Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2023

Mathematics

StemUp Model Solution

Unit M1
(With calculator)
Foundation Tier



[GMC11]

GMC11

FRIDAY 19 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 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-nine** 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.

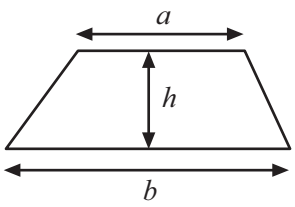
INFORMATION FOR CANDIDATES

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.

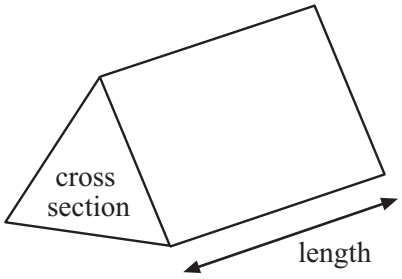
13338

Formula Sheet

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



Volume of prism = area of cross section × length



13338

1 **(a)** It is estimated that 19% of the Amazon rainforest has been destroyed.

What percentage has not been destroyed?

100 − 19 = 81

Answer 81 % [1]

(b) Every year, around 78 million acres of rainforest are destroyed.

Write 78 million in figures.

Answer 78 000 000 acres [1]

2 A family pays for gas and electricity on a prepay meter.

The family's costs are

Electricity	£2 per day
Gas	£1.50 per day

(a) The family puts £10 of electricity on the meter.

How many days should that last for?

£10 ÷ £2 = 5

Answer 5 days [1]

(b) They want to have enough gas to last for the next 20 days.

What is the minimum amount they should prepay?

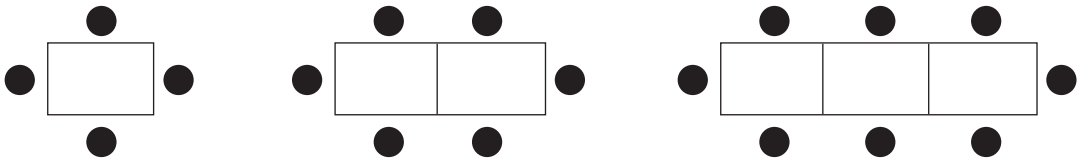
20 × £1.50 = £30

Answer £ 30 [1]

[Turn over

3 A single table at a restaurant can seat 4 people.

Every time a table is joined to the end, an extra 2 people can be seated.



The manager uses the rule

number of people = 2 × number of tables + 2

(a) How many people can be seated when 5 tables are joined together?

$2 \times 5 + 2 = 12$

Answer 12 people [1]

(b) A group of 20 people make a booking at the restaurant.

How many tables will need to be joined together to seat them?

$2 \times 9 + 2 = 20$

Answer 9 tables [1]

4 Use the most suitable number from the list to complete each sentence.

0.6 6 6000 600

(a) A 10p coin weighs about 6 grams. [1]

(b) Most smartphones are about 0.6 centimetres thick. [1]

5 A broadband WiFi salesman uses a pictogram to record his sales over a 4-week period.

Week	Number of sales
1	
2	
3	
4	

Key  means 10 sales

(a) There were 42 sales in Week 2 and 38 sales in Week 3

Use this information to complete the key in the space given above. [1]

(b) There were 150 sales in total over the 4-week period.

Use this information to complete the pictogram. [2]

Each symbol = 10, so the dot = 2 and each line = 2
Week 1 = 36, Week 2 = 42, Week 3 = 38
Week 4 = 150 − 36 − 42 − 38 = 34
34 = 3 full symbols + dot (2) + 1 line (2)

[Turn over

6 A restaurant menu is shown.

Starters

Soup of the Day – £2.95
Prawn Cocktail – £4.95
Brie Bites – £4.50

Main Courses

Monkfish Tails – £11.50
Fillet Steak – £22.95
Crispy Pork Belly – £10.95

Desserts

Chef's Selection – £5.50

(a) Work out the total cost of this order.

1 × soup	£	2.95	
2 × brie bites	£	9.00	2 × 4.50
2 × crispy pork belly	£	21.90	2 × 10.95
1 × fillet steak	£	22.95	
3 × chef's selection	£	16.50	3 × 5.50
Total	£	73.30	(add all)

[3]

(b) The restaurant gives loyalty points to customers.

