Level 1 / Level 2 GCSE (9 – 1)

MATHEMATICS

Paper 2 (Calculator)

Foundation Tier

Time : 1 hour 30 minutes **Paper : 1 MA1 / 2F**

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 π button, take the value of π 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 $\frac{2}{5}$ as a decimal.

correct answer only 0.4 (1)

……

(Total for Question 1 is 1 mark)

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2. Write 3048 correct to the nearest 100.

correct answer only 3000 (1)

……

(Total for Question 2 is 1 mark)

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3. Simplify $4p - 5p + p$

correct answer only 0 (1)

……

(Total for Question 3 is 1 mark)

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4. Write 0.28 as a percentage.

correct answer only 28% (1)

……

(Total for Question 4 is 1 mark)

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5. Write down a square number less than 100 that is also a cube number.

$64 = 8^2 = 4^3$

correct answer only 64 (1)

……

(Total for Question 5 is 1 mark)

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6. Here is a part of a bus timetable.

Bexleyheath	0754	0801	0809	0817	0825
Crayford	0803	0811	0819	0827	0835
Dartford Station	0814	0823	0831	0839	0847
Darent Valley Hospital	0824	0833	0841	0849	0857
Bluewater	0828	0837	0845	0853	0901

Millie goes from Bexleyheath to Bluewater by bus.

Millie takes 12 minutes to walk from her house to the bus stop in Bexleyheath.

It takes Millie 8 minutes to walk from the bus station in Bluewater to her meeting at work.

Millie needs to get to the meeting by 9 a.m.

Millie leaves her home at 0802

Does Millie get to her meeting by 9 a.m.?
You must show all your working.

Millie gets to the bus stop at $8:02\text{ am} + 12\text{ mins} = 8:14\text{am}$
The next bus comes at $08:17\text{am}$ (1)
She will arrive at Bluewater at $8:53\text{am}$
She will arrive at work at $8:53\text{ am} + 8\text{ mins} = 9:01\text{am}$ (1)
Millie will not get to her meeting in time.(1)

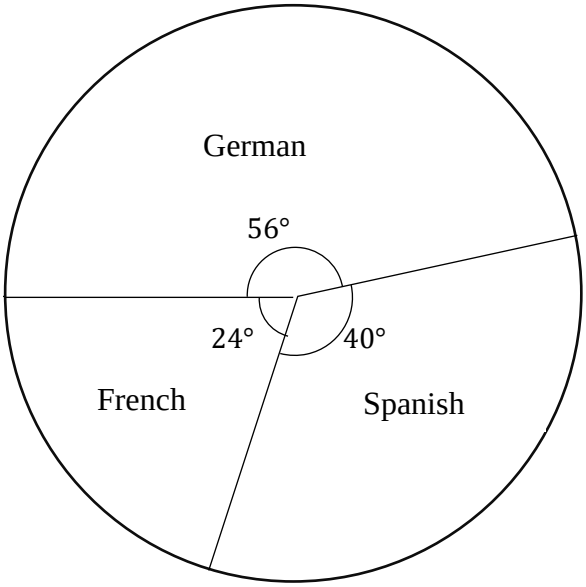
.....

(Total for Question 6 is 3 marks)

7. Year 10 students from Higher School were asked to choose one language to study.
The table shows information about their choices.

Language	Number of students	Angle
French	56	168°
Spanish	40	120°
German	24	72°

Tom drew a pie chart to show information about their choices.
The pie chart is **not** fully correct.

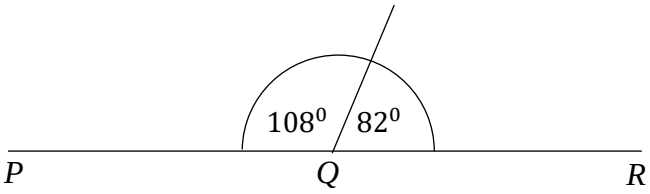


Write two things that are wrong with Tom's pie chart.

for one correct reason (1) for two correct reasons (1)
1. German should represent the smallest sector of the circle.
2. French should represent the largest sector of the circle.
3. The angle that represents German should be 72°
4. The angle that represents Spanish should be 120°
5. The angle that represents French should be 168°

(Total for Question 7 is 2 marks)

8.



