

Level 1 / Level 2 GCSE (9 – 1)

MATHEMATICS

Paper 3 (Calculator)

Foundation Tier

Time : 1 hour 30 minutes

Paper : 1 MA1 / 3F

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may be used.**
- If your calculator does not have a  $\pi$  button, take the value of  $\pi$  to be 3.142 unless the question instructs otherwise.



### Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Write 52800 to the nearest thousand.

53000 (1)

.....  
(Total for Question 1 is 1 mark)

2. Write down a power of 4 that is between 50 and 69.

$$4^2 = 16, 4^3 = 64$$

64 (1)

.....  
(Total for Question 2 is 1 mark)

3. Change 2.5 kilograms to grams.

$$2.5 \times 1000 = 2500 (1)$$

..... g  
(Total for Question 3 is 1 mark)

4. Here is a list of numbers.

36    41    47    49    57    63    69    72

From the list, write down all the numbers that are multiples of 7.

49, 63 (1)

.....  
(Total for Question 4 is 1 mark)

5. Write 22% as a decimal.

0.22 (1)

.....  
(Total for Question 5 is 1 mark)



6. There are four types of solid shapes in a toy box.

The table shows the number of each type of solid shapes in the toy box.

Type of solid shape	yellow cube	red cube	yellow cuboid	red cuboid
Number of solid shape	12	16	8	14

Express red solid shapes as a percentage of the total solid shapes

$$\text{Red solid shapes} = 30 \quad (1)$$

$$\text{Total solid shapes: } 12 + 16 + 8 + 14 = 50$$

$$\frac{30}{50} \times 100\% = 60\%$$

$$(1) \quad (1)$$

.....  
**(Total for Question 6 is 3 marks)**

7. A boy has £10 and spends  $\frac{1}{5}$  of his money on sweets and  $\frac{1}{4}$  of his money on comics.

How much money is left for the boy?

$$\frac{1}{5} + \frac{1}{4} = \frac{9}{20} \quad (1)$$

$$\frac{1}{5} + \frac{1}{4} = \frac{9}{20} \quad (1)$$

$$\frac{9}{20} \times 10 = 4.5 \quad (1)$$

OR

$$1 - \frac{9}{20} = \frac{11}{20} \quad (1)$$

$$10 - 4.5 = \text{£}5.50 \quad (1)$$

$$\frac{11}{20} \times 10 = \text{£}5.50 \quad (1)$$

£ .....

**(Total for Question 7 is 3 marks)**

8. Simplify  $3m - 4n - n - m$

$$2m - 5n \quad (1)$$

$$\text{Either } 2m \text{ OR } -5n \quad (1)$$

.....  
**(Total for Question 8 is 2 marks)**



9. The population of Australia is approximately 25 million, of which 5.1 million people live in Sydney, 4.9 million people live in Melbourne and 2.4 million people live in Perth.

What fraction of the population do not live the above regions?

Give your fraction in its simplest form.

Number of people who live in the above regions:  $5.1 + 4.9 + 2.4 = 12.4$

Number of people who don't live in the above regions:  $25 - 12.4 = 12.6$  (1)

Find fraction:  $\frac{12.6}{25} = \frac{12.6 \times 5}{25 \times 5} = \frac{63}{125}$

(1)

(1)

.....  
(Total for Question 9 is 3 marks)

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10. The ratio of part-time to full-time workers at a factory is 3 : 5.

Raj says that 60% of the workers are part-time.

Is he correct? Explain your answer.

No,  $\frac{3}{8} \times 100\% = 37.5\%$  is the correct answer (1)

.....  
(Total for Question 10 is 1 mark)



11. The table shows the prices of carton of Semi-Skimmed Milk 1 litre sold at two different supermarkets.

	Price
<b>Supermarket X</b>	82 p
<b>Supermarket Y</b>	79 p

Fred buys 3 cartons from supermarket **X** and 5 cartons from supermarket **Y**. He pays with a £10 note.

Work out how much change he should get.

$$3 \times 82 \text{ p} + 5 \times 79 \text{ p} = 641 \text{ p} = \text{£}6.41 \quad (1)$$

$$\text{£}10 - \text{£}6.41 = \text{£}3.59 \quad (1)$$

(2)

£.....

