Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE

Monday 10 June 2024

Morning (Time: 2 hours 30 minutes)

Paper reference **4MB1/02R**

Mathematics B

PAPER 2R

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

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.*
- **Calculators may be used.**

Information

- The total mark for this paper is 100.
- 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.
- Check your answers if you have time at the end.
- Without sufficient working, correct answers may be awarded no marks.

Turn over ▶

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P 7 3 4 9 7 A 0 1 3 2

Pearson

Answer all TWELVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Gary buys furniture and sells it in a shop.

In the shop on Monday, Gary has tables and chairs such that

number of tables : number of chairs = 2 : 7

Gary has 42 chairs in the shop on Monday.

(a) Calculate the number of tables Gary has in the shop on Monday.

(2)

Gary buys a table for $240 and sells it for $276

(b) Calculate the percentage profit from the sale of the table.

(2)

Gary buys some chairs and sells them for $513
Gary's percentage profit from the sale of the chairs is 35%

(c) Calculate the price at which Gary bought the chairs.

(2)

The cost of a table that Gary buys is $732
An identical table costs 684 euros in France.

Using the exchange rate $1 = 0.95 euros

(d) find the difference in the costs of the tables.
State whether your answer is in euros or $.

(3)

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Question 1 continued

(Total for Question 1 is 9 marks)

2

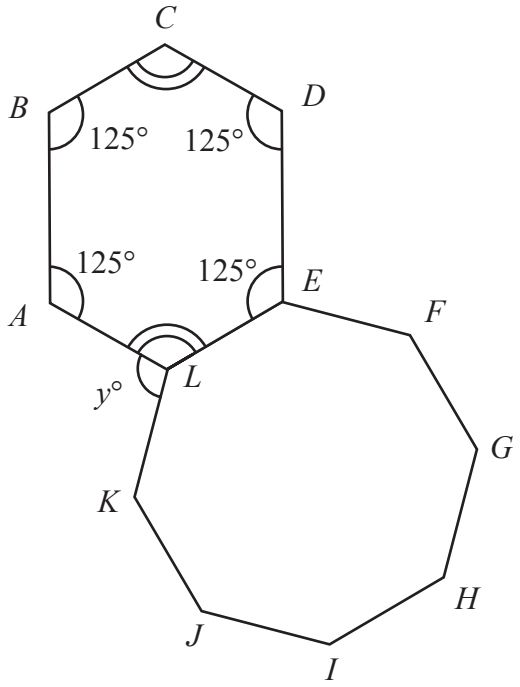


Diagram **NOT** accurately drawn

Figure 1

Figure 1 shows a hexagon *ABCDEL* and a regular octagon *EFGHIJKL*

$\angle BAL = \angle ABC = \angle CDE = \angle DEL = 125°$

$\angle BCD = \angle ALE \qquad \angle ALK = y°$

(a) Calculate the value of y

(5)

A different regular polygon has T sides and is such that

an interior angle $= (10x + 25)°$ an exterior angle $= (7x - 83)°$

(b) Calculate the value of T

(4)

[Sum of interior angles of polygon $= (2n - 4)$ right angles]

Question 2 continued

(Total for Question 2 is 9 marks)

3 Triangle A and triangle B are drawn on the grid opposite.

(a) Describe fully the single transformation that maps triangle A onto triangle B

(3)

Triangle A is transformed to triangle C by a reflection in the line with equation $y = -1$

(b) On the grid, draw and label triangle C

(2)

Triangle A is transformed to triangle D by an enlargement with centre (0, 3) and scale factor 2

(c) On the grid, draw and label triangle D

(2)

