New Specification

Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2019

Mathematics

StemUp Model Solution

Unit M1
(With calculator)
Foundation Tier



[GMC11]

GMC11

TUESDAY 8 JANUARY, 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 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-five** 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.

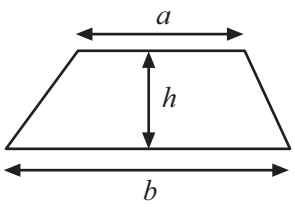
INFORMATION FOR CANDIDATES

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.

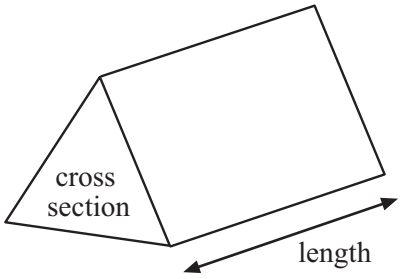
11921

Formula Sheet

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



Volume of prism = area of cross section × length



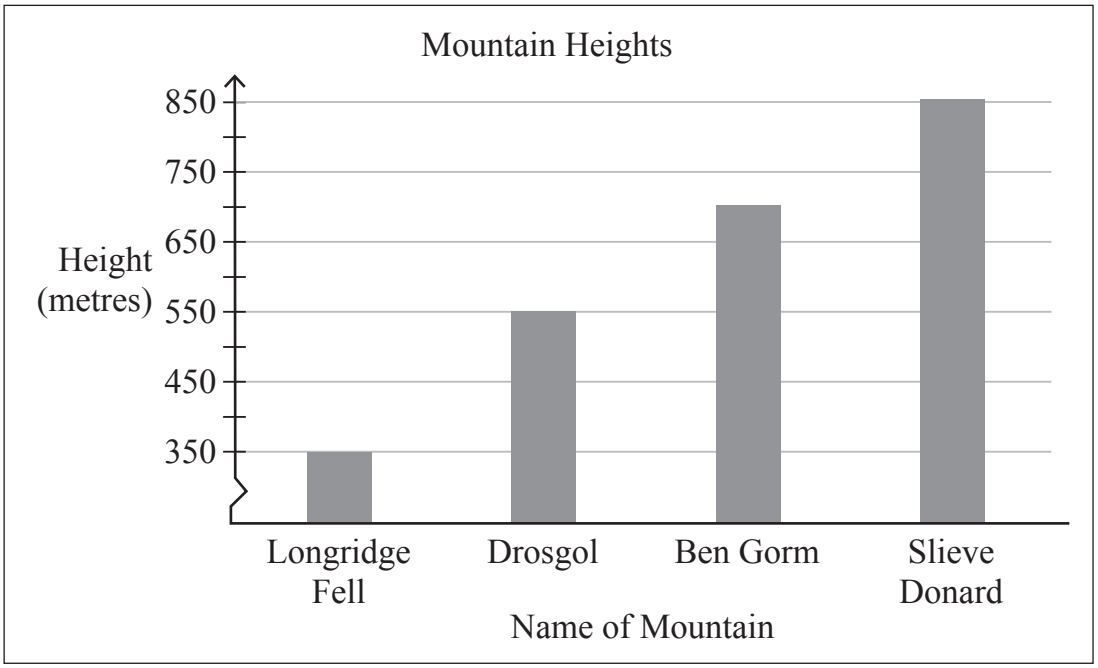
11921

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(Questions start overleaf)

1 Some mountain heights are shown.



(a) What height is Drosgol?

Answer 550 m [1]

(b) How much higher is Slieve Donard than Drosgol?

850 − 550 = 300

Answer 300 m [1]

(c) Joe says Ben Gorm is more than twice as high as Longridge Fell.

Mary says the height of Ben Gorm is exactly twice that of Longridge Fell.

Who is correct?

Give a reason for your answer.

