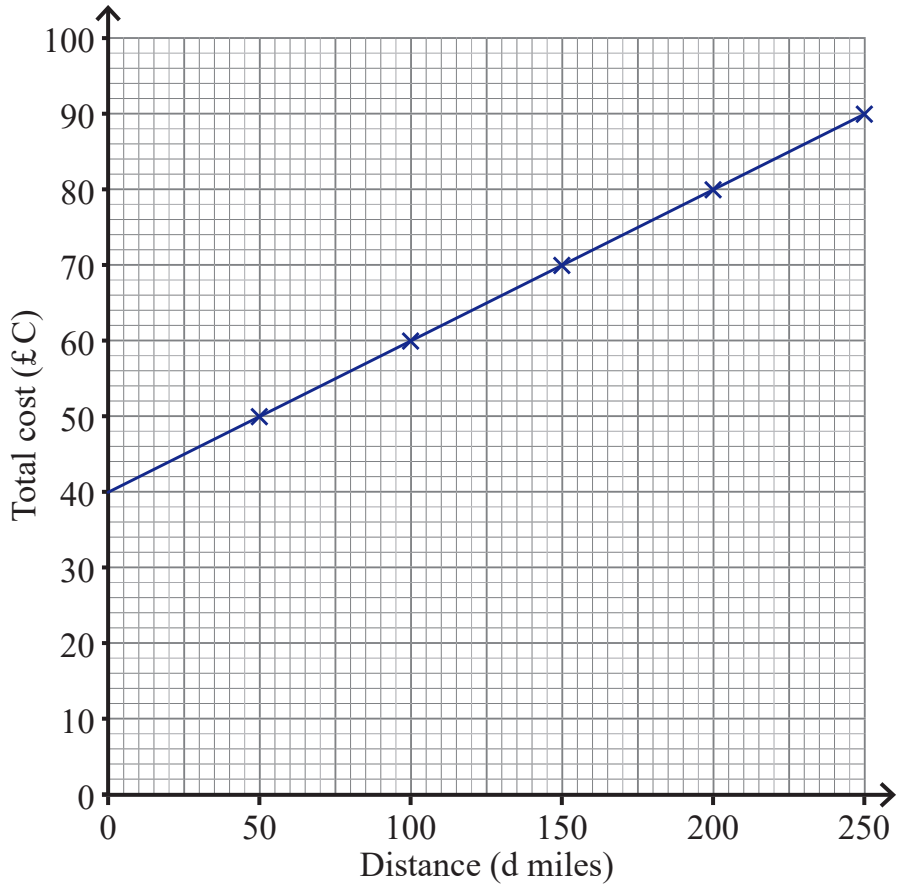
[Turn over

26 Martine wants to hire a van.

The table shows the costs for hiring the van.

Distance (d miles)	50	100	150	200	250
Total cost (£C)	50	60	70	80	90

(a) Draw a straight line graph to illustrate this information.



[2]

stemup.co.uk

(b) Use the graph to find

(i) the initial fixed charge for hiring the van,

Answer £ 40 [1]

(ii) the cost per mile, in pence, for using the van.

50 miles costs £10: 1000p ÷ 50 = 20p

Answer 20 p [1]

(c) Work out the total cost if the van travels 450 miles.

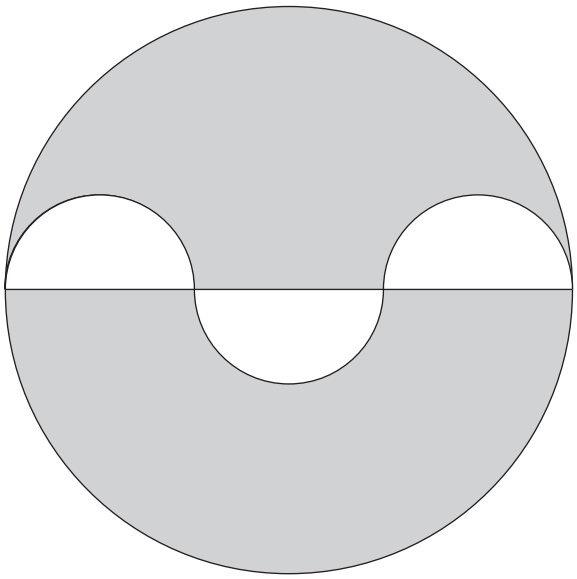
C = 40 + 450 × 0.20

= 40 + 90 = 130

Answer £ 130 [2]

[Turn over

27



A large circle has three semicircles of equal diameters placed across its diameter as shown.

The radius of each of the small semicircles is 2 cm.

Work out the area shaded.

Large radius = (3 × 4) ÷ 2 = 6 cm

Large circle = $\pi \times 6^2$ = 113.0973...

Each semicircle = ½ × $\pi \times 2^2$ = 6.28318...

Shaded = 113.0973... − 3 × 6.28318...

= 94.2477... = 94.25

Answer 94.25 cm^2 [5]

THIS IS THE END OF THE QUESTION PAPER

BLANK PAGE

DO NOT WRITE ON THIS PAGE

DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
Total Marks	

Examiner Number

Permission to reproduce all copyright material has been applied for.
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA will be happy to rectify any omissions of acknowledgement in future if notified.