Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2020

Mathematics

StemUp Model Solution

Unit M1
(With calculator)
Foundation Tier



[GMC11]

GMC11

MONDAY 13 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-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.

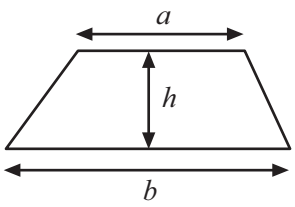
INFORMATION FOR CANDIDATES

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.

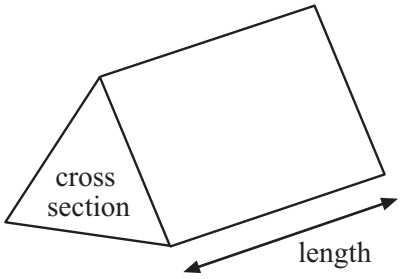
12504

Formula Sheet

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



Volume of prism = area of cross section × length



12504

1 Choose a number from the box below to complete the statements which follow.

Each number should be used once.

6	25	330	1360	40 000



(a) A packet of crisps weighs _____25_____ grams. [1]



(b) A can of cola contains _____330_____ millilitres. [1]



(c) The capacity of a household oil tank is _____1360_____ litres. [1]



(d) Tom walks _____6_____ kilometres in one hour. [1]



(e) A cruise ship weighs _____40 000_____ tonnes. [1]

[Turn over

2 **(a)** 1 kg of potatoes costs £1.50

Alan buys 2.5 kg of potatoes.

How much does he pay?

1.50 × 2.5 = 3.75

Answer £ 3.75 [2]

(b) A tin of tuna costs £1.20

Beth has £10

What is the greatest number of tins of tuna she can buy?

10 ÷ 1.20 = 8.333...
so 8 whole tins

Answer 8 [2]

3 The cost of hiring a bouncy castle is given below.



cost of hire = number of days × £55 + delivery charge

(a) Heidi hired a bouncy castle for 7 days and the delivery charge was £20

What was the cost of hire?

$7 \times 55 + 20$
$= 385 + 20 = 405$

Answer £ 405 [2]

(b) Colin hired a bouncy castle for 3 days and the cost of hire was £200

What was the delivery charge?

$200 - 3 \times 55$
$= 200 - 165 = 35$

Answer £ 35 [2]

[Turn over

4 The Giant's Causeway visitor centre is open from 9 am to 7 pm.

(a) For how many hours is the visitor centre open?

9 am to 7 pm: 9 → 12 is 3 hours, 12 → 7 is 7 hours
3 + 7 = 10

Answer 10 hours [1]

The table shows the number of visitors to the Giant's Causeway in 2016 and 2017

Year	Number of visitors
2016	589 000
2017	666 000

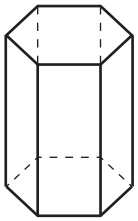
(b) How many **more** visitors were there in 2017 than in 2016?

666 000 − 589 000 = 77 000

Answer 77 000 visitors [1]

(c) The Giant's Causeway is famous for its stone columns.

One of them is shown below.



What is the name of this shape?

Circle the correct answer.

cylinder pentagonal pyramid cuboid hexagonal prism cone

[1]

[Turn over

stemup.co.uk

5 The table shows information about eight different cameras.

Name of camera	Price (£)	Weight (g)	Battery life (shots)	Resolution (megapixels)	Touchscreen
Tinon 10	479	460	260	24	Yes
Tinon 20	605	510	400	28	No
Fiji F1	345	390	366	12	No
Fiji F2	380	360	450	18	Yes
Nika N400	750	625	300	20	No
Nika N500	879	775	365	24	No
Olympia OL	399	375	240	16	Yes
Olympia OM	549	390	275	20	No

(a) Write down the name of the camera with a battery life of 365 shots.

Answer Nika N500 [1]

(b) Write down the name of the cheapest camera that has a touchscreen.