Answer Mary because Ben Gorm is 700 m and Longridge Fell is 350 m, and 2 × 350 = 700, so it is exactly twice [2]

11921

2 **(a)** Some metric units are shown in the box.

grams	cm^2	litres	kilograms	kilometres
centimetres	millilitres	m^2	metres	cm^3

Which unit is used to measure the

(i) amount of water in a bath,

Answer litres [1]

(ii) height of a tree,

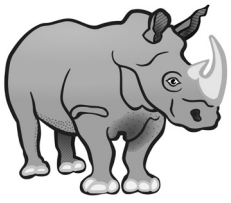
Answer metres [1]

(iii) area of a football pitch?

Answer m^2 [1]

(b) The weight of a rhino is 2.4 tonnes.

How many kilograms is this?



2.4 × 1000 = 2400

Answer 2400 kg [1]

[Turn over

3 A car costing £11 985 is reduced by one third in a sale.



(a) What is the sale price?

1/3 of 11 985 = 11 985 ÷ 3 = 3995

11 985 − 3995 = 7990

Answer £ 7990 [2]

(b) The car needs new tyres.

The total cost of four tyres is £197.60

How much does each tyre cost?

197.60 ÷ 4 = 49.40

Answer £ 49.40 [2]

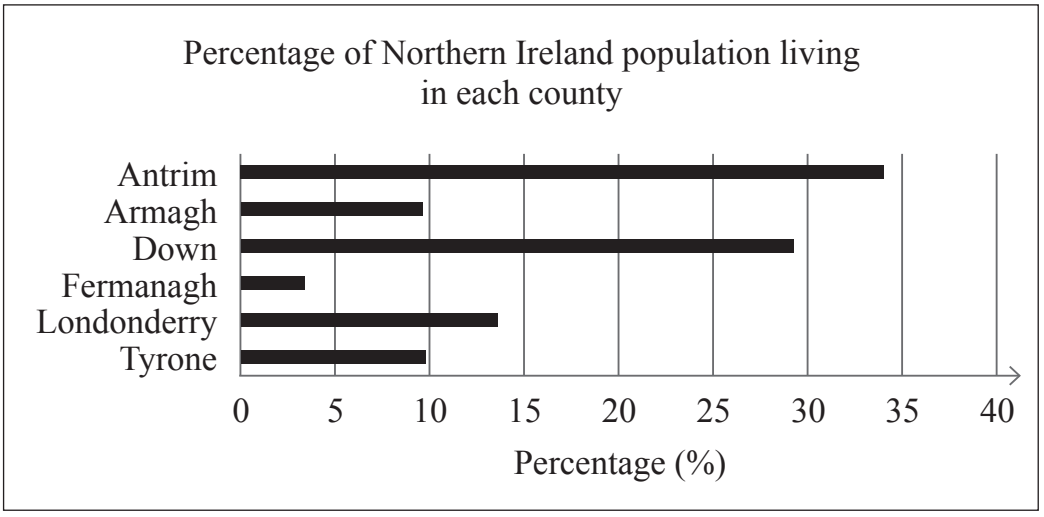
(c) The car insurance is £307.65

Round this amount to the nearest £10

307.65 ≈ 310

Answer £ 310 [1]

4 This chart shows the percentage breakdown of Northern Ireland's population by county.



(a) Which county contains about 30% of the population?

Answer Down [1]

(b) Luke makes a statement about the chart and Kate disagrees.



Who do you think is correct?

Explain your answer.

Answer Kate because Antrim has only about 34% of the population, which is less than 50%, so not most people [1]

[Turn over

5 **(a)** There are 30 passengers on a bus.

18 of them are children.

What fraction of the passengers are **not** children?

Give your answer in its **lowest terms**.

Not children = 30 − 18 = 12

$\frac{12}{30} = \frac{6}{15} = \frac{2}{5}$

Answer $\frac{2}{5}$ [2]

(b) The bus fare is £1.80

Gerry has a "Save 10%" voucher.