One loyalty point is given for every £5 spent.

A customer spends £38.85 in the restaurant.

How many loyalty points will they be given?

£38.85 ÷ £5 = 7.77
so 7 full lots of £5

Answer 7 [1]

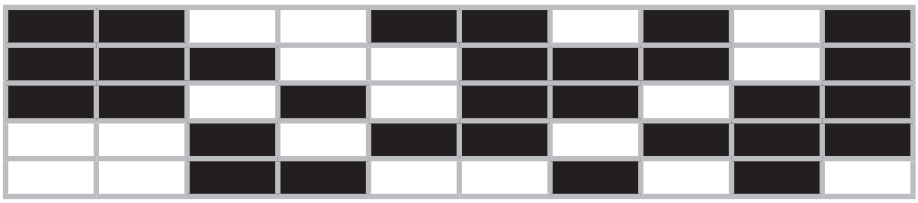
[Turn over



7 To raise funds for a new building, a club asks members to "buy a brick".

Each brick costs £25

The diagram below shows which bricks were bought.



shows the brick was bought

(a) What fraction of the bricks were bought?

Give your answer in its simplest form.

30 out of 50 bricks bought $\frac{30}{50} = \frac{3}{5}$

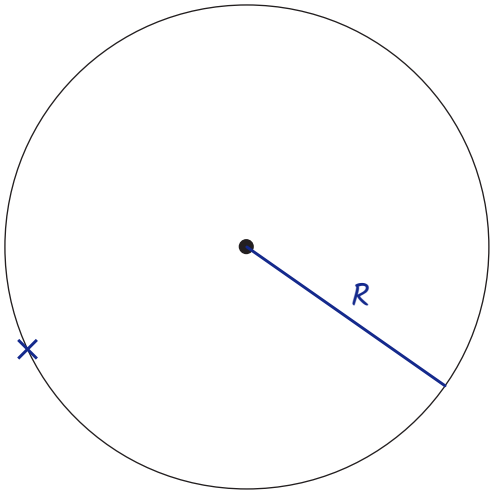
Answer $\frac{3}{5}$ [2]

(b) How much money did the club raise?

30 × £25 = £750

Answer £ 750 [1]

8



(a) Mark with an "X" any point on the circumference of the circle. [1]

(b) Draw a radius on the circle.

Label it with the letter "R". [1]

(c) Measure the diameter of the circle, in mm.

Diameter = 6.4 cm = 64 mm

Answer 64 mm [2]

[Turn over

9 The table shows information about earthquake activity on a single day in Chile.

Time	Magnitude	Depth (km)	Region
0335	8.7	28	Valdivia
0351	6.1	30	Talca
0417	5.5	34	Ovalle
0430	5.6	29	Talca
0436	6.0	32	Valdivia
0445	5.3	34	Ovalle
0452	5.4	32	Valdivia
0455	5.1	35	Valdivia
0501	6.9	29	Talca
0526	6.2	27	Ovalle

(a) What time was the earthquake with the smallest magnitude?

Answer 0455 [1]

(b) In what region was the earthquake with the greatest depth?

Answer Valdivia [1]

(c) Which region had the highest number of earthquakes that day?
Valdivia 4, Talca 3, Ovalle 3

Answer Valdivia [1]

10 A company gives every customer one offer when they place an order.

	Offer 1	25% off your order
or	Offer 2	$\frac{1}{3}$ off your order
or	Offer 3	£50 off your order

Gary placed an order worth £180

Which offer will save him the greatest amount of money?

You must show working to explain your answer.

Offer 1: 25% of £180 = 0.25 × 180 = £45

Offer 2: $\frac{1}{3}$ of £180 = 180 ÷ 3 = £60

Offer 3: £50

£60 > £50 > £45

Answer Offer *2* because *it saves £60, which is more than £45 (Offer 1) or £50 (Offer 3).* [3]

[Turn over

11 Decide if each of the following statements is true or false.

Circle your answer.