Peter wants to buy 9 cartons from supermarket **Y**.

He does the calculation  $10 \times \text{£}0.80 = \text{£}8$  to estimate the cost.

b. Explain why Peter's calculation shows the actual cost will be less than £8.

Both figures are rounded up (1)

OR Either 10 is greater than 9 and 80p is greater than 79 p (1)

.....

(1)

(Total for Question 11 is 3 marks)



12. The first three terms of the sequence are:

1, 3, 6, ...

You get each new term by adding the natural numbers 'starting from 2'

Clark says,

'The difference between the tenth and ninth term is 9'.

Give an example to show that Clark is wrong.

1, 3, 6, 10, 15, 21, 28, 36, 45, 55

$$10^{\text{th}} \text{ term} = 55 \quad 9^{\text{th}} \text{ term} = 45 \quad (1)$$

$$55 - 45 = 10 \quad (1)$$

.....  
(Total for Question 12 is 2 marks)

13. Calculate the value of

$$\frac{3.2^2 + 9.17}{6.19 - 2.13}$$

a. Write down all the figures on your calculator display.

Either numerator is 19.41 OR denominator 4.06 (1)

$$\frac{19.41}{4.06} = 4.780788177 \quad (1)$$

.....  
(2)

b. Give your answer correct to 2 decimal places.

4.78 (1)

(1)

.....  
(Total for Question 13 is 3 marks)



14. This formula can be used to work out a monthly mobile phone bill:

$$\text{Total Bill (£)} = \text{£}0.75 \times \text{number of minutes} + \text{£}29$$

a. Find the total bill in a month when Jill talks 320 minutes.

$$\text{Total Bill} = \text{£}0.75 \times 320 + \text{£}29 \quad (1)$$

$$= \text{£}269 \quad (1)$$

£.....

(2)

The total bill in another month is £372.50.

b. For how many minutes did he talk in another month?

$$\text{£}0.75 \times n + \text{£}29 = \text{£}372.50$$

$$n = \frac{372.50 - 29}{0.75} \quad (1)$$

$$n = 458 \quad (1)$$

..... minutes

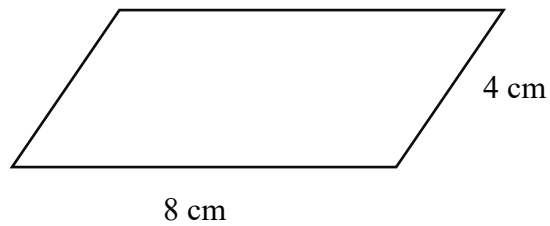
(2)

**(Total for Question 14 is 4 marks)**

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15. Here is a parallelogram.

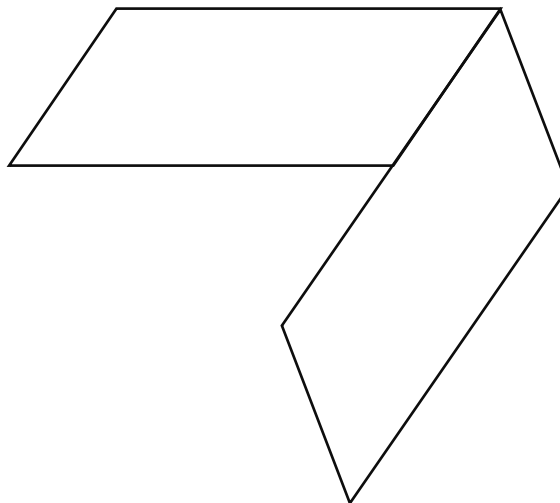


a. Work out the perimeter of this parallelogram.

$$\text{Perimeter} = 2(8 + 4) = 24 \text{ cm} \quad (1)$$

..... cm  
(1)

The 7-sided shape below is made from two of these parallelograms.



b. Work out the perimeter of this 7-sided shape.

