Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
November 2021

Mathematics

StemUp Model Solution

Unit M1
(With calculator)
Foundation Tier



[GMC11]

GMC11

MONDAY 29 NOVEMBER, 9.15am–11.00am

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 are provided with Foundation Tier Additional Support Materials for use with this paper.**
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.

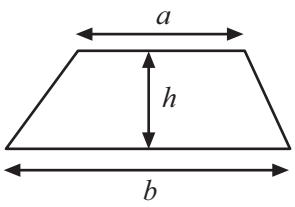
INFORMATION FOR CANDIDATES

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.

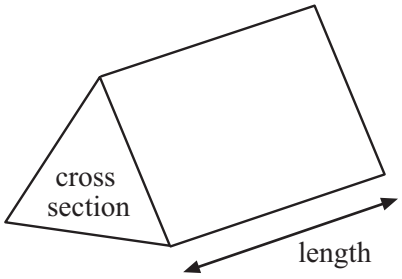
12917.06 **R**

Formula Sheet

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

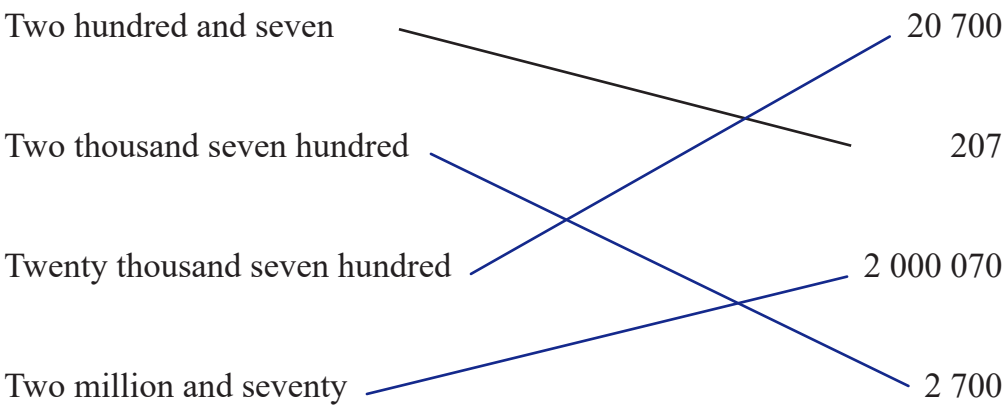


Volume of prism = area of cross section × length



1 Draw lines to match each number in words to the correct number in figures.

The first one has been done for you.



[3]

[Turn over

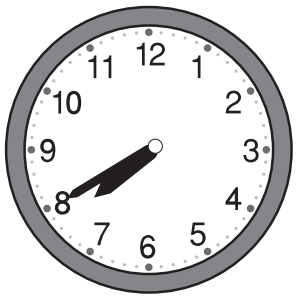
2 **(a)** Measure the length of the line AB below.

Give your answer correct to the nearest millimetre.



Answer 9.5 cm [1]

(b) What time is shown on the clock?



Answer 7:40 [1]

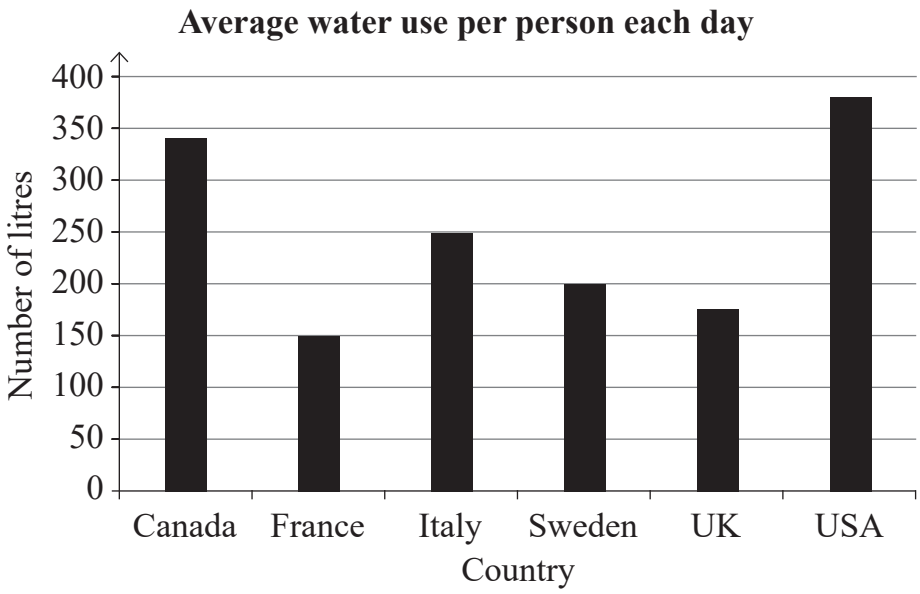
(c) A film lasts 135 minutes.