Answer Fiji F2 [1]

(c) Stan wants to buy a camera with

a resolution of at least 20 megapixels and

a weight under 500 g.

Write down the names of the two cameras that he could buy.

Answer Tinon 10 and Olympia OM [1]

6 The chart shows the distance in miles between some towns in Northern Ireland.

Ballymena	26					
Coleraine	18	28				
Larne	47	21	47			
Limavady	31	38	14	57		
Portrush	18	31	7	52	20	
Strabane	61	56	43	81	31	48
	Ballycastle	**Ballymena**	**Coleraine**	**Larne**	**Limavady**	**Portrush**

(a) What is the distance in miles between Coleraine and Ballymena?

Answer 28 miles [1]

(b) Which two towns are furthest apart?

Answer Larne and Strabane [1]

[Turn over

7 Giant's Causeway ticket prices are shown below.

Adult	£11.50
Child (5–18 years)	£5.75
Child (under 5 years)	Free
Family (2 adults and up to 3 children)	£28.50

(a) Eric buys tickets for himself and his two daughters, aged 10 and 13

How much does he pay altogether?

1 adult + 2 children
11.50 + 2 × 5.75
= 11.50 + 11.50 = 23

Answer £ 23.00 [2]

(b) Fiona buys a family ticket for herself, her husband and three children, aged 8, 11 and 15

How much does she save by buying a family ticket rather than two adult and three child tickets?

2 × 11.50 + 3 × 5.75 = 23 + 17.25 = 40.25
40.25 − 28.50 = 11.75

Answer £ 11.75 [2]

(c) Gary spends £9.65 in the café.

He pays with a £10 note.

He receives three coins in change.

What are these coins?

10.00 − 9.65 = 0.35 = 35p
35p = 20p + 10p + 5p

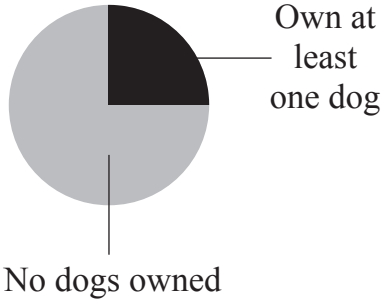
Answer 20p 10p 5p [1]

[Turn over

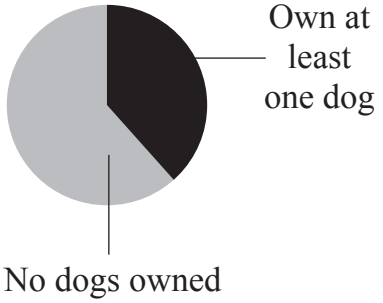
8 The pie charts show the proportion of households in the UK in 2017 that owned dogs.

The number of households in each country is also shown.

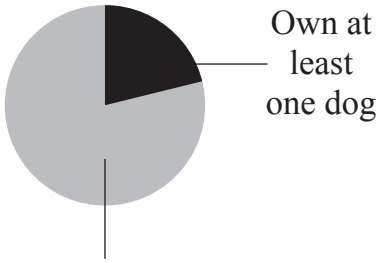
England
(22 million households)



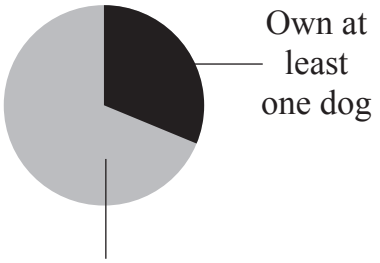
Northern Ireland
(800 000 households)



Scotland
(2.4 million households)



Wales
(1.3 million households)



(a) What percentage of households in England own at least one dog?

Answer 25 % [1]

(b) About what fraction of households in Wales own at least one dog?

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

(c) $\frac{3}{8}$ of the households in Northern Ireland own at least one dog.