$$\begin{aligned} \text{Perimeter} &= 8 + 4 + 8 + 4 + 8 + 4 + 4 && \text{(at least 5 figures correct)} \quad (1) \\ &= 40 \text{ cm} && (1) \end{aligned}$$

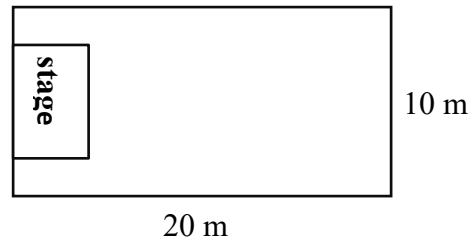
..... cm  
(2)

**(Total for Question 15 is 3 marks)**





16. Here is a plan of school hall, using a scale of 1 cm to represent 4 m.



Work out the real dimensions of the stage.

Stage width = 1 cm = 4m (1)

Length = 1.5 cm = 6 m (1)

.....  
(Total for Question 16 is 2 marks)

17. Make  $N$  the subject of the formula

$$M = \frac{N}{5} - 7$$

$$M + 7 = \frac{N}{5} \quad \text{or} \quad 5M = N - 35 \quad (1)$$

$$N = 5(M + 7) \quad \text{or} \quad N = 5M + 35 \quad (1)$$

.....  
(Total for Question 17 is 2 marks)



18. The table below shows the boot sizes of players in a football team.

Boot size	Frequency
7	2
8	4
9	5
10	6
11	1

Alan says ‘the mean boot size is the same as the median boot size’

Is he correct?

You must show all your working.

$$\text{Mean} = \frac{(7 \times 2) + (8 \times 4) + (9 \times 5) + (10 \times 6) + (11 \times 1)}{18}$$

At least 4 product shown correct in the numerator (1)

$$= \frac{162}{18} \quad (1)$$

$$= 9 \quad (1)$$

$$\text{Median value position} = \frac{18}{2} = 9$$

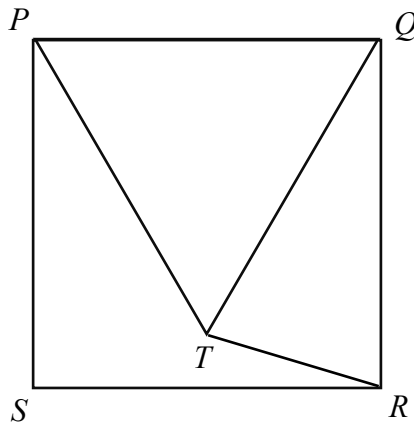
9<sup>th</sup> value is 9 so mean = median (1)

.....  
(Total for Question 18 is 4 marks)

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19. The diagram shows a square  $PQRS$  and an equilateral triangle  $PQT$ .



Work out the size of angle  $QTR$ .

Angle  $PQT = 60^\circ$  because angles in an equilateral triangle are  $60^\circ$

Angle  $PQR = 90^\circ$  because it is an angle in a square

Angle  $TQR = 60^\circ - 90^\circ = 30^\circ$  (1)

The sides of the equilateral triangle are the same length as the square, so triangle  $TQR$  is isosceles.

$$\text{Angle } QTR = \frac{180-30}{2} \quad (1)$$

$$= 75^\circ \quad (1)$$

.....<sup>0</sup>

**(Total for Question 19 is 3 marks)**

20. Purple paint is made from a mix of red paint and blue paint in the ratio 4 : 1. Raj has only 225 ml of red paint and 89 ml of blue paint.

What is the maximum amount of purple paint he can make?

$$\text{Red : Blue} = 224 : 56 \quad (1)$$

$$224 + 56 = 280 \quad (1)$$

..... ml

**(Total for Question 20 is 2 marks)**



21. Mr Grey hires a car in Los Angeles.

The charges are shown below

**Car Hire**

\$26.50 per day plus \$7.50 per day insurance.

\$1.25 for every kilometre travelled after the first 900 km.

The first 900 km are included in the price.