How many hours and minutes is this?

135 − 120 = 15
120 minutes = 2 hours

Answer 2 hours 15 minutes [1]

3 **(a)** The chart shows the average water use per person each day in some countries.



(i) Which country uses the most water on average per person?

Answer USA [1]

(ii) Which country uses 175 litres of water on average per person?

Answer UK [1]

(iii) How many litres of water are used on average per person in Canada?

Answer 340 litres [1]

[Turn over

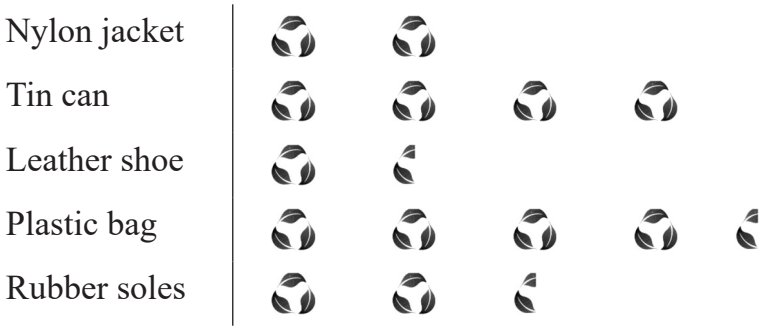
(b) The length of time some objects take to decompose is shown.

Objects	Time (Years)
Nylon jacket	40
Tin can	80
Leather shoe	30
Plastic bag	70
Rubber soles	50

Alice draws a pictogram to show this information.

She makes one mistake.

Time to decompose



Key: represents 20 years

(i) What mistake does Alice make?

Answer *Plastic bag should have 3½ symbols (70 years),*

not 4½ symbols (that shows 90 years) [1]

(ii) Glass takes 1 million years to decompose.

Give a reason why it would not be sensible to add glass to Alice's pictogram.

Answer *1 000 000 ÷ 20 = 50 000 symbols would be needed,*

which is far too many to draw [1]

4 A café has the following breakfast menu.

Meat items	Bread items	Egg items	Other items
60p each Bacon Sausage	30p each Soda bread Potato bread	50p each Fried Poached	35p each Beans Mushrooms

(a) Eric wants to order breakfast consisting of

1 bacon
2 sausages
2 soda breads
1 potato bread
2 fried eggs
1 portion of beans

Work out the total cost for these items.

60 + 60 + 60 + 30 + 30 + 30 + 50 + 50 + 35
= 405p
= £4.05

Answer £ 4.05 [2]

(b) Eric notices this sign underneath the menu.

Special offer
9 items for £3.50

How much will Eric save on his breakfast?

£4.05 − £3.50 = £0.55

Answer 55p [1]

[Turn over

5 Information about **monthly** SIM-only mobile phone plans is shown.

Plan	Network	Data (GB)	Minutes	Texts	Price (£)
A	Cell4U	3	3000	unlimited	15
B	E_2	0.5	500	300	6
C	Moby	1	500	500	11
D	Green	40	unlimited	unlimited	30
E	Cell4U	1	750	1000	9
F	E_2	5	unlimited	1500	21
G	Cell4U	10	unlimited	unlimited	26
H	Green	2	1000	400	10

(a) Which is the cheapest Cell4U plan?