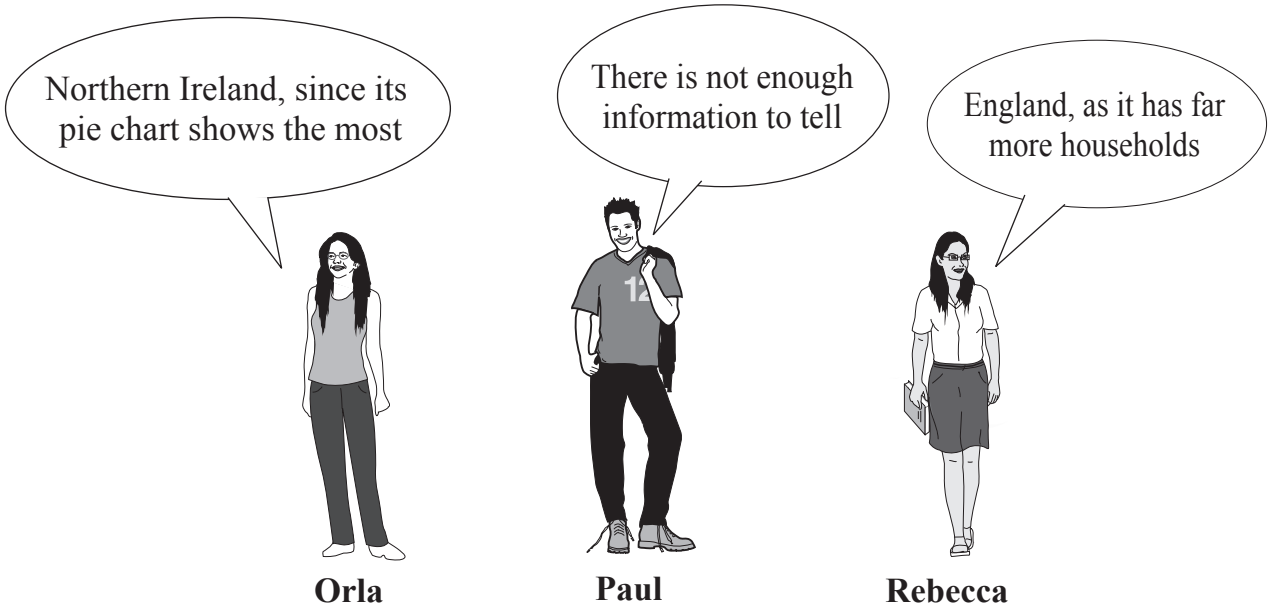
How many households is this?

$\frac{3}{8} \times 800\,000 = 800\,000 \div 8 \times 3$

$= 100\,000 \times 3 = 300\,000$

Answer 300 000 households [1]

(d) Three friends were asked which country in the UK has the most households owning dogs.



Circle the person you agree with.

Orla Paul (Rebecca)

[1]

[Turn over

9 Below are some of Denzel's school exam results.

English $\frac{13}{20}$

Maths $\frac{46}{50}$

Science $\frac{7}{10}$

LLW $\frac{21}{25}$

(a) Write Denzel's English result as a percentage.

13 ÷ 20 × 100 = 65

Answer 65 % [1]

(b) Put his results in order, starting with his **highest** result.

You must show all your working.

English 13 ÷ 20 = 0.65 = 65%

Maths 46 ÷ 50 = 0.92 = 92%

Science 7 ÷ 10 = 0.7 = 70%

LLW 21 ÷ 25 = 0.84 = 84%

92% > 84% > 70% > 65%

Answer Maths , LLW , Science , English [3]

↑
highest

10 **(a)** What is the value of the digit 4 in the number 3.04?

Circle the correct answer.

$\frac{4}{10}$ 40 4 400 $\frac{4}{100}$

[1]

(b) Put these decimals in order of size, starting with the **smallest**.

3.024 3.1 3.24 3.124

Answer 3.024 (↑ smallest) , 3.1 , 3.124 , 3.24 [1]

11 Ciara bought four burgers.

She paid with a £20 note and got £6 change.