$\sqrt{100} = 50$	True	(False)	√100 = 10
$5^2 = 25$	(True)	False	
$33\% < \frac{1}{3}$	(True)	False	1/3 = 33.33...%

[3]

12 The ages of 10 players are

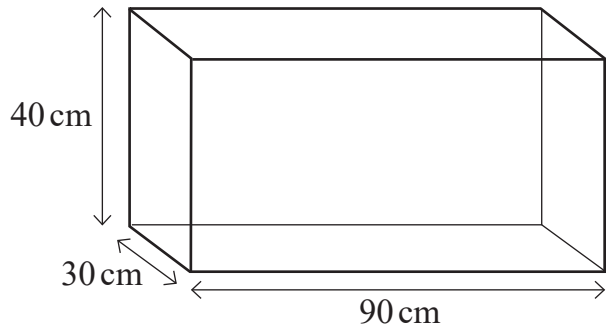
18 25 23 29 36 24 31 20 21 33

Calculate the mean age.

18 + 25 + 23 + 29 + 36 + 24 + 31 + 20 + 21 + 33 = 260
260 ÷ 10 = 26

Answer 26 [3]

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



The **base** of the tank needs to be covered with gravel.

1 kg of gravel covers 200 cm^2

How much gravel is needed to cover the base of this tank?

Base area = 90 × 30 = 2700 cm^2
2700 ÷ 200 = 13.5 kg

Answer *13.5* kg [2]

[Turn over

14 John has £100 to spend on downloading games.

Each game costs £7.99 to download.

He wants to download as many games as possible.

(a) How many games can John download?

100 ÷ 7.99 = 12.515...
so 12 games

Answer 12 [2]

(b) How much money will he have left?

12 × £7.99 = £95.88
£100 − £95.88 = £4.12

Answer £ 4.12 [1]

15 A chef uses this formula to work out how long to cook turkey for.

$$T = 20W + 45$$

where T is the time (in minutes)
W is the weight of the turkey (in kilograms, kg)

He wants to cook a turkey weighing 11 kg.

(a) How long, in minutes, should he cook the turkey for?

$T = 20 \times 11 + 45$
$= 220 + 45 = 265$

Answer 265 mins [2]

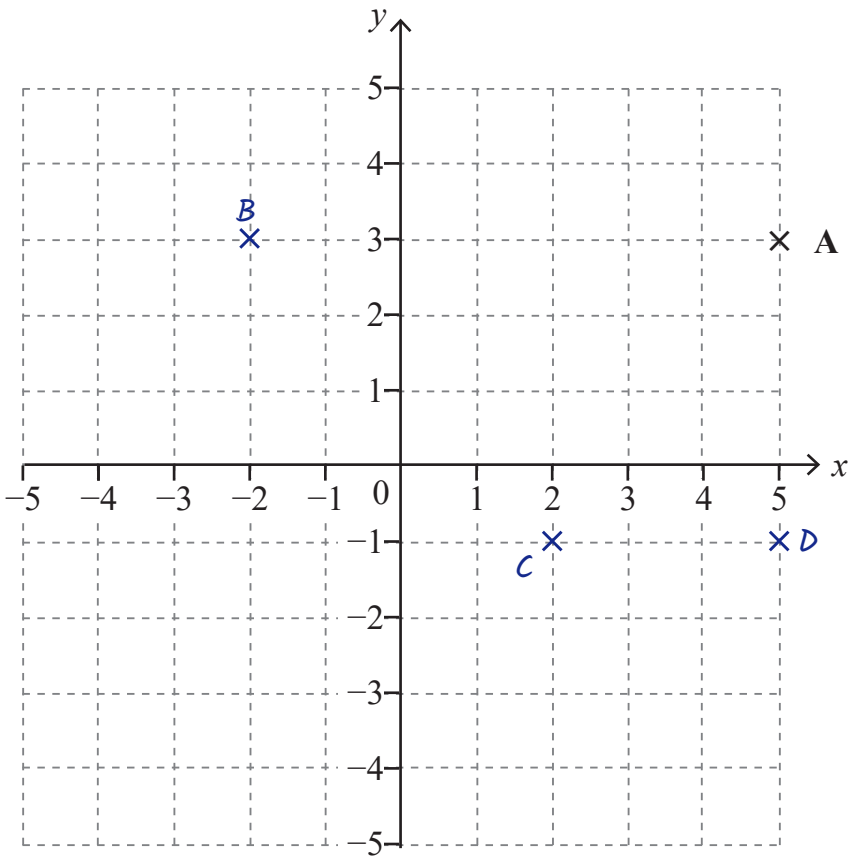
(b) Change this time to hours and minutes.