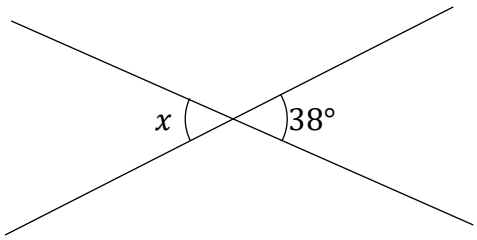
PQR is a straight line.
The diagram above is wrong.

a. Explain why.

$108° + 82° = 190°$. This is wrong as PQR is a straight line and angles on a straight line add up to 180° (1)

OR any other valid explanation- eg. 82° should be 72° or 108° should be 98

(1)



b. i. Work out the size of the angle marked *x*.

correct answer only 38° (1)

…….^{0}

(1)

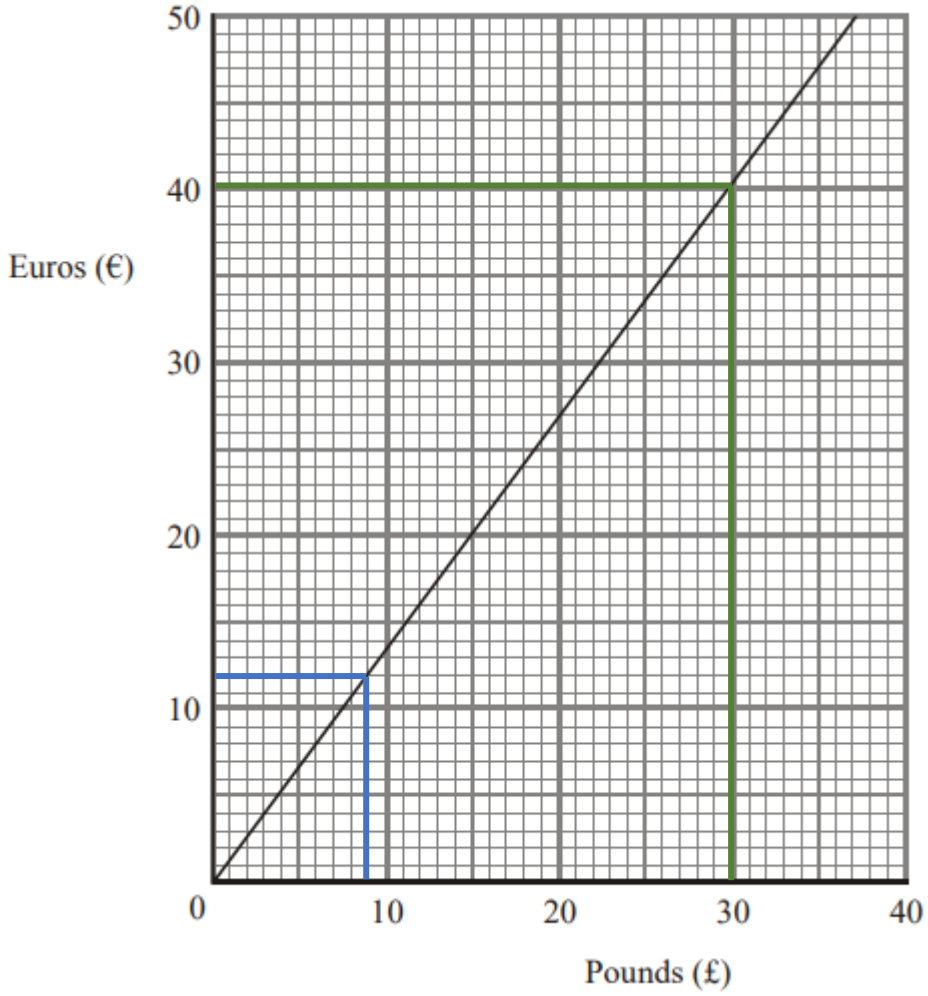
ii. Give a reason for your answer.

vertically opposite angles are equal (1)

(1)

(Total for Question 8 is 3 marks)

9. Here is a conversion graph that can be used to change between Euros and Pounds.



a. Change 12 Euros to Pounds.

See graph for workings (blue lines)
12 Euros = 9 Pounds (1)

…….…… pounds
(1)

b. Change £60 to Euros.

From the green lines, 30 pounds = 40 euros (1)

As the graph is a straight line, 60 pounds = 80 euros (1)

…… euros
(2)

(Total for Question 9 is 3 marks)

10. a. Solve $\frac{z}{3} = 4$

$\frac{z}{3} = 4$

$\times 3$ $\times 3$

$z = 12$

(1)

$z =$ .....