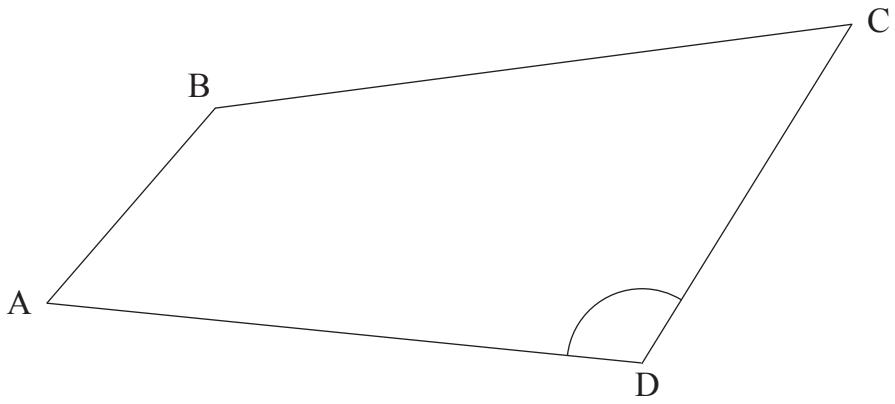
How much did each burger cost?

20 − 6 = 14
14 ÷ 4 = 3.50

Answer £ 3.50 [2]

[Turn over

12



(a) Measure the length of the line BC in mm.

BC = 8.5 cm = 85 mm

Answer 85 mm [2]

(b) Measure the size of angle CDA.

Answer 116 ° [1]

13 Insert the correct symbol in each box below.

$<$ $>$ $=$

(a) 375 mm [=] 37.5 cm

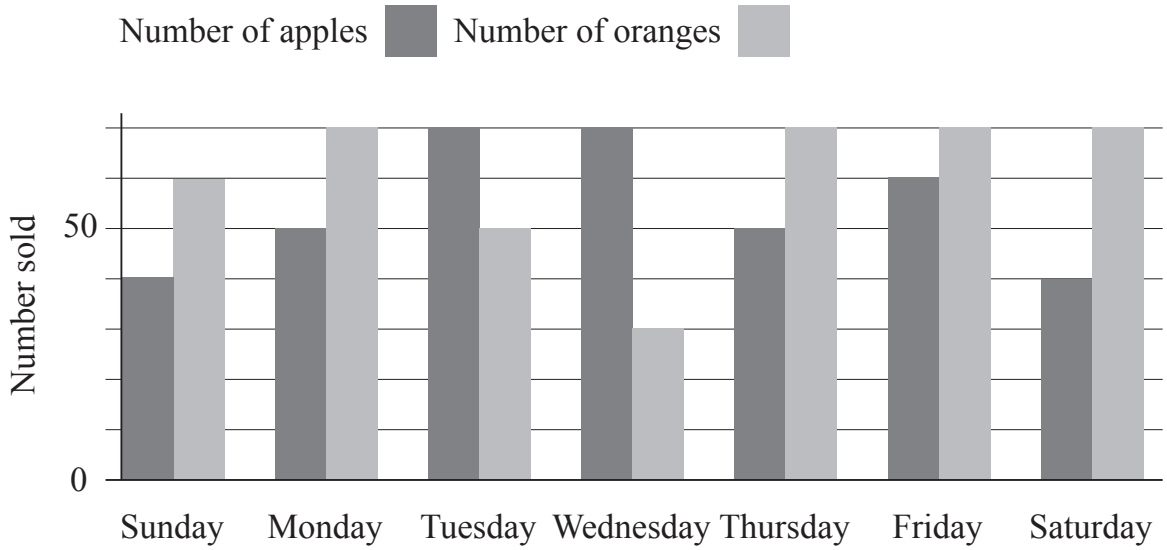
(b) 600 g [<] 6 kg

(c) 27 litres [>] 26 900 ml

(d) 310 mins [>] 5 hours [4]

(a) 37.5 cm = 375 mm
(b) 6 kg = 6000 g
(c) 27 litres = 27 000 ml
(d) 5 hours = 300 mins

14 The dual bar chart shows how many apples and oranges were sold in a fruit shop last week.



The owner says

"I sold 50 more oranges than apples last week."