Mr Grey hired the car for 14 days and paid \$951.

a. Find the number of kilometres Mr Grey travelled in this car.

$$\$26.50 + \$7.50 = \$34 \quad \text{per day}$$

$$14 \times \$34 = \$476 \quad 14 \text{ days} \quad (1)$$

$$\$476 + \$1.25 \times d = \$951 \quad (1)$$

$$d = \frac{951 - 476}{1.25} = 380 \quad (1)$$

$$\text{Total distance} = 380 + 900 = 1280 \text{ km} \quad (1)$$

..... km  
(4)

b. The car used fuel at an average of 1 litre for every 12 km travelled.

Fuel costs \$1.40 per litre.

Calculate the cost of the fuel used by the car during the 14 days.

Give your answer correct to the nearest dollar.

$$\frac{1280}{12} = 106.66666 \text{ litres} \quad (1)$$

$$106.66666 \times \$1.40 = 149.33 = \$149 \quad (1)$$

\$ .....  
(2)

**(Total for Question 21 is 6 marks)**



22. Daisy, Emily and Farah each have some money.

Daisy has 15% less money than Emily.

Farah has  $\frac{5}{6}$  of the amount of money that Emily has.

Farah has 55.50 pounds.

Work out how much money Daisy has.

Daisy	Emily	Farah			
$(1 - \frac{15}{100})x$	$x$	$\frac{5}{6}x$	$0.85x$	or	$\frac{5}{6}x$ (1)

$$\frac{5}{6}x = 55.50 \quad (1)$$

$$x = 66.60 \quad (1)$$

$$\text{daisy} = 0.85 \times 66.60 = \text{£}56.61 \quad (1)$$

£ .....

**(Total for Question 22 is 4 marks)**

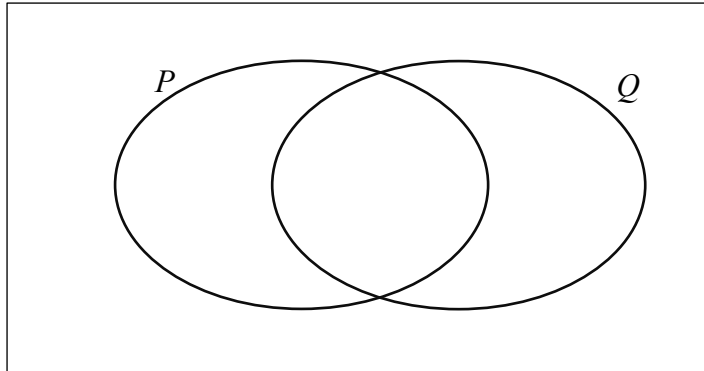
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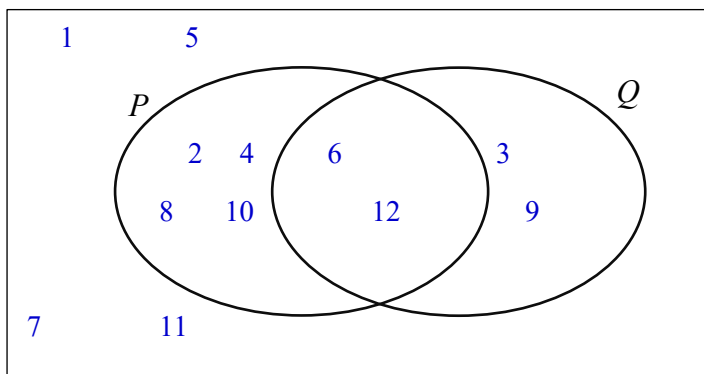
23.  $\varepsilon = \{\text{integers from 1 to 13}\}$

$P = \{\text{even numbers from 1 to 12}\}$

$Q = \{\text{multiples of 3 from 1 to 12}\}$



a. Complete the Venn diagram to represent this information.



6, 12 intersection only (1)

2, 4, 8, 10 in set P only OR 3, 9 in set Q only OR 1, 5, 7, 11 in  $(P \cup Q)'$  (1)

For all numbers correctly placed in the Venn diagram (1)

(3)

A number is chosen at random from the set  $P$ .

b. Find the probability that the member is in the set  $P \cap Q$ .