(1)

c. Solve $2 - y = 10$

$2 - y = 10$

$y = -8$

(1)

$y =$.....

(1)

(Total for Question 10 is 2 marks)

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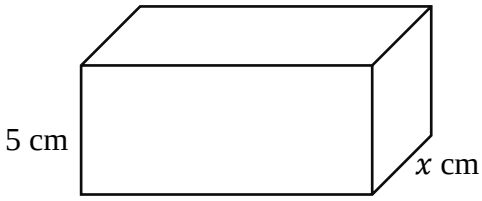
11. The diagram shows a cuboid.



The volume of the cuboid is 0.00024 m^3.

Calculate the value of x.

0.00024 $m^3 = 240\ cm^3$ (1)

Volume of cuboid: $5 \times 12 \times x = 240$ (1)

$x = \frac{240}{5 \times 12} = 4$ (1)

..... cm

(Total for Question 11 is 3 marks)

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12. A special car licence plate begins WW 01 followed by 2-digit number and a letter.

The number is a square number between 10 and 30.
The letter is B or C.

Write down all the possibilities for this plate.

The only square numbers between 10 and 30 are $4^2 = 16$ and $5^2 = 25$ (1)

So the outcomes are:

WW 01 16 B WW 01 25 B WW 01 16 C WW 01 25 C (1)

……
……
……

(Total for Question 12 is 2 marks)

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13. Amelia wants to buy as many packets of pens as she can.

She has £10 to spend on packets of pens.
Each packet costs £1.49
Work out how much change she will get from £10.

for £10 ÷ £1.49 = 6.7114 (1)

Amelia can buy 6 packets of pens. These will cost:
for 6 × £1.49 = £8.94 (1)

Her change from £10 will be:
for £10 – £8.94 = £1.06 (1)

……

(Total for Question 13 is 3 marks)

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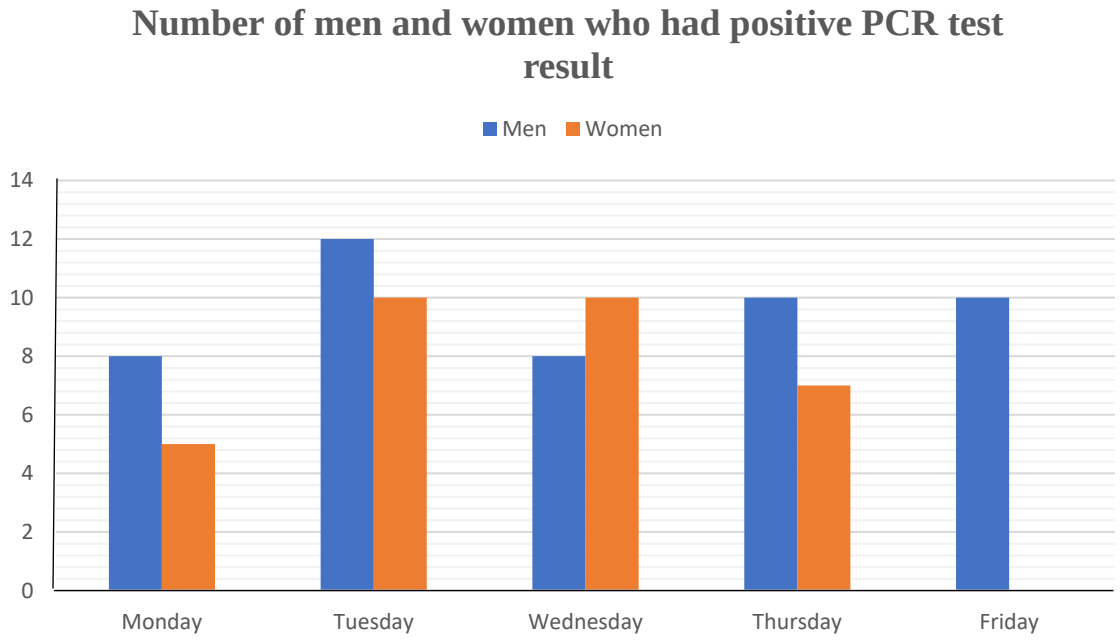
14. Tom completes a 5-day weekly bar chart that shows the number of men and women who had a positive PCR test result for Covid-19 in a small town.