Is he correct?

You must explain your answer.

Apples: 40 + 50 + 70 + 70 + 50 + 60 + 40 = 380
Oranges: 60 + 70 + 50 + 30 + 70 + 70 + 70 = 420
420 − 380 = 40

Answer No because he sold 40 more oranges than apples, not 50 [3]

15 8500 tickets for a concert are sold.

The organisers think that 40% of the ticket holders will turn up more than an hour before the start.

How many ticket holders will this be?

40% of 8500 = 0.4 × 8500
= 3400

Answer 3400 [2]

16

Silverside	costs	£4.90 per kg
Topside	costs	£5.75 per kg
Fillet	costs	£13.00 per kg

Martin buys 4.5 kg of Fillet.

He also buys some Silverside.

The total cost is £92.31

How much Silverside does he buy?

Fillet: 4.5 × 13.00 = £58.50
Silverside: 92.31 − 58.50 = £33.81
33.81 ÷ 4.90 = 6.9 kg

Answer 6.9 kg [4]

[Turn over

17 **(a)** Calculate the value of $\dfrac{2}{0.4^2}$

$0.4^2 = 0.16$

$2 \div 0.16 = 12.5$

Answer 12.5 [2]

(b) Calculate the cube of 6

$6 \times 6 \times 6 = 216$

Answer 216 [1]

(c)

36	1	19	49	10	39	15	31

From the numbers in the list, write down all the

(i) prime numbers,

Answer 19, 31 [1]

(ii) square numbers.

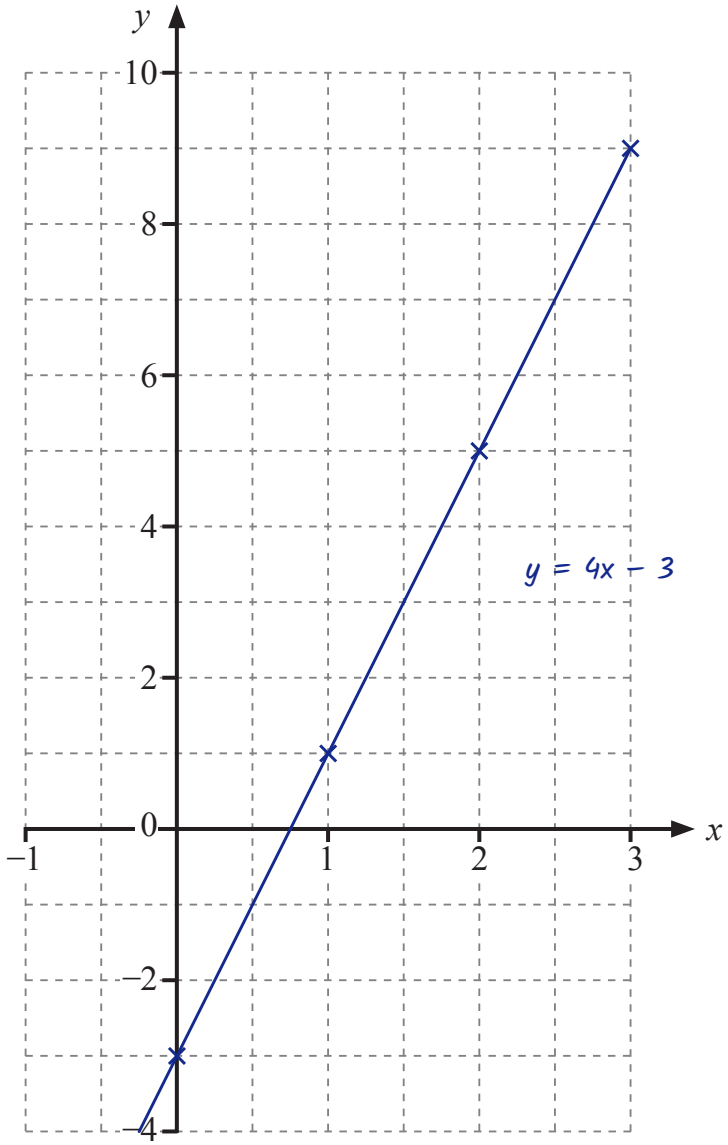
Answer 36, 1, 49 [1]