Either 2 OR 6 correct (1)

$\frac{2}{6}$  (1)

(2)

(Total for Question 23 is 5 marks)



24. Michael invests £ $P$  at a rate of 2.8% per year compound interest.

After 25 years the value of this investment is £23933.66

Calculate the value of  $P$ .

$$P\left(1 + \frac{2.8}{100}\right)^{25} = 23933.66 \quad (1)$$

$$P = \frac{23933.66}{\left(\frac{102.8}{100}\right)^{25}} \quad (1)$$

$$P = \text{£}12000 \quad (1)$$

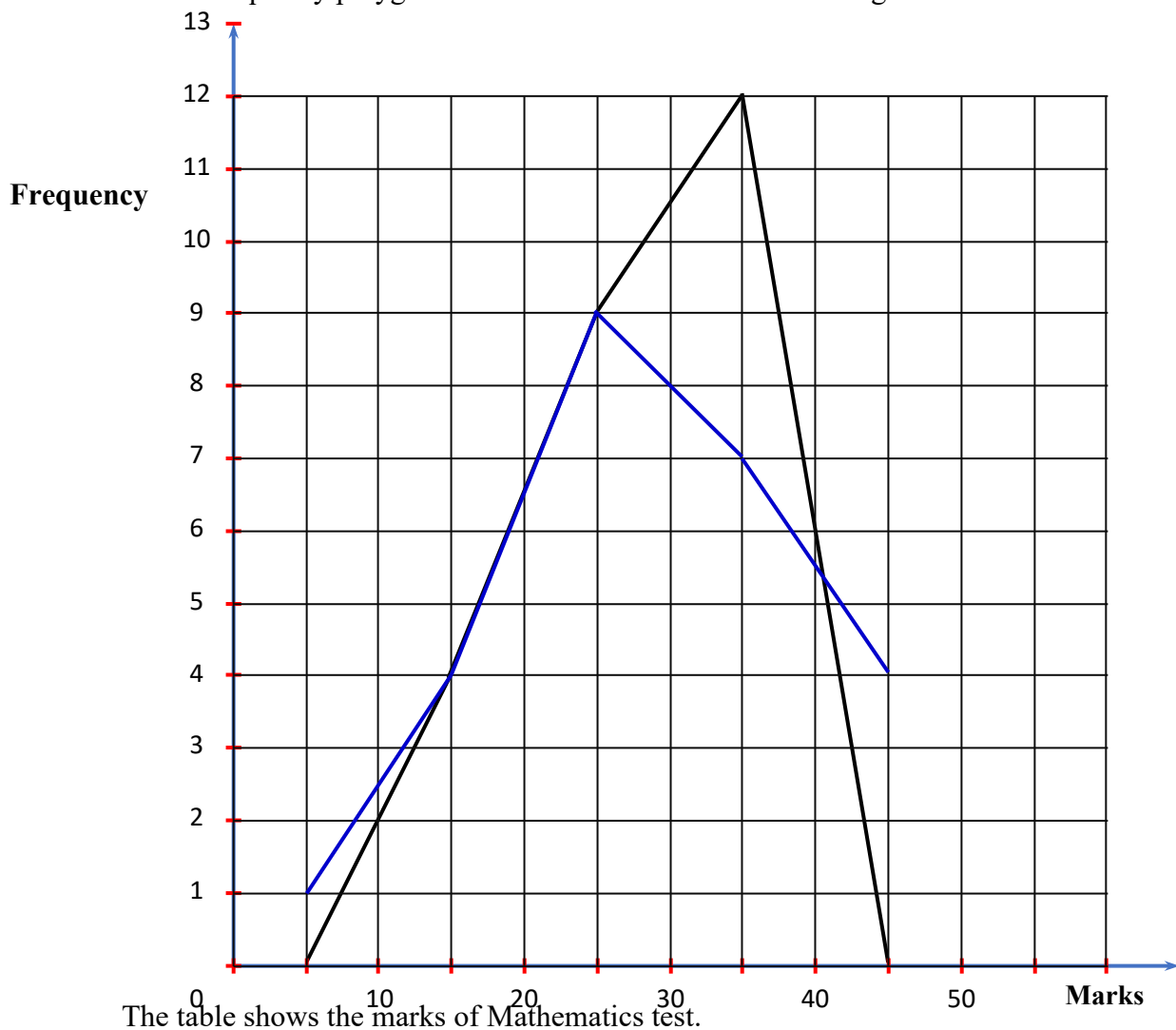
£ .....