a. How many men had a positive PCR test result of Covid-19 in a week?
We want the total of all the blue bars:
$8 + 12 + 8 + 10 + 10 = 48$ (1)

(1)

Tom said 'The number of women who had a positive PCR test result of Covid-19 is 60% of total number.'

b. Is he right? Explain your answer.
$5 + 10 + 10 + 7 = 32$ women had a positive PCR test.

$$\frac{32}{32+48} \times 100\% = 40\%$$ (1)

He is incorrect. (1)

(2)

c. On which day women PCR test result was higher than men?
correct answer only Wednesday (1)

(1)

(Total for Question 14 is 4 marks)

15. $A = \frac{1}{2}p - q$

a. Work out the value of A when $p = 8$ and $q = -4$

$A = \frac{1}{2}(8) - (-4)$ (1)

$= 8$ (1)

.....

(2)

b. Work out the value of q when $A = 12$ and $p = 10$

$12 = \frac{1}{2}(10) - q$ (1)

$q = -7$ (1)

.....

(2)

(Total for Question 15 is 4 marks)

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16. Fiona has two vouchers from the shop M&S.

A

B

She buys a top using voucher A, and a pair of trousers using voucher B. She spends £100.

Find the value of x.

Price of top:

$80 \times 0.8 = £64$, for a process to find 80% of £80 for the voucher **A** (1)

Price of trousers:

$£100 - £64 = £36$

Discount:

$£54 - x = £36 \Rightarrow x = £18$, for a process to find £x (1)

correct answer only (1)

(Total for Question 16 is 3 marks)

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17. Here is a list of ingredients for making fudge for 6 people.

Fudge

Ingredients for 6 people

600 g sugar

12 g of butter

480 g of condensed milk

90 ml of milk

a. Hazel has 150 g of butter.
She has plenty of each of the other ingredients.
Work out how many people she can make fudge for.

$150 \div 12 = 12.5$ (1)

Hazel can make 12.5 times the amount of fudge in the recipe. It will serve $6 \times 12.5 = 75$ people. (1)

.....

(2)

b. Write down the ratio of sugar to condensed milk.
Give your ratio in its simplest form.

Sugar : Condensed milk

$\div 120$ ← $= 600\text{g} : 480\text{g}$ → $\div 120$ (1)

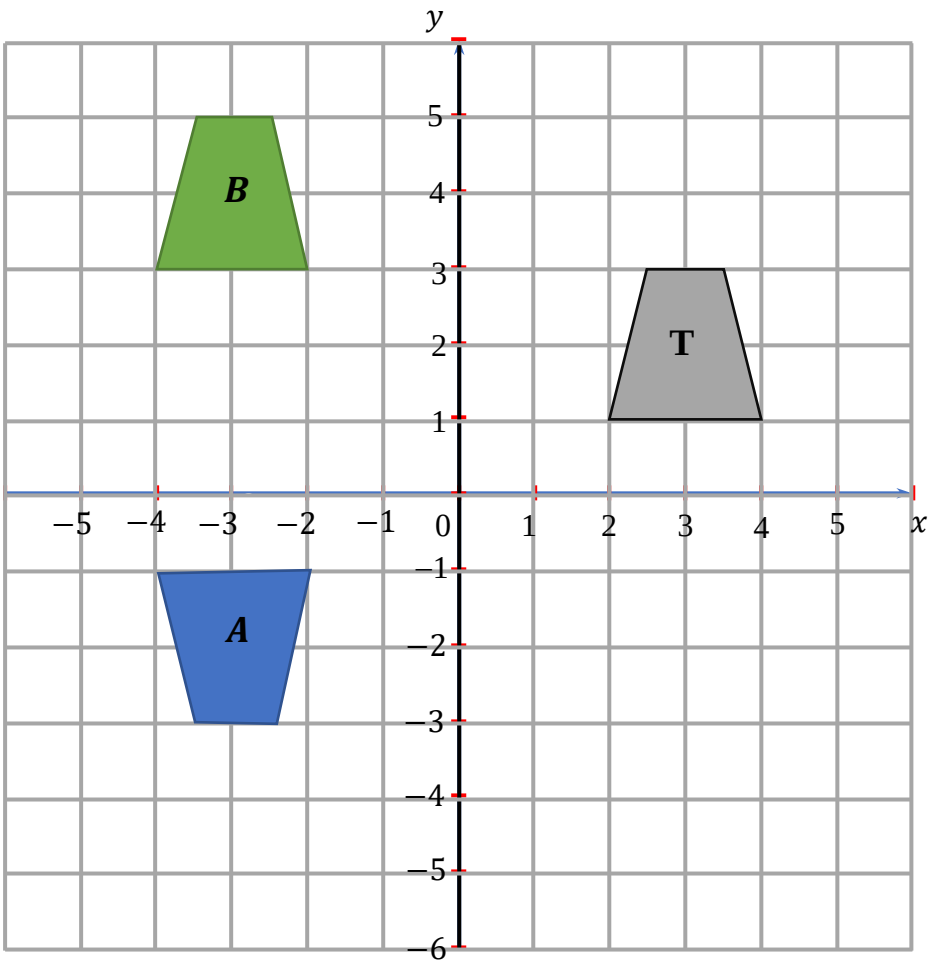
$= 5 : 4$ (1)