$265 = 240 + 25$, 240 min $= 4$ hours

Answer 4 hours 25 mins [1]

[Turn over

16 The point A (5, 3) is plotted on this coordinate grid.



(a) Plot the points B (−2, 3) and C (2, −1) on the grid. [2]

(b) Write down the coordinates of a point D that could be plotted on the grid to make ABCD a trapezium.

DC parallel to AB

Answer (5 , −1) [1]

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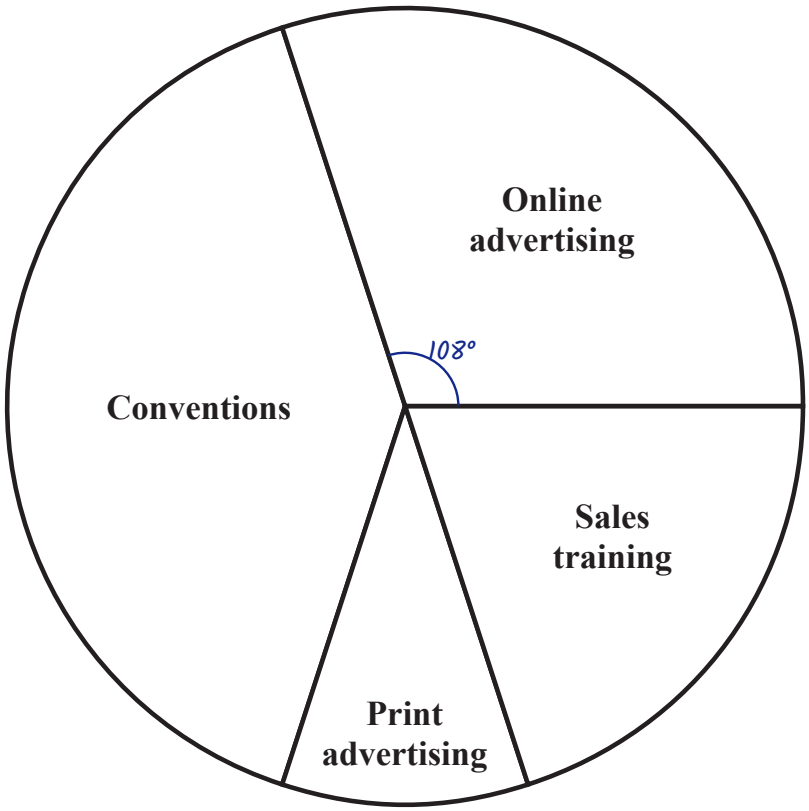
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(Questions continue overleaf)

[Turn over

17 A business spent £18 000 last year.

The pie chart shows how the money was spent.



(a) (i) Measure the angle for the sector labelled "Online advertising".

Answer 108 ° [1]

(ii) Use your answer to part **(i)** to calculate the amount of money the company spent on "Online advertising" last year.

£18 000 ÷ 360 = £50 per degree
50 × 108 = £5400

Answer £ 5400 [2]

13338

(b) Complete the following sentences correctly.

(i) The company spent _____twice_____ as much on "Sales training" as they did on "Print advertising". [1]

Sales training 72°, Print 36°

(ii) Spending on "Conventions" and "Print advertising" together used

_____half_____ of the total budget. [1]

Conventions 144° + Print 36° = 180° out of 360°

[Turn over

18 Debbie works as a salesperson for an insurance company.

Her rate of pay is £11.50 per hour.

Every time she sells an insurance policy she receives a bonus of £7.25

Last week Debbie worked these hours.

Monday	8am – 4pm
Tuesday	8am – 4pm
Wednesday	8am – 4pm
Thursday	8am – 4pm
Friday	8am – 12 noon
Saturday	Off
Sunday	Off

Her total pay for the week was £537.25

How many insurance policies did she sell?