How much does he save?

10% of £1.80 = 180p ÷ 10 = 18p

Answer 18 p [1]

(c) The bus has a 3-digit number.

Each digit is **different**.

The first digit is a multiple of 4

The second digit is a square number.

The third digit is a factor of 10

The sum of the three digits is 10

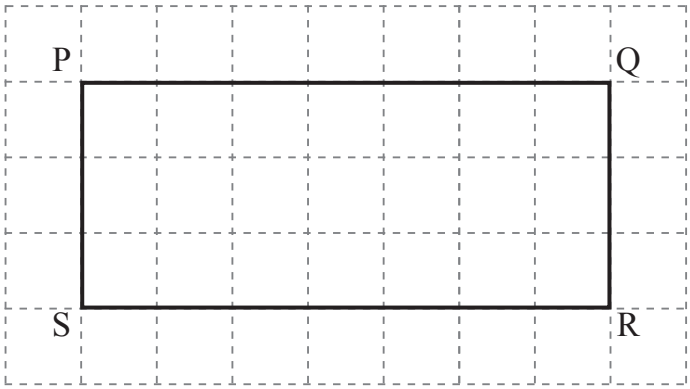
What is the bus number?

Multiples of 4: 4, 8
Square numbers: 1, 4, 9
Factors of 10: 1, 2, 5
4 + 1 + 5 = 10 (all digits different)

Answer *415* [2]

[Turn over

6 **(a)** Rectangle PQRS is drawn on a centimetre grid.



(i) What is the perimeter of the rectangle?

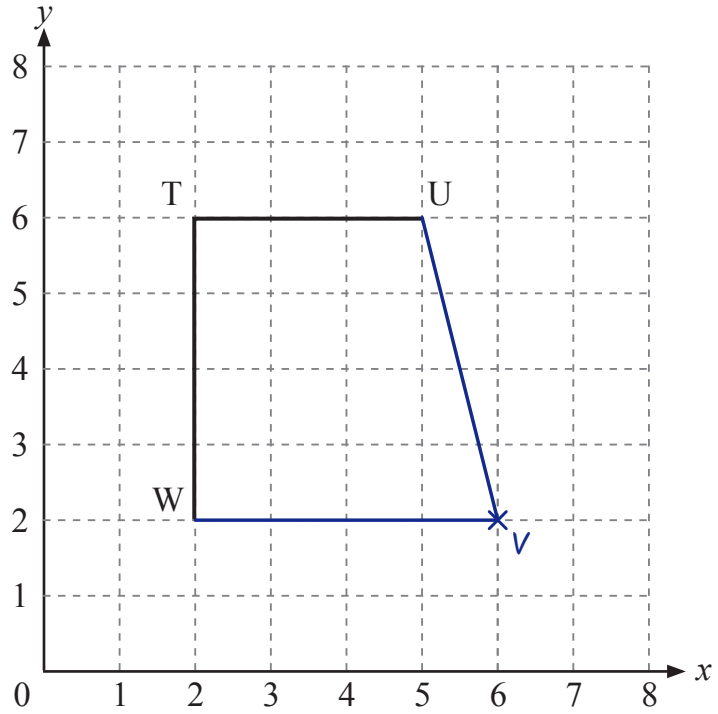
7 + 3 + 7 + 3 = 20

Answer 20 cm [1]

(ii) Name a pair of perpendicular sides in the rectangle.

Answer PQ and QR [1]

(b)



(i) What are the coordinates of U?