Cell4U: A £15, E £9, G £26

Answer Plan E [1]

(b) Brian doesn't use data.

He needs unlimited minutes and unlimited texts.

Which is the cheapest call plan he could choose to meet his needs?

unlimited minutes and texts: D £30, G £26

Answer Plan G [1]

(c) Claire uses about 1 GB of data each **day**.

Which plan should she choose?

1 GB × 30 days = about 30 GB a month
only plan with more than 30 GB is D (40 GB)

Answer Plan D [1]

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6 Complete the table to show what these metric units measure.

The first row is done.

	Area	Capacity	Length	Mass
centimetres			✓	
milligrams				✓
square metres	✓			
tonnes				✓
litres		✓		
kilometres			✓	

[3]

7 Blake works at a car wash.

His pay each day is worked out using the formula

Total pay (£) = 2 × number of cars washed + 10

(a) One day Blake washed 17 cars.

What was his pay for that day?

2 × 17 + 10
= 34 + 10 = 44

Answer £ 44 [2]

(b) Does Blake receive any money if he doesn't wash any cars?

You must explain your answer.

Answer Yes because 0 cars: pay = 2 × 0 + 10 = £10

so he still gets £10 even with no cars washed [1]

[Turn over

8 John's bank gave him a 4-digit code.

All the digits are different.

The first digit is a **multiple** of 3

The second digit is a **factor** of 15

The third digit is the **sum** of the **first and second** digits

The fourth digit is the **sum** of the **first and third** digits

Write down John's 4-digit code in the boxes below.

3	1	4	7

[3]

first digit: 3, 6 or 9 second digit: 1, 3 or 5
3, 1: third = 3 + 1 = 4, fourth = 3 + 4 = 7
other choices give a sum of 10 or more, or repeat a digit

9 The ages, in years, of a family are shown.

Dave 47 Ellie 21 Fergus 18 Geri 44 Harry 10 Ivy 25

(a) What is the range of the ages?

47 − 10 = 37

Answer 37 years [1]

(b) What is the mean age?

47 + 21 + 18 + 44 + 10 + 25 = 165
165 ÷ 6 = 27.5

Answer 27.5 years [3]

(c) What was the mean age of the family two years ago?

27.5 − 2 = 25.5

Answer 25.5 years [1]

[Turn over

10 Five friends had these bank balances.

	£
Bernie	230
Jonny	−570
Sara	65
Wendy	460
Jason	−190

(a) List the balances in order, starting with the **lowest**.

−570 , −190 , 65 , 230 , 460 [2]

(b) Jason receives £120 for his birthday and puts it into his bank account.

What is his new balance?

−190 + 120 = −70

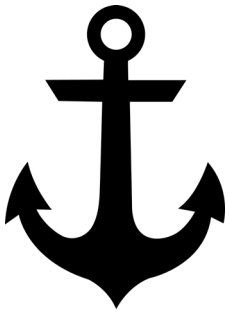
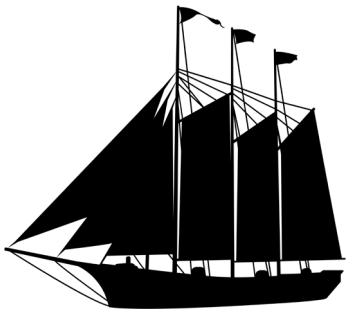
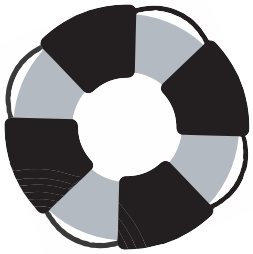
Answer −70 [1]

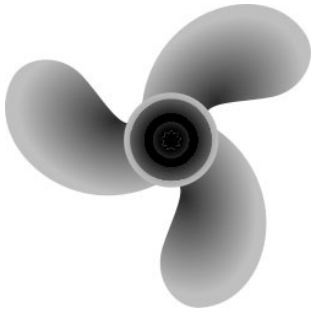
(c) How much more money is in Bernie's bank account than in Jonny's?