.....

(2)

(Total for Question 17 is 4 marks)

18.



a. Rotate trapezium **T** 180^0 about the origin.
Label the new trapezium **A**.

(–4,–1), (–3.5,–3), (–2.5,–3),(–2,–1) blue shape labelled **A** (1)

(1)

b. Translate trapezium **T** by the vector $\begin{pmatrix} -6 \\ 2 \end{pmatrix}$

Label the new trapezium **B**.

(–4,3), (–3.5,5), (–2.5,5),(–2,3) green shape labelled **B** (1)

(1)

(Total for Question 18 is 2 marks)

19. *ABCD* is a straight line.

The length of *BC* is three times the length of *AB*.
The length of *CD* is half times the length of *AB*.
What fraction of the length of *BD* is the length of *AD*?

We will call length CD 1.
This means that:
$AB = CD \times 2 = 2$
$BC = AB \times 3 = 6$
$BD = BC + CD = 6 + 1 = 7$ (1)

$AD = AB + BD = 2 + 7 = 9$
$\frac{BD}{AD} = \frac{7}{9}$ (1)

.....

(Total for Question 19 is 2 marks)

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20. A shop sells black pens and blue pens in packs of 3.

On one day

the number of packs of black pens sold : the number of packs of blue pens sold = 4 : 9

A total of 78 pens were sold.

Work out the number of packs of black pens sold.

$78 \div 3 = 26$ packs sold(1)
$4 + 9 = 13$
$26 \div 13 = 2$, so one 'part' is worth 2 packs of pens(1)
Number of packs of black pens sold: $2 \times 4 = 8$(2)

.....

(Total for Question 20 is 4 marks)

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21. a. Find the highest common factor (HCF) of 48 and 60.

$$48 = 2 \times 2 \times 2 \times 2 \times 3$$

$$60 = 2 \times 2 \times 3 \times 5$$

$$HCF = 2 \times 2 \times 3 = 12$$

for listing factors of 48 and 60 (no more than 1 mistake in each list) (1)
for fully correct lists (1)
for 12 or $2^2 \times 3$ (1)

.....

(2)

b. $A = 2^2 \times 3 \times 7^2 \times 13$
$B = 3^2 \times 5$
$C = 2^3 \times 7 \times 13$
Find the lowest common multiple (LCM) of *A*, *B* and *C*.

for at least 3 common multiples of A , B and C e.g. $2^3, 3^2, 5, 7^2, 13$ (1)

for $2^3 \times 3^2 \times 5 \times 7^2 \times 13$ (1)

.....

(2)

(Total for Question 21 is 4 marks)

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22. $\varepsilon = \{9, 10, 11, 12, 13, 14, 15, 16, 17, 18\}$

$A = \{\text{odd numbers}\}$
$B = \{\text{multiples of 3}\}$

a. i. List the members of the set $A \cap B$

$A = \{9, 11, 13, 15, 17\}$
$B = \{9, 12, 15, 18\}$
$A \cap B = \{9, 15\}$

ii. List the members of the set $A \cup B$

$A \cup B = \{9, 11, 12, 13, 15, 17, 18\}$

(2)

A number is chosen at random from the universal set, ε

b. Find the probability that this number is in the set $A' \cap B$.