Answer (5 , 6) [1]

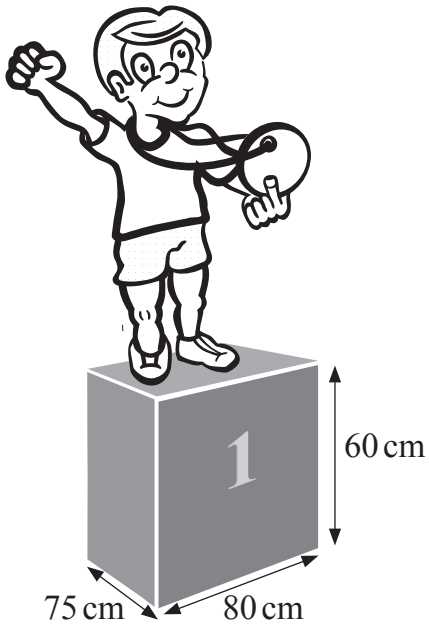
(ii) Shape TUVW is a trapezium.

Side WV is **longer** than side TU.

Mark a possible vertex V on the grid and complete the drawing of the trapezium. [1]

[Turn over

7 A winners' podium (a cuboid) is shown.



(a) How many **vertices** has the podium?

Answer 8 vertices [1]

(b) What is the area of the **base** of the podium?

80 × 75 = 6000

Answer 6000 cm^2 [2]

(c) What is the volume, in m^3, of the podium?

80 cm = 0.8 m, 75 cm = 0.75 m, 60 cm = 0.6 m
0.8 × 0.75 × 0.6 = 0.36

Answer 0.36 m^3 [2]

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(Questions continue overleaf)

[Turn over

8 Eight leaders and 143 members of a youth club go by bus to a bowling alley.

The Beezer Bus Company has buses for hire that hold 32 passengers each.

(a) How many buses will the youth club need to hire?

8 + 143 = 151 people
151 ÷ 32 = 4.71875
4 buses is not enough, so 5 buses

Answer 5 [3]

(b) How many spare seats will there be altogether?

5 × 32 = 160 seats
160 − 151 = 9

Answer 9 [2]

(c) Each bus costs £140 to hire.

The cost is split equally between the members.

The leaders do not pay.

How much does each member need to pay to cover the cost of hiring the buses?

5 × £140 = £700
£700 ÷ 143 = 4.8951048...
= £4.90 (to the nearest penny)

Answer £ 4.90 [3]

[Turn over

9 The average monthly temperatures in Colorado during the ski season are shown below.

December	January	February	March	April
−14°C	−15°C	−13°C	−9°C	−5°C

(a) Which month was warmest?

Answer April [1]

(b) What was the difference in temperature between the warmest and coldest months?

$-5 - (-15) = 10$

Answer 10 °C [1]

10 The hourly rates of pay for some jobs in a warehouse are shown below.

Warehouse Associate	£8.07
Warehouse Worker	£8.24
Health and Safety Officer	£9.94
Picker	£7.59

(a) Work out the mean of these four hourly rates.

8.07 + 8.24 + 9.94 + 7.59 = 33.84
33.84 ÷ 4 = 8.46

Answer £ 8.46 [3]

(b) What is the range of the hourly rates?

9.94 − 7.59 = 2.35

Answer £ 2.35 [1]

[Turn over

11 Work out the size of the missing angle in each of the diagrams below.

(a)

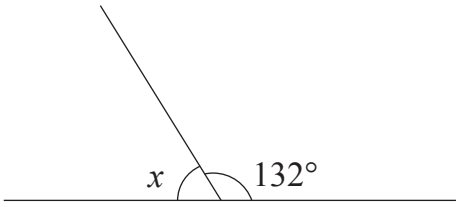


diagram not drawn accurately

180 – 132 = 48 (angles on a straight line)

Answer $x =$ 48 ° [1]

(b)

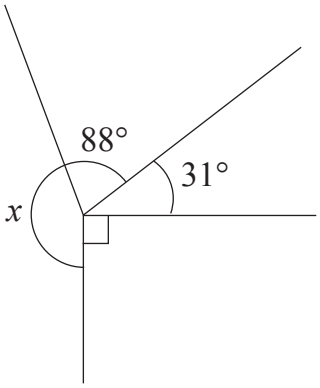


diagram not drawn accurately

360 – 90 – 88 – 31 = 151 (angles at a point)