Hours = 8 + 8 + 8 + 8 + 4 = 36 hours
Basic pay = 36 × £11.50 = £414
Bonus = £537.25 − £414 = £123.25
Policies = 123.25 ÷ 7.25 = 17

Answer 17 [4]

19 A survey was issued online, by post, by text and face to face.

The number of responses received for each method are shown in the table.

Method	No of surveys issued	No of responses
Online	240	120
Post	100	30
Text	300	150
Face to face	160	120

Frank thinks that you are most likely to get a response from surveys issued by text.

Is he right?

You must show working to justify your answer.

Online: 120 ÷ 240 = 1/2 = 50%
Post: 30 ÷ 100 = 3/10 = 30%
Text: 150 ÷ 300 = 1/2 = 50%
Face to face: 120 ÷ 160 = 3/4 = 75%

Answer No because face to face has the highest response rate (75%), text is only 50%. [4]

[Turn over

20

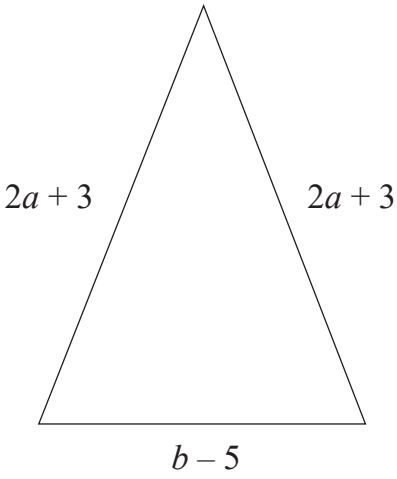


diagram not drawn accurately

(a) Write an expression for the perimeter of the triangle.

Simplify your answer.

$2a + 3 + 2a + 3 + b - 5$
$= 4a + b + 1$

Answer $4a + b + 1$ [2]

(b) The perimeter of the triangle is 30

You are told that $b = 9$

Work out the value of a

$4a + 9 + 1 = 30$
$4a = 30 - 10 = 20$
$a = 20 \div 4 = 5$

Answer $a =$ 5 [3]

21 Below are listed six data sets.

A: number of pages in a book

B: temperature of a liquid

C: mass of an apple

D: colour of students' eyes

E: age of person

F: favourite food

From the list, choose one data set that represents

(a) Qualitative data Answer D [1]

(b) Discrete data Answer A [1]

(c) Continuous data Answer B [1]

[Turn over

22 The diagram shows a net which is to be folded to make an open box.

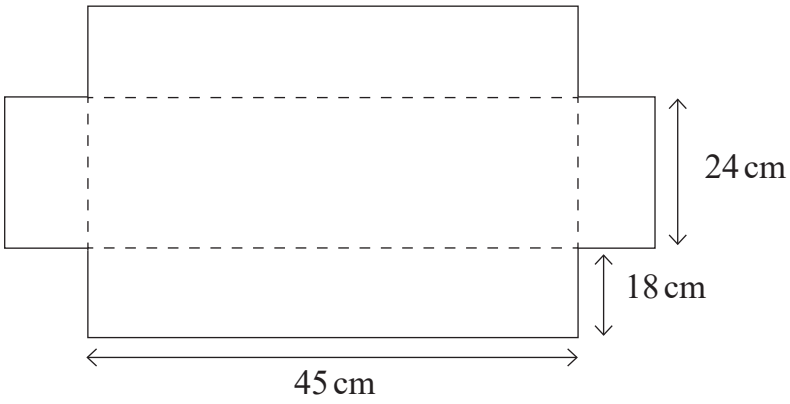


diagram not drawn accurately

(a) Calculate the volume of the box.

You should include units with your answer.

Volume = 45 × 24 × 18
= 19440 cm³

Answer 19440 cm³ [3]

(b) Calculate the total external (outside) surface area of the box.

Base: 45 × 24 = 1080
Front and back: 2 × 45 × 18 = 1620
Two ends: 2 × 24 × 18 = 864
Total = 1080 + 1620 + 864 = 3564

Answer 3564 cm^2 [3]

23 The table shows part of a train timetable from Edinburgh to St Andrews.

The Express trains travel directly. The Standard trains stop at other stations.