**(Total for Question 24 is 3 marks)**

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25. The frequency polygons shows the marks of students in English test.



Marks	Frequency
$0 < m \leq 10$	1
$10 < m \leq 20$	4
$20 < m \leq 30$	9
$30 < m \leq 40$	7
$40 < m \leq 50$	4

a. Draw a frequency polygon to this information on the diagram above.

Correct frequency polygon with one point incorrect OR

Joining points at correct heights consistently within intervals including plotting at end values (1)

Polygon drawn (5,1) (15,4) (25,9) (35,7) (45,4) (1) (2)

b. Compare and comment on the marks of the students in these two tests.

English test results have smaller range and English modal class is higher

(1) (1)

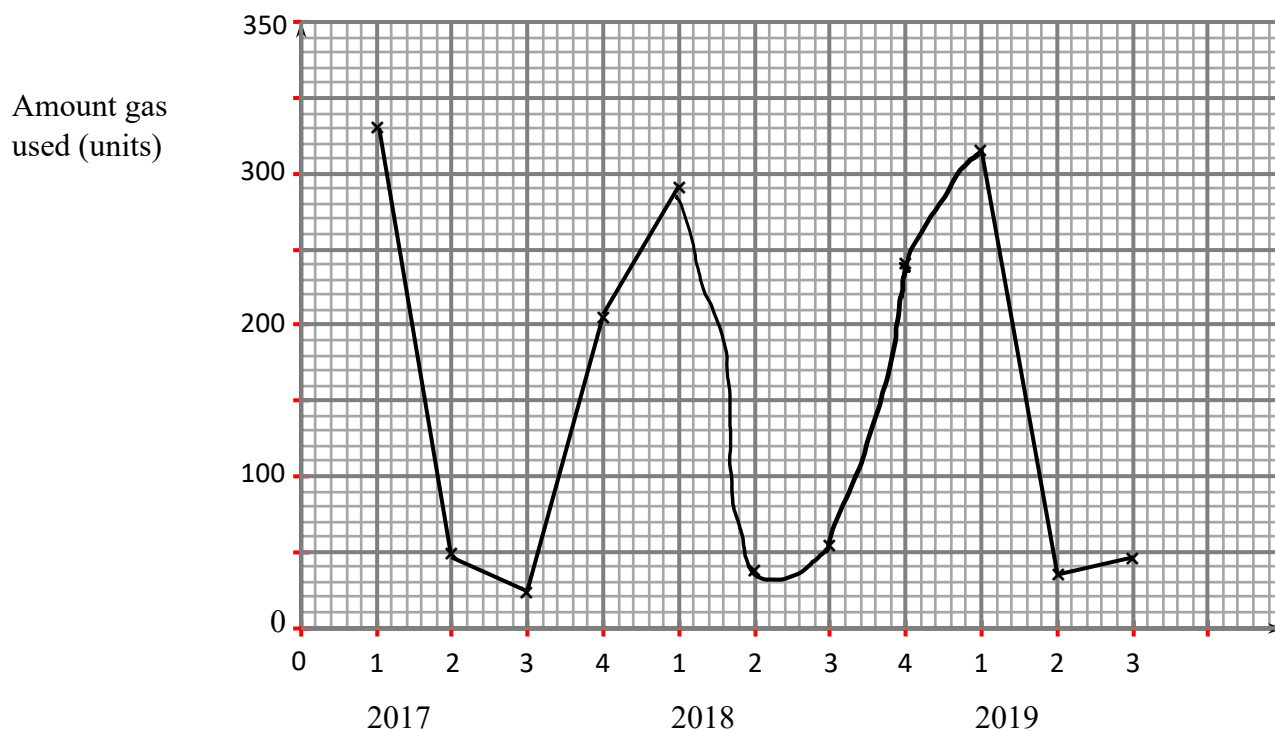
(2)

(Total for Question 25 is 4 marks)





26. The graph shows the amount of gas used by a householder each quarter over a period of 3 years.



Write down two things that are wrong or could be misleading with this graph.