Answer $x =$ 151 ° [1]

(c)

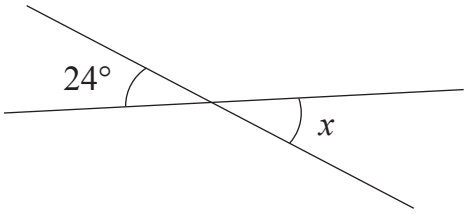


diagram not drawn accurately

vertically opposite angles are equal

Answer $x =$ 24 ° [1]

12 **(a)** Simplify $9a - 5a + 2a$

Answer 6a [1]

(b) Solve $4y = 60$

$y = 60 \div 4$

Answer $y =$ 15 [1]

(c) Solve $m - 4 = 9$

$m = 9 + 4$

Answer $m =$ 13 [1]

13 Brian hired some equipment.

There was a fixed charge of £45 plus a hire fee of £13.50 per day.

He paid £274.50 in total.

How many days did he hire the equipment for?

£274.50 − £45 = £229.50
£229.50 ÷ £13.50 = 17 days

Answer 17 [3]

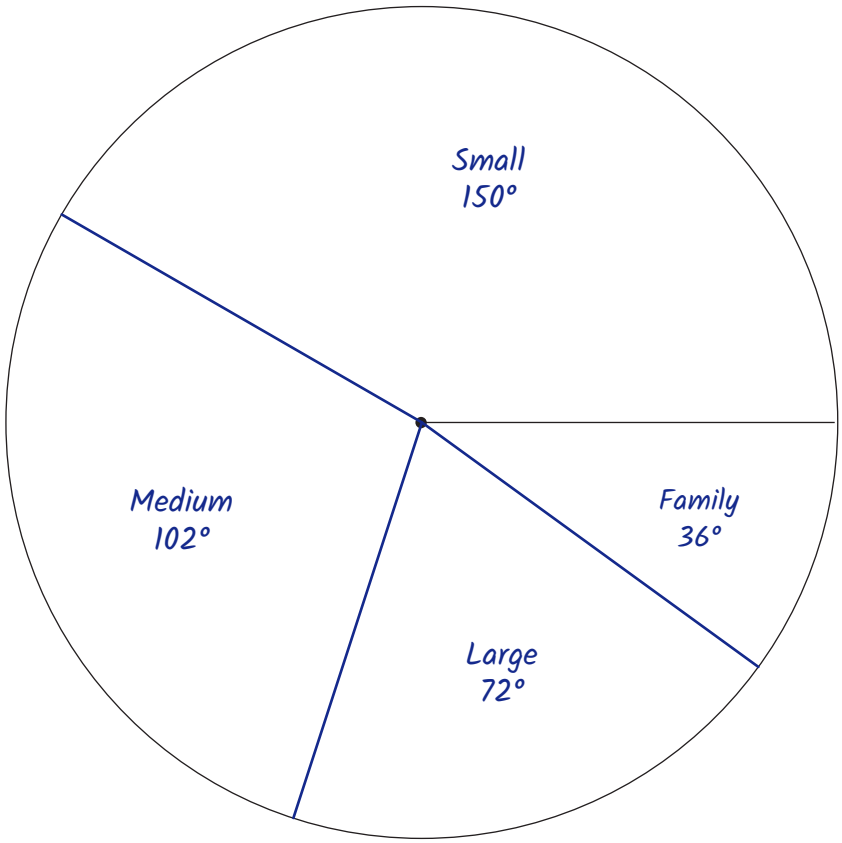
[Turn over

14 (a) Dodd's Ice Cream shop sold four sizes of ice cream tubs.

The owner wants to see a pie chart showing the numbers of tubs sold.