$A' = \{10, 12, 14, 16, 18\}$
$B = \{9, 12, 15, 18\}$
$A' \cap B = \{12, 18\}$ (1)
$P(A \cap B) = \frac{2}{10}$ (1)

(2)

(Total for Question 22 is 4 marks)

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23. a. Complete the table of values for $y = x^2 + 2x - 1$

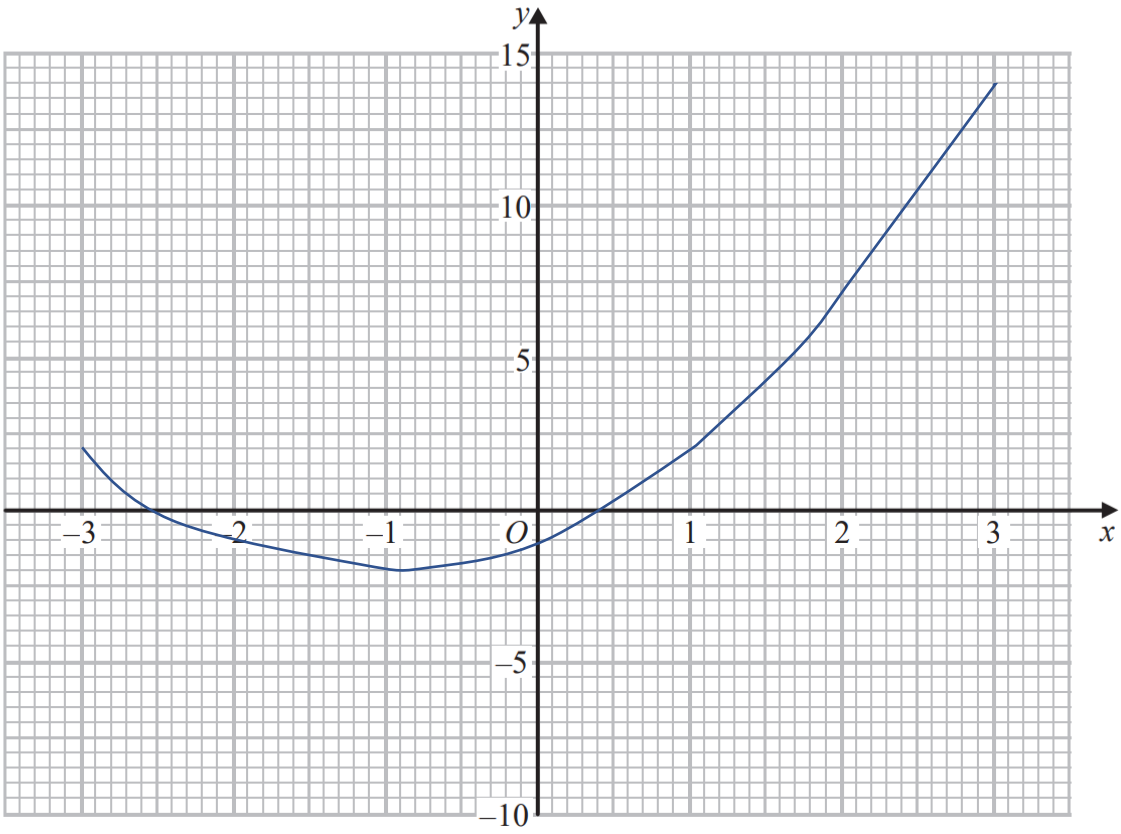
x	-3	-2	-1	0	1	2	3
y	2	-1	-2	-1	2	7	14

for 2 or 3 correct values (1)

for all 4 values correct e.g. $-1, -2, 2, 7$ (1)

(2)

b. On the grid, draw the graph of $y = x^2 + 2x - 1$ for values of x from –3 to 3.



(2)

for plotting at least 6 of the points from their table correctly (1)

for a fully correct curve drawn (1)

c. Use your graph to find an estimate of the turning point of the graph $y = x^2 + 2x - 1$

for correct minimum point e.g. $(-1, -2)$ (1)

.....

(1)

(Total for Question 23 is 5 marks)

24. Danielle puts chocolates into small boxes and into large boxes.

He puts 10 chocolates into a small box.

He puts 24 chocolates into a large box.

Danielle puts a total of 4800 chocolates into the boxes so that:

Number of chocolates in small boxes : number of chocolates in large boxes = 3 : 5

Danielle says that more than 60% of the boxes filled with chocolates are large boxes.

Is Danielle correct?

You must show all your working.