Two different statements

1. should be joined with straight lines in the year 2018 (1) OR
2. 4<sup>th</sup> period of year 2019 not shown (1) OR
3. 400 is missing in the vertical axis (1) OR
4. The labelling in the horizontal axis is missing (1)

**(Total for Question 26 is 2 marks)**

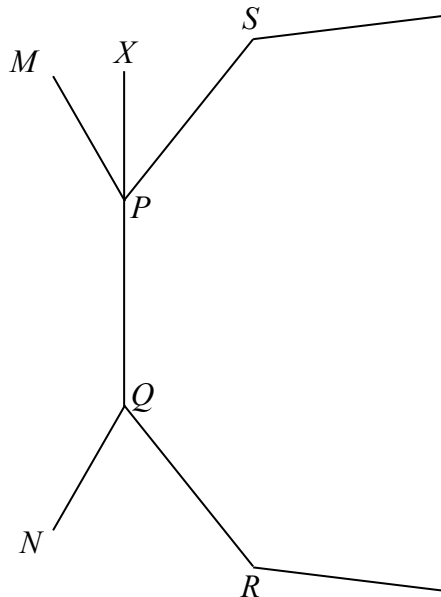


27. Two regular polygons share a common side  $PQ$ .

$QPX$  is a straight line.

Angle  $MPS = \text{Angle } NQR = 60^\circ$

Angle  $SPX$  is twice the angle  $MPX$ .



a. What is the size of angle  $MPQ$ .

$$\text{Angle } MPX + \text{Angle } SPX = x + 2x = 60^\circ \quad (1)$$

$$\text{Angle } MPX = x = 20^\circ \quad (1)$$

$$\text{Angle } MPQ = 180 - 20 = 160^\circ \quad (1)$$

.....<sup>0</sup>

(3)

b. How many sides does the polygon  $SPQR$  have?

$$\text{Angle } SPX = 2 \times 20 = 40^\circ$$

Using that the exterior angles of a regular polygon are equal and sum to  $360^\circ$

$$\text{Number of sides} = \frac{360}{40} \quad (1)$$

$$\text{Number of sides} = 9 \quad (1)$$

(2)

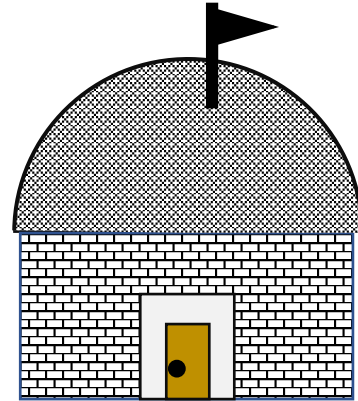
.....  
(Total for Question 27 is 5 marks)



28. A tin of paint covers a surface area of 60 m<sup>2</sup> and costs \$5.25.

Find the cost of painting the outside surface of a hemispherical dome of radius 17.5 m.

Give your answer correct to the nearest dollar.



$$\text{Curved surface area of hemisphere} = \frac{1}{2} \times 4\pi \times (17.5)^2 \quad (1)$$

$$= 1924.2255 \text{ m}^2 \quad (1)$$

$$\frac{1924.2255}{60} = 32.070425 \quad (1)$$

So 33 tins of paint will be needed

$$33 \times 5.25 = \$173.25$$

$$= \$173 \text{ to the nearest dollar } (1)$$

\$ .....

**(Total for Question 28 is 4 marks)**

29. Solve the simultaneous equations

$$2x + y = 5 \quad (1)$$

$$3x - y = 15 \quad (2)$$

Eqn(1)+Eqn(2):

$$5x = 20$$

$$x = 4 \quad (1)$$

Substituting into Eqn (1)

$$8 + y = 5$$

$$y = -3 \quad (1)$$

.....  
**(Total for Question 29 is 2 marks)**