230 − (−570) = 230 + 570 = 800

Answer £ 800 [1]

11 Five drawings related to sailing are shown.

		
Anchor	Boat	Lifebuoy

	
Wheel	Propeller

(a) Which drawing has rotational symmetry of order 3?

Answer Propeller [1]

(b) Which drawing has exactly 1 line of symmetry?

Answer Anchor [1]

(c) Which two drawings have both line symmetry and rotational symmetry?

Answer Lifebuoy and Wheel [1]

[Turn over

12 Pupils were asked which activity they prefer.

The results were

Cinema	35% of the pupils
Bowling	$\frac{2}{5}$ of the pupils
Ice skating	$\frac{1}{4}$ of the pupils

(a) The teacher says "Bowling was more popular than cinema."

Is the teacher correct?

You must show working to explain your answer.

$\frac{2}{5} = 2 \div 5 = 0.4 = 40\%$

Cinema = 35%, 40% > 35%

Answer Yes because bowling is 40%, which is greater than 35% for cinema [2]

(b) 15 pupils said they preferred ice skating.

How many pupils were asked altogether?

$\frac{1}{4}$ of the pupils = 15

15 × 4 = 60

Answer 60 [2]

13 Mr Evans booked a family holiday.

He paid a deposit of £300

He then paid £45.50 each week for 26 weeks.

How much did he pay in total?

$26 \times 45.50 = 1183$

$1183 + 300 = 1483$

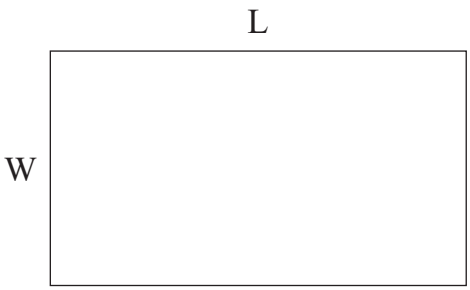
Answer £ 1483 [3]

[Turn over



14 Jessica fits guttering around buildings.

She measures the length (L) and width (W) for rectangular sheds in metres.



To work out the total amount (T) of guttering needed, Jessica uses the formula

$$T = 2L + 2W$$

(a) How much guttering will Jessica need for this shed?

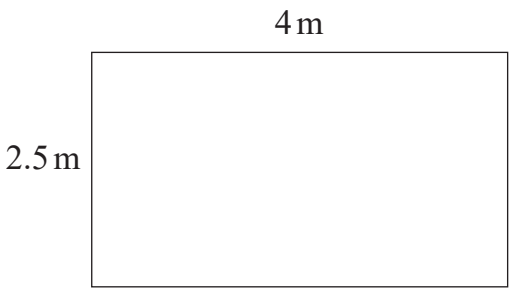


diagram not drawn accurately

$T = 2 \times 4 + 2 \times 2.5$
$= 8 + 5$
$= 13$

Answer 13 m [2]

(b) Jessica measured another shed.

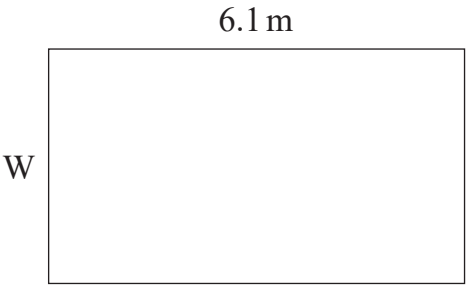


diagram not drawn accurately

The total (T) was 19.9 m.

Work out the width (W) of this shed.