18 **(a)** Complete the table below for $y = 4x - 3$

x	1	2	3
y	1	5	9

[1]

(b) Draw the line $y = 4x - 3$ on the grid below



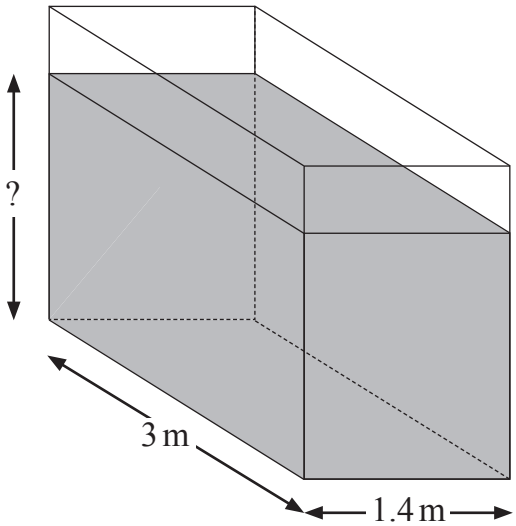
[2]

[Turn over

19 A tank is in the shape of a cuboid, as shown below.

The tank is used to store $11.13\,m^3$ of liquid.

How deep is the liquid in the tank?



Volume = length × width × depth
Area of base = 3 × 1.4 = 4.2 m^2
depth = 11.13 ÷ 4.2
= 2.65

Answer 2.65 m [3]

20 Work out the size of the angle marked x in the diagram below.

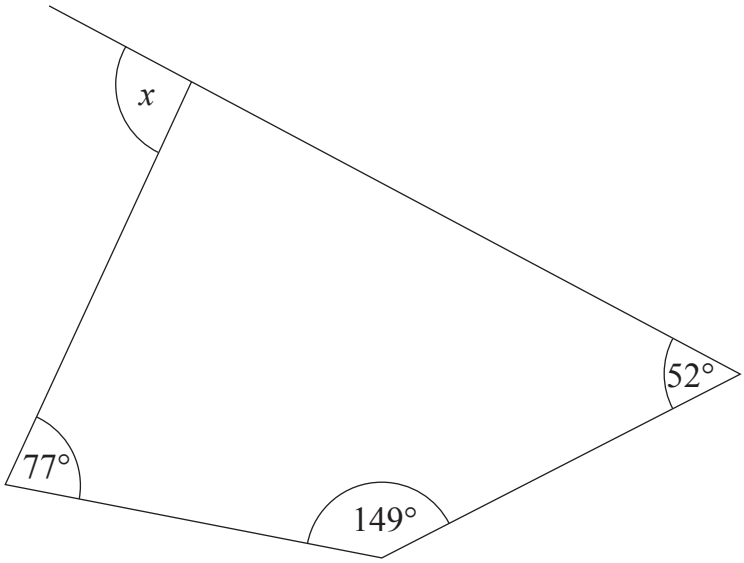


diagram not
drawn accurately

Angles in a quadrilateral add up to 360°
inside angle at top = 360 − (77 + 149 + 52)
= 360 − 278 = 82°
Angles on a straight line add up to 180°
x = 180 − 82 = 98°