	Express	**Standard**	**Express**	**Standard**	**Express**
Edinburgh	1318	1343	1424	1441	1520
Haymarket		1406		1504	
Kirkcaldy		1418		1516	
Ladybank		1423		1521	
St Andrews	1403	1439	1509	1537	1605

(a) Alex arrives at Edinburgh Airport at 1306

It takes him 26 minutes to collect his luggage.

By taxi, he arrives at Edinburgh Train Station 18 minutes later.

How long will he have to wait at the station for the next train to St Andrews?

1306 + 26 min = 1332, 1332 + 18 min = 1350
Next train is 1424 (the 1343 has gone)
1350 to 1424 = 10 + 24 = 34 minutes

Answer 34 minutes [3]

(b) The distance between Edinburgh and St Andrews is 54 miles.

Calculate the average speed at which the Express train travels between Edinburgh and St Andrews.

Express: 1424 to 1509 = 45 min = 0.75 hr
Speed = 54 ÷ 0.75
= 72 miles/hr

Answer 72 miles/hr [3]

[Turn over

24 Greg bought a mobile phone for £180

A year later he sold it for £54

What was Greg's percentage loss on the phone?

Loss = £180 − £54 = £126

$\frac{126}{180} \times 100 = 70\%$

Answer 70 % [3]

25 Solve the equation $4(y + 2) = 22$

$4y + 8 = 22$

$4y = 22 - 8 = 14$

$y = 14 \div 4 = 3.5$

Answer $y =$ 3.5 [3]

26

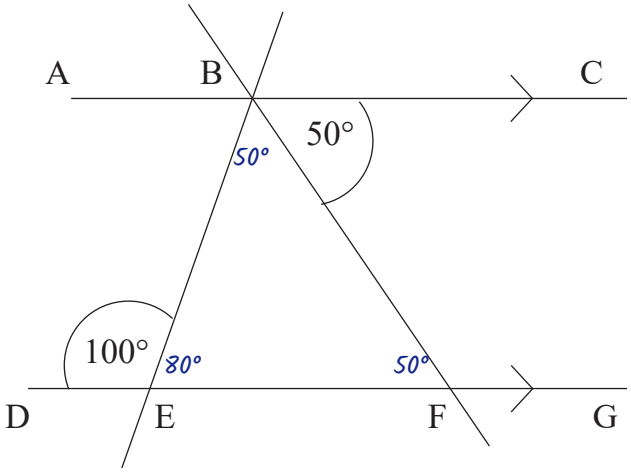


diagram not drawn accurately

AC and DG are parallel lines.

Angle CBF = 50° and angle BED = 100°

What type of triangle is BEF?

Give a reason for each angle found.

Angle BFE = 50° (alternate angles, AC is parallel to DG)

Angle BEF = 180 – 100 = 80° (angles on a straight line add to 180°)

Angle EBF = 180 – 50 – 80 = 50° (angles in a triangle add to 180°)

Two angles are 50°, so triangle BEF is isosceles.

Answer *Isosceles* [3]

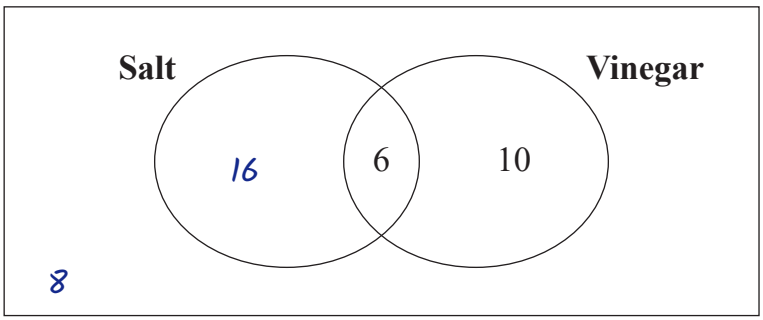
[Turn over

27 40 customers order chips in a takeaway.

6 customers take **both** salt and vinegar on their chips.

10 customers take vinegar **only**.

This information is shown on the Venn diagram.



22 customers take salt on their chips.

Use the Venn diagram to work out how many customers take neither salt nor vinegar on their chips.