$19.9 = 2 \times 6.1 + 2W$

$19.9 = 12.2 + 2W$

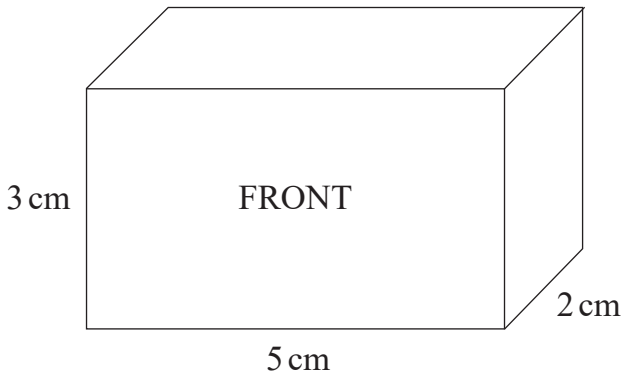
$2W = 19.9 - 12.2 = 7.7$

$W = 7.7 \div 2 = 3.85$

Answer 3.85 m [3]

[Turn over

15 Here is a cuboid.



(a) What is the area of the front face of the cuboid?

$5 \times 3 = 15$

Answer 15 cm^2 [1]

(b) Work out the volume of the cuboid.

$V = 5 \times 2 \times 3$

$= 30$

Answer 30 cm^3 [2]

16 Dylan needs to get part of his house painted.

He has a budget of £200

He needs to buy 3 tins of paint, each costing £16.75

He employs a painter who is paid £12.30 per hour.

How many **full** hours will the painter have to complete the work without going over Dylan's budget?

3 × 16.75 = 50.25

200 − 50.25 = 149.75 left for the painter

149.75 ÷ 12.30 = 12.1747...

so 12 full hours

Answer 12 [3]

[Turn over

17

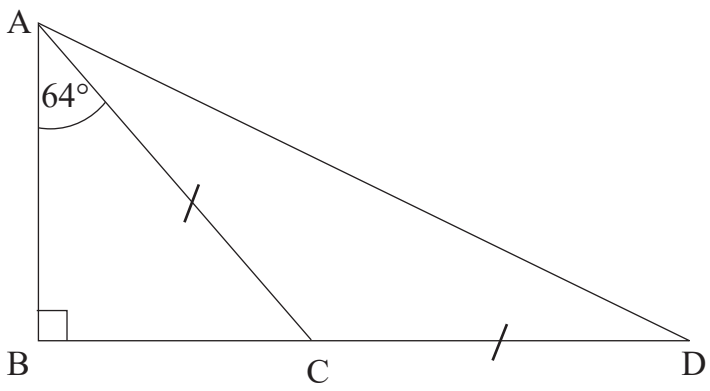


diagram not drawn accurately

ABC is a right-angled triangle.
ACD is an isosceles triangle.
BCD is a straight line.

Calculate the size of

(a) angle ACB,

ACB = 180 − 90 − 64 (angles in a triangle add to 180°)
= 26°

Answer 26 ° [2]

(b) angle ADC.

ACD = 180 − 26 = 154° (angles on a straight line add to 180°)

ACD isosceles (AC = CD), so CAD = ADC

$ADC = \frac{180 - 154}{2} = \frac{26}{2} = 13°$

Answer 13 ° [3]

18 Guttering costs £4.30 per metre.

Martin bought 11 metres of guttering and 7 metres of downpipe.

He paid £66.55 in total.

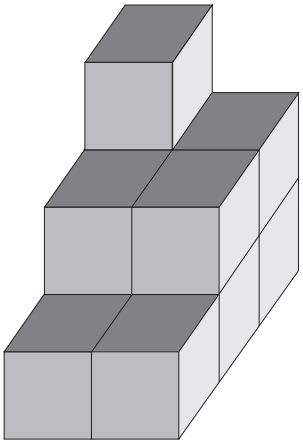
How much does downpipe cost per metre?