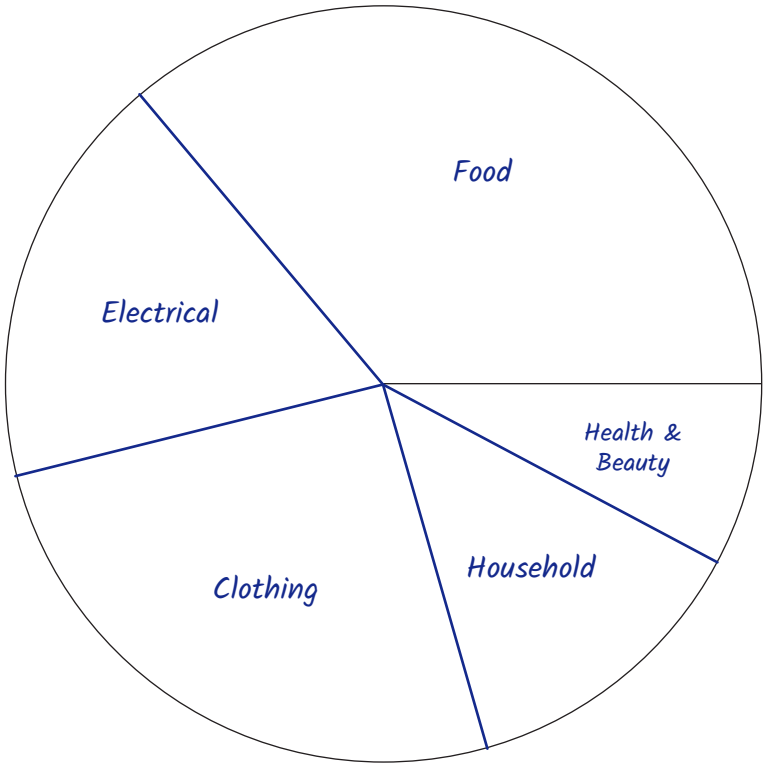
Answer 98 ° [3]

[Turn over

21 The total sales figures for a supermarket one month are shown below.

Department	Total Sales (£1000s)	Angle (× 2)
Food	65	130°
Electrical	32	64°
Clothing	46	92°
Household	23	46°
Health & Beauty	14	28°

Draw a pie chart to show this information.



[4]

65 + 32 + 46 + 23 + 14 = 180
360 ÷ 180 = 2, so each £1000 = 2°

22 A hotel has single, twin and family rooms.

It offers room only, bed and breakfast (B&B) or half board.

On Saturday night, all the rooms in the hotel were booked.

Some information is shown in this two-way table.

	Room only	**B&B**	**Half board**	
Single	2	1	*1*	4
Twin	*4*	4	3	*11*
Family	1	*3*	6	10
	7	*8*	*10*	*25*

How many rooms are in the hotel?

Single: 4 − 2 − 1 = 1 *Twin room only: 7 − 2 − 1 = 4*

Twin: 4 + 4 + 3 = 11 *Total = 4 + 11 + 10 = 25*

Answer *25* [3]

[Turn over

23 Streetwise Youth Club has 86 members.

59 of the members attended last week.

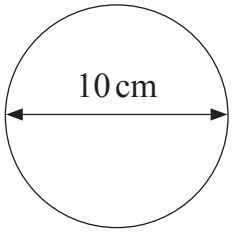
What percentage attended last week?

Give your answer to 1 decimal place.

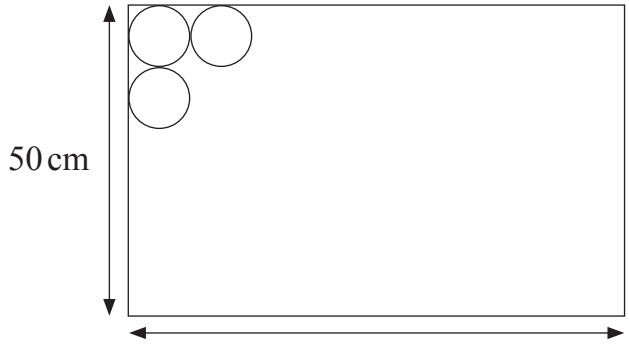
59 ÷ 86 × 100
= 68.6046511...
= 68.6 (1 d.p.)