Number of chocolates in one 'part';
$4800 \div (3 + 5) = 600$ (1)

Number of chocolates in small boxes: $600 \times 3 = 1800$
Number of chocolates in large boxes: $600 \times 5 = 3000$ (1)

Number of small boxes filled: $1800 \div 10 = 180$
Number of large boxes filled: $3000 \div 24 = 125$ (1)

Percentage of boxes filled that are large:

$$= \frac{125}{180 + 125} \times 100\% = 40.9\% \text{ (1)}$$

No, Danielle is incorrect as 41% (to 1 sig fig) of the filled boxed are large. (1)

(Total for Question 24 is 5 marks)

25. $\mathbf{a} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 2 \\ -4 \end{pmatrix}$

Find $\mathbf{a} - \frac{1}{2}\mathbf{b}$ as a column vector.

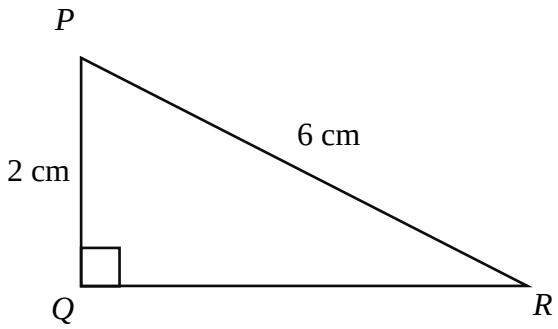
$\begin{pmatrix} -1 \\ 2 \end{pmatrix} - \frac{1}{2}\begin{pmatrix} 2 \\ -4 \end{pmatrix} = \begin{pmatrix} -2 \\ 4 \end{pmatrix}$

(1) (1)

$\begin{pmatrix} \ldots\ldots \\ \ldots\ldots \end{pmatrix}$

(Total for Question 25 is 2 marks)

26.



Calculate the length *QR*.
Give your answer correct to 3 significant figures.

Using Pythagoras' theorem:

$QR^2 = PR^2 - PQ^2$
$QR^2 = 36 - 4$ (1)
$QR = \sqrt{32} = 5.657$
$= 5.66$ to 3 s.f. (1)

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(Total for Question 26 is 2 marks)

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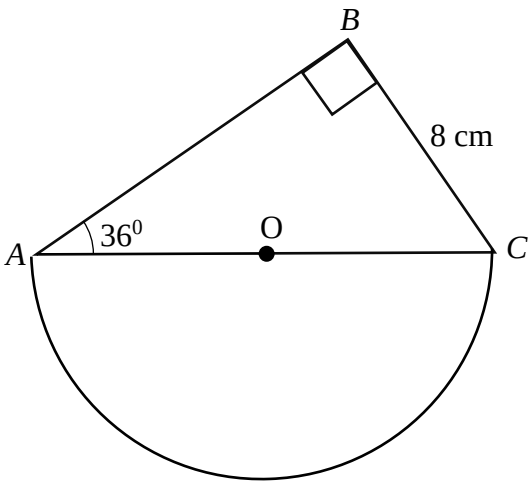
27. The diagram shows a right-angled triangle and a semicircle.



The right-angle triangle *ABC* has angle *ABC* = 90^0
BC = 8 cm and angle *BAC* = 36^0.
The semicircle has diameter *AC*.

Work out the area of the semicircle.
Give your answer correct to 3 significant figures.
You must show all your working.

$\sin 36 = \frac{8}{AC}$ (1)

$AC = \frac{8}{\sin 36} = 13.6104$ (1)

$Area = \frac{1}{2}\pi \times (\frac{13.6104}{2})^2$ (1)

$= 72.7$ (1)

……

(Total for Question 27 is 4 marks)

28. a. Work out the size of an exterior angle of a regular pentagon.

Thinking of a person walking around the perimeter of a pentagon, they will make 5 equal turns and return to their starting position. The turns they make are the exterior angles of the pentagon.

$$\frac{360}{5} = 72$$

(1) (1)

.....

(2)

b. Work out the sum of interior angles of a 22-sided polygon.

$$(22 - 2) \times 180 = 3600$$

(1) (1)

.....

(2)

(Total for Question 28 is 4 marks)

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29. a. Write down the gradient of the line with equation $y = 5 - 2x$

correct answer only –2 (1)

.....

(Total for Question 29 is 1 mark)

TOTAL FOR PAPER IS 80 MARKS