Salt only = 22 − 6 = 16
16 + 6 + 10 = 32
Neither = 40 − 32 = 8

Answer 8 [3]

28 The ages of 21 workers in an office are recorded as

28	32	38	40	42	49	51	23	26	27	53
49	45	36	38	37	62	23	46	58	47	

(a) Draw a stem and leaf diagram to display this set of data.

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

Key: 2 | 3 = 23 years

[3]

(b) A new worker joins the office. He is aged 34

What effect will this have on the median age?

Answer the median will be lowered (from 40 to 39) [1]

[Turn over

29 A local sports club runs a tuck shop during matches.

Before last week's match the club bought

25 packs, each containing 6 drinks, costing £3 per pack,

15 packs, each containing 12 bags of crisps, costing £2.40 per pack,

35 packs, each containing 5 chocolate bars, costing £1 per pack.

(a) Calculate the total cost to the club.

Drinks: 25 × £3 = £75

Crisps: 15 × £2.40 = £36

Chocolate bars: 35 × £1 = £35

Total = 75 + 36 + 35 = £146

Answer £ 146 [2]

(b) Tuck shop prices

Drinks	80p each
Crisps	50p per bag
Chocolate Bars	30p each

Special Deal ***1 drink, 1 bag of crisps, 1 chocolate bar for £1.50***

During the match, 115 people bought the Special Deal.

By the end of the match the tuck shop had sold **all** the drinks, crisps and chocolate bars.

What was the tuck shop's profit for that day?

Drinks 25 × 6 = 150, crisps 15 × 12 = 180, bars 35 × 5 = 175

Special Deal: 115 × £1.50 = £172.50

Drinks: 150 − 115 = 35 left, 35 × 80p = £28

Crisps: 180 − 115 = 65 left, 65 × 50p = £32.50

Bars: 175 − 115 = 60 left, 60 × 30p = £18

Income = 172.50 + 28 + 32.50 + 18 = £251

Profit = £251 − £146 = £105

Answer £ 105 [4]

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Question Number	**Marks**
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Examiner Number

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General Certificate of Secondary Education
Summer 2023

GCSE Mathematics

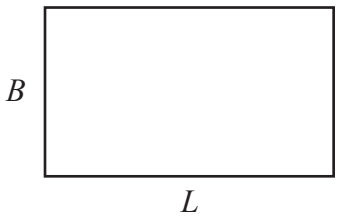
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ADDITIONAL SUPPORT MATERIALS
(For use in Summer 2023)

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$$\text{Average Speed} = \frac{\text{Distance}}{\text{Time}}$$

Perimeter, Area and Volume

The perimeter of a polygon is the distance around the outside of the polygon.



The area of a rectangle is found by multiplying the length of the rectangle by the breadth.

$A = L \times B$, where A is the area, L is length and B is breadth.

The volume of a cuboid is found by multiplying the length by the breadth by the height of the cuboid.

$V = L \times B \times H$ where V is volume, L is length, B is breadth and H is height.

The area of a circle is $A = \pi r^2$ where r is the radius of the circle.

Gradient of Line

$$\text{Gradient of line} = \frac{\text{increase in vertical distance}}{\text{increase in horizontal distance}}$$

Geometry and Angles

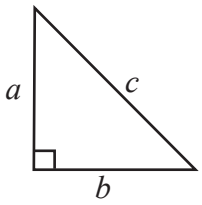
There are 180° on a straight line.
There are 180° inside a triangle.
An isosceles triangle is a triangle with 2 equal sides and 2 equal angles.
The sum of all the angles inside a polygon is given by $180(n - 2)$ where n is the number of sides in the polygon.

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Pythagoras' Theorem

If a, b and c are the sides of a right angled triangle shown below, then

$$a^2 + b^2 = c^2$$



Mean

The mean of a set of data is the sum of all the data values divided by the number of data values.

Estimate for the mean of a grouped frequency distribution

Estimated mean = sum of (mid interval values multiplied by their frequency) divided by the sum of all the frequencies.

Pie Chart

In a pie chart, the total angle that corresponds to the entire data set is 360°

Probability

The sum of the probabilities of all outcomes equals 1

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