Size of tub	Number of tubs sold	Angle
Small	50	150°
Medium	34	102°
Large	24	72°
Family	12	36°

Draw a pie chart to show this information.



[4]

Total = 50 + 34 + 24 + 12 = 120 tubs
360° ÷ 120 = 3° per tub
50 × 3 = 150, 34 × 3 = 102, 24 × 3 = 72, 12 × 3 = 36

(b) Complete the table to find the total number of scoops used.

Size of tub	Number of tubs sold	Number of scoops per tub	Number of scoops used
Small	50	1	50
Medium	34	2	68
Large	24	3	72
Family	12	10	120
		Total	310

[2]

24 × 3 = 72, 12 × 10 = 120

50 + 68 + 72 + 120 = 310

[Turn over

15 **(a)** Place a digit from 1, 2, 3, 4, 5 in each box to make a true statement.

4 × 5 = 20, 1 + 20 = 21

$\boxed{1} + \boxed{4} \times \boxed{5} = 21$

[2]

(b) Insert brackets to make a true statement.

6 − 4 = 2, 24 ÷ 2 = 12

$24 \div (6 - 4) = 12$

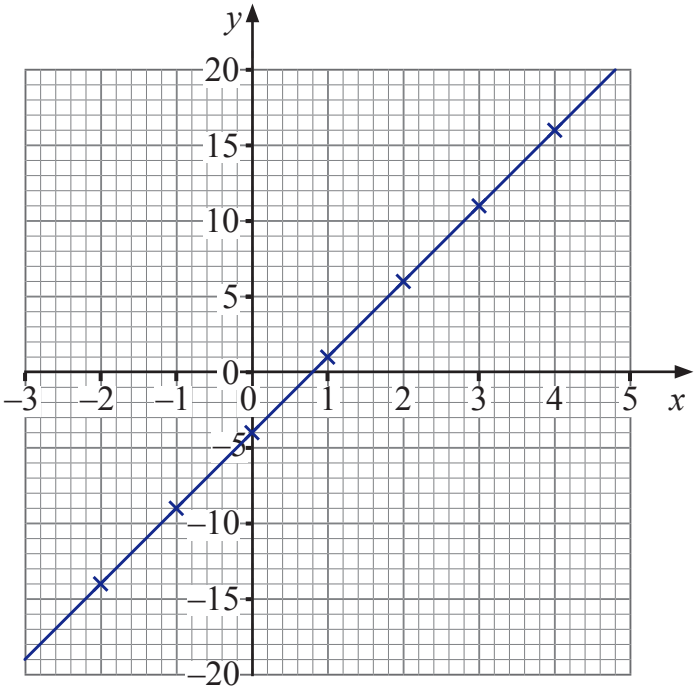
[1]

16 **(a)** Complete the table below for $y = 5x - 4$

x	−2	−1	0	1	2	3	4
y	−14	−9	−4	1	6	11	16

[1]

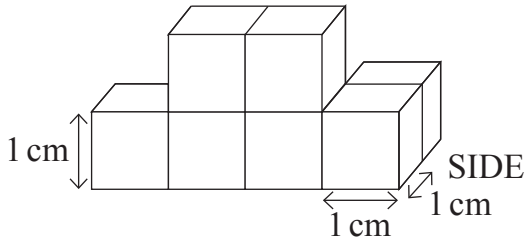
(b) On the grid below, draw the graph of $y = 5x - 4$



[2]