11 × 4.30 = 47.30 (guttering)
66.55 − 47.30 = 19.25 (downpipe)
19.25 ÷ 7 = 2.75

Answer £ 2.75 [4]

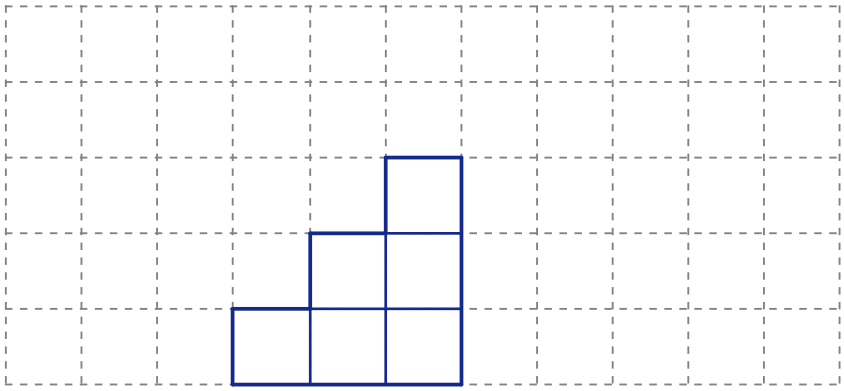
[Turn over

19 A solid is made from 1 cm cubes.





(a) On the grid below draw the side elevation of the solid.



[2]

(b) What is the smallest number of cubes you would need to add to the solid to make it into a cube?

cube 3 × 3 × 3 = 27 cubes

solid has 11 cubes

27 − 11 = 16

Answer *16* [1]

20 In a group of students,

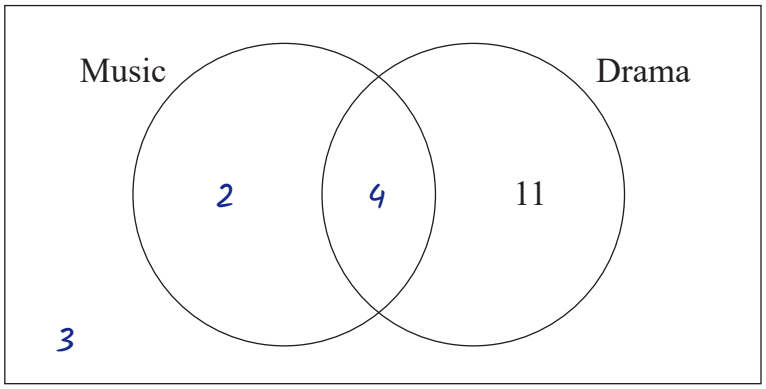
6 study Music

15 study Drama

11 students study only Drama

3 study neither subject.

Complete the Venn diagram to show this information.



[3]

both = 15 − 11 = 4
Music only = 6 − 4 = 2
neither = 3

21 A manager is preparing to draw a pie chart to display how 40 workers travel to work.

The table below shows some of her information.

Transport	Number of workers	Angle
Car	5	45°
Bus	12	108°
Walk	7	63°
Train	10	90°
Bike	6	54°
	Total = 40	360°

Use the information in the table to work out what angle will represent those who travel by bike.

Show all your working clearly.

40 workers = 360°, so 1 worker = 360 ÷ 40 = 9°

Car: 45 ÷ 9 = 5 workers Bus: 108 ÷ 9 = 12 workers

5 + 12 + 7 + 10 = 34 workers

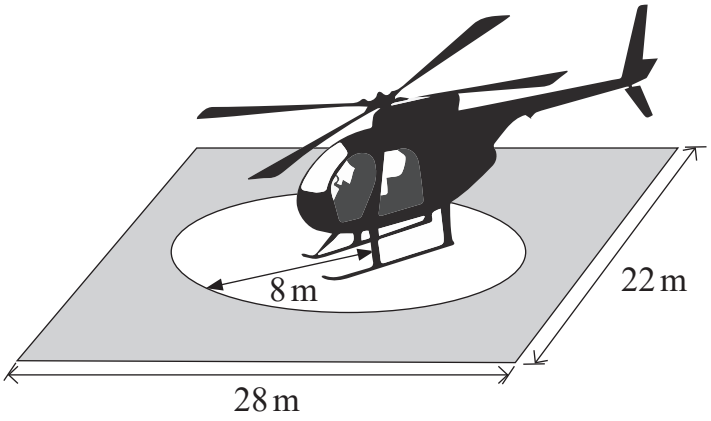
Bike: 40 − 34 = 6 workers

6 × 9 = 54°

Answer 54 ° [4]

22 The landing pad for a helicopter is a white circle of radius 8 m.

It is painted on a black rectangular plot 28 m by 22 m.