Answer 68.6 % [3]

24 Circles with diameter 10 cm are cut from a sheet of plastic as shown below.



diagrams not drawn accurately



(a) Calculate the area of each circle.

radius = 5 cm

Area = $\pi \times 5^2$ = 78.5398163...

Answer 78.54 cm^2 [2]

(b) How many circles can be cut from the sheet of plastic?

100 ÷ 10 = 10 across, 50 ÷ 10 = 5 down

10 × 5 = 50

Answer 50 [2]

(c) What is the area of the plastic left over after the maximum number of circles have been cut out?

Sheet = 100 × 50 = 5000 cm^2

Circles = 50 × 78.5398163... = 3926.9908...

Left over = 5000 − 3926.9908... = 1073.0091...

Answer 1073.01 cm^2 [3]

[Turn over

25 Julie works on a market stall.
One Saturday she has 42 boxes of candles to sell.
Each box cost her £2.40
There are 18 candles in each box.

During the day she sells 34 boxes at £3.60 each.
In the last hour she starts to sell the remaining candles individually at 35p each.

At the end of the day she has only 12 candles left.
Calculate the profit she made that day.

Cost: 42 × £2.40 = £100.80

Boxes sold: 34 × £3.60 = £122.40

Boxes left: 42 − 34 = 8

Candles left: 8 × 18 = 144

Candles sold singly: 144 − 12 = 132

132 × 35p = 132 × £0.35 = £46.20

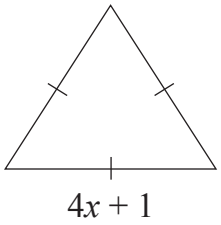
Total takings: £122.40 + £46.20 = £168.60

Profit: £168.60 − £100.80 = £67.80

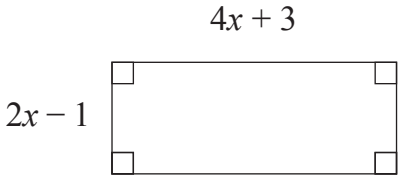
Answer £ 67.80 [6]

26 Which of these shapes has the greatest perimeter?

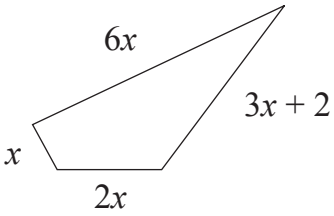
Show all your working.



Shape A



Shape B



Shape C

Shape A: $3 \times (4x + 1) = 12x + 3$

Shape B: $2(4x + 3) + 2(2x - 1)$

$= 8x + 6 + 4x - 2 = 12x + 4$

Shape C: $6x + (3x + 2) + 2x + x = 12x + 2$

All have $12x$, and $12x + 4 > 12x + 3 > 12x + 2$

so Shape B has the greatest perimeter

Answer Shape ___B___ [4]

[Turn over



27 A shop sells 80 gift vouchers valued at £5, £10, £20, £50 or £100
The table shows the number of each sold one weekend.

Price of gift voucher	Number of vouchers sold	Price × number
£5	34	170
£10	26	260
£20	9	180
£50	7	350
£100	4	400

The shopkeeper states "on average people spend at least £15 on a gift voucher".

By finding all three averages (mode, median, mean), which average makes her statement correct?

Mode = £5 (most vouchers sold, 34)

Median: 80 values, so between 40th and 41st

34 at £5, then 35th to 60th are £10, so Median = £10

Mean = (170 + 260 + 180 + 350 + 400) ÷ 80

= 1360 ÷ 80 = £17

£5 < £15, £10 < £15, but £17 ≥ £15

Answer Mean because the mean is £17, which is at least £15,

but the mode (£5) and median (£10) are both less than £15 [5]

THIS IS THE END OF THE QUESTION PAPER

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Question Number	**Marks**
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Examiner Number

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