[Turn over

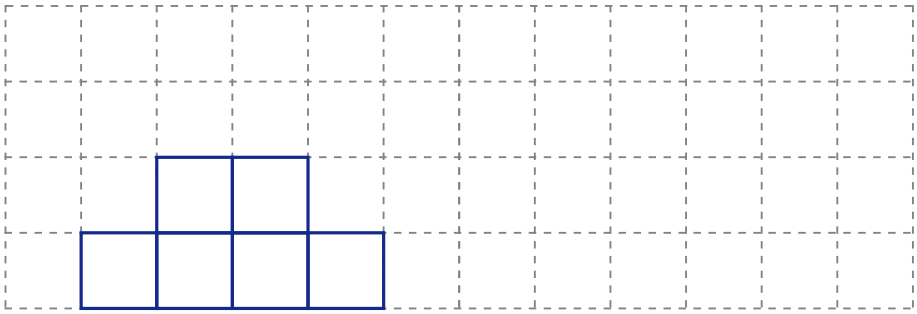
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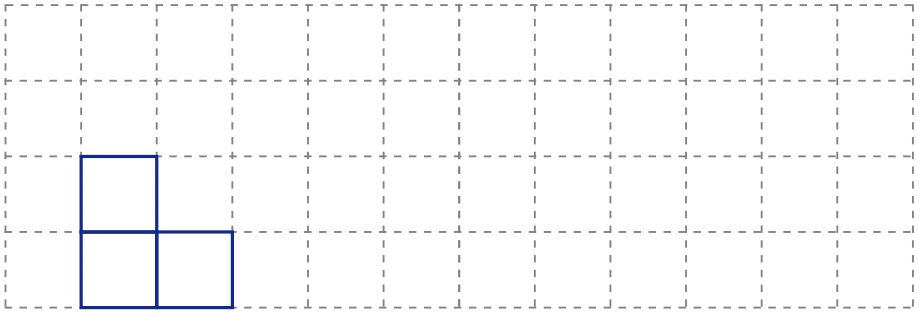
FRONT

Draw the front and side elevations on the grid below.

FRONT



SIDE



[3]

18 Mary raised some money.

She gave $\frac{2}{5}$ of the money to a charity.

She gave $\frac{1}{4}$ of the money to a housing project.

She gave the rest of the money to a first aid group.

What **percentage** of the money did the first aid group receive?

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

$\frac{1}{4} = 25\%$

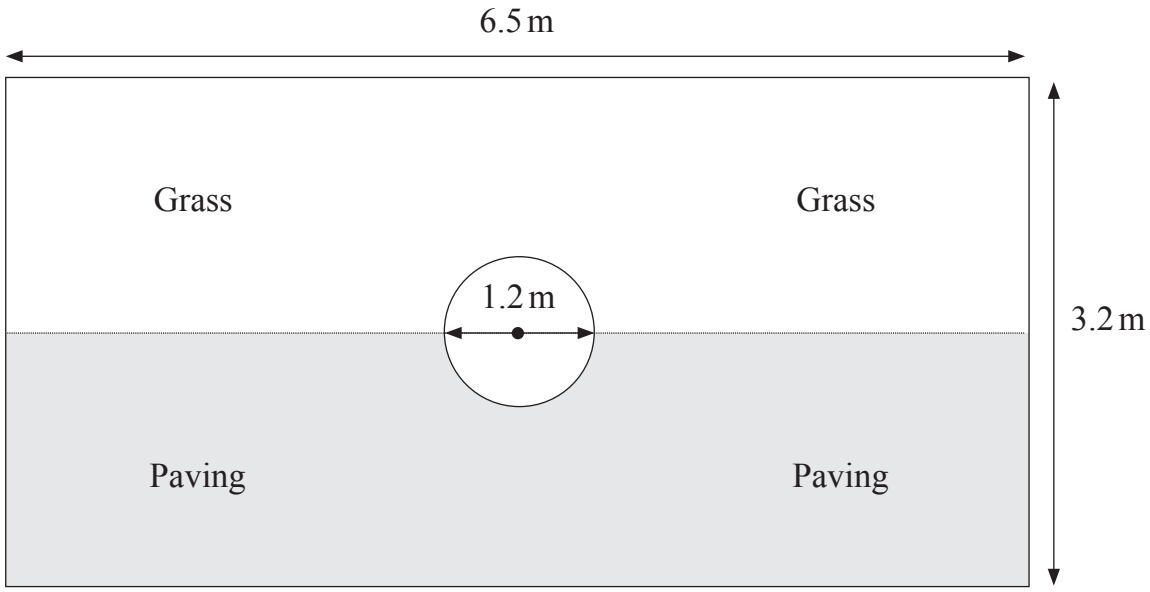
$40\% + 25\% = 65\%$

$100\% - 65\% = 35\%$

Answer 35 % [4]

[Turn over

19 The diagram below shows a rectangular garden with a circular pond in the centre.



(a) Work out the area of the pond.