What area of the plot is **not** painted white?

Give units with your answer.

Rectangle = 28 × 22 = 616 m^2

Circle = $\pi \times 8^2$ = 201.0619...

Not white = 616 − 201.0619...

= 414.938... = 414.94 m^2

Answer 414.94 m^2 [5]

[Turn over

23 **(a)** Multiply out $4\,(3t - 5)$

$4 \times 3t - 4 \times 5$

Answer $12t - 20$ [1]

(b) Factorise $18w + 21$

HCF of 18 and 21 is 3

Answer $3(6w + 7)$ [1]

24 A tracksuit normally cost £75

(a) In a sale the price was reduced by 15%

Calculate the sale price of the tracksuit.

15% of 75 = 0.15 × 75 = 11.25
75 − 11.25 = 63.75

Answer £ 63.75 [3]

(b) The following week the shop displayed this sign.

FINAL STOCK CLEARANCE
A FURTHER 20% OFF ALL SALE PRICES

Show that the tracksuit now costs £51

20% of 63.75 = 0.2 × 63.75 = 12.75
63.75 − 12.75 = 51
so the tracksuit now costs £51

[2]

(c) Rhys says, "I am getting 15% off, then 20% off, so I am getting 35% off the £75."

Is he correct?

You must show working to explain your answer.

35% of 75 = 26.25, 75 − 26.25 = £48.75

Answer No because 35% off gives £48.75, not £51

(the 20% is taken off the lower sale price, not £75) [2]

[Turn over

25 A girl collects the following data in metres (m) in a Science experiment.

0.32 0.51 0.43 0.64 0.39 0.49 0.62 0.54 0.52 0.36 0.54 0.68 0.48 0.52 0.60

(a) She states, "The median is the one in the middle so my median is 0.54 m."

Explain why she is not correct.

Answer *the data is not in order, she must put it in order first (the middle value is then 0.52)* [1]

(b) She then decides to show her data in a stem and leaf diagram.

The first three are recorded.

Complete the stem and leaf diagram.

0.3	2 6 9
0.4	3 8 9
0.5	1 2 2 4 4
0.6	0 2 4 8

KEY: 0.3 | 2 = 0.32 m

[2]

(c) Give **one** advantage of displaying the data in a stem and leaf diagram.

Answer *the data is now in order, so it is easier to read and to find the median* [1]

(d) Use the stem and leaf diagram to write down the correct median.

15 values: median is the 8th

Answer *0.52* m [1]

26 John receives a wage of £400 per week.

$\frac{2}{5}$ of his wage is spent on rent.

$\frac{1}{4}$ of his wage is spent on food.

$\frac{3}{20}$ of his wage is used to pay other bills.

What **fraction** of John's wage is left?

$\frac{2}{5} + \frac{1}{4} + \frac{3}{20} = \frac{8}{20} + \frac{5}{20} + \frac{3}{20} = \frac{16}{20}$

$1 - \frac{16}{20} = \frac{4}{20} = \frac{1}{5}$

Answer $\frac{1}{5}$ [3]

27 The attendance for some classes is shown below.

Class A	17 pupils out of 20 were present.
Class B	21 pupils out of 24 were present.
Class C	19 pupils out of 22 were present.

Which class had the **highest percentage attendance**?

You must show working to justify your answer.

A: 17 ÷ 20 × 100 = 85%

B: 21 ÷ 24 × 100 = 87.5%

C: 19 ÷ 22 × 100 = 86.36...%

87.5% is the highest

Answer B [3]

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