State the units of your answer.

radius = 1.2 ÷ 2 = 0.6 m
Area = π × 0.6^2
= 1.130973... = 1.13

Answer 1.13 m^2 [3]

(b) Paving costs £30 per square metre.

It can only be bought in whole square metres.

How much will it cost to pave the section shown on the diagram?

Rectangle = $6.5 \times 3.2 = 20.8\ m^2$
Paving = $(20.8 - 1.130973...) \div 2$
$= 9.834513...\ m^2$
Whole square metres, so buy $10\ m^2$
$10 \times £30 = £300$

Answer £ 300 [4]

[Turn over



20 Leah wants to check how economical her car is.

She travels 275 miles, using 22 litres of petrol.

(a) How many miles does her car travel per litre of petrol?

275 ÷ 22 = 12.5

Answer 12.5 miles [1]

(b) The 275 mile journey took Leah 5 hours 30 minutes.

What was her average speed for the journey?

5 hours 30 minutes = 5.5 hours
275 ÷ 5.5 = 50

Answer 50 miles per hour [3]

21 The price of a photocopier is reduced in a sale.

COOL COPY

was £489

now 15% off

How much does it cost now?

15% of £489 = 0.15 × 489 = £73.35
£489 − £73.35 = £415.65

Answer £ 415.65 [3]

22 Jayne owns a hotel.

On Monday morning 54 of her 75 guests had breakfast.

What percentage had breakfast?

$\frac{54}{75} \times 100 = 72$

Answer 72 % [2]

[Turn over

23 **(a)** Multiply out $5(2t + 7)$

Answer $10t + 35$ [1]

(b) Factorise $16r - 8$

Answer $8(2r - 1)$ [1]

24 Dean bought a new car.

He had to pay £220 plus 20% VAT per month for 3 years.

The mileage allowed before any charge was 30 000 miles for the 3 years.

Each additional mile was charged at 8p per mile.

After 3 years Dean had driven 37 200 miles.

How much did Dean pay in total for the 3-year period?

VAT: 20% of £220 = £44

£220 + £44 = £264 per month

3 years = 36 months: 36 × £264 = £9504

Extra miles: 37 200 − 30 000 = 7200

7200 × 8p = 57 600p = £576

Total = £9504 + £576 = £10 080

Answer £ 10 080 [5]

[Turn over



25 (a) (i) Fiona wanted to do a survey about attendance at her school.

She designed a questionnaire for students to complete.

One of the questions was:

"How many days have you had off school?"

State **one** criticism of her question.

Answer *No time period is given, e.g. this term or this year, so answers are not comparable.* [1]

(ii) She decides to give her questionnaires out to the first 20 students coming out of the Year 12 assembly one Monday.

State **two** reasons why her sample may not be representative of the whole school population.

Answer *She only asks Year 12 students, not other year groups.*

She only asks students who were in school that day, so pupils who were absent are missed. [2]

(b) Fiona asked the school office for information about pupils who had arrived late to school on a certain day.

They told her that 14 pupils were late that day.

The list below shows how many minutes late each pupil was.

8	12	15	27	19	26	24
38	29	14	11	16	23	16

Show this information in an ordered stem and leaf diagram.

0	8
1	1 2 4 5 6 6 9
2	3 4 6 7 9
3	8

Key: 3 | 8 means 38 minutes

[3]

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