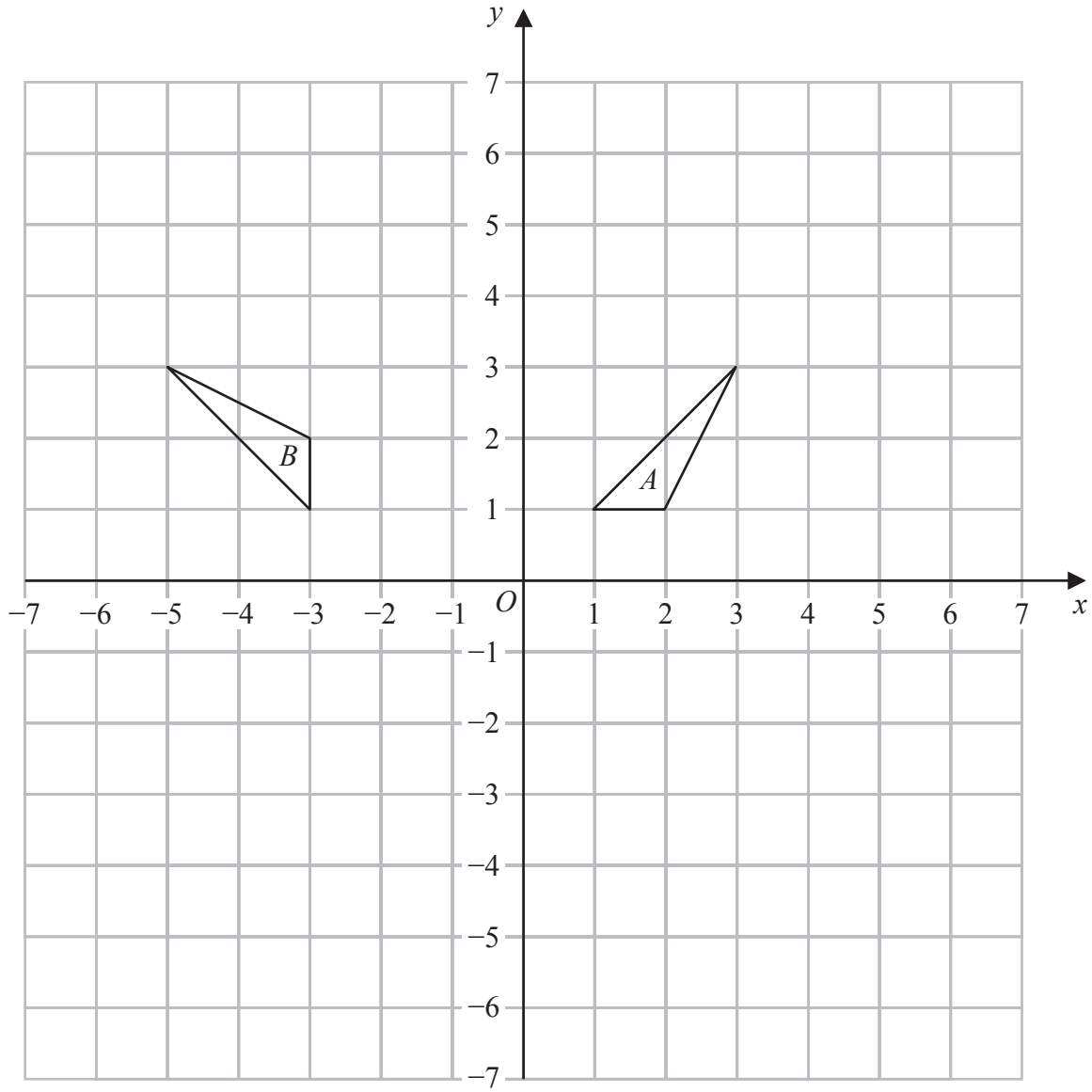
Triangle A is transformed to triangle E under the transformation with matrix $\mathbf{M}$ where

$$\mathbf{M} = \begin{pmatrix} -2 & 1 \\ 0 & -2 \end{pmatrix}$$

(d) On the grid, draw and label triangle E

(3)

Question 3 continued



Turn over for a spare grid if you need to redraw your triangles.

Question 3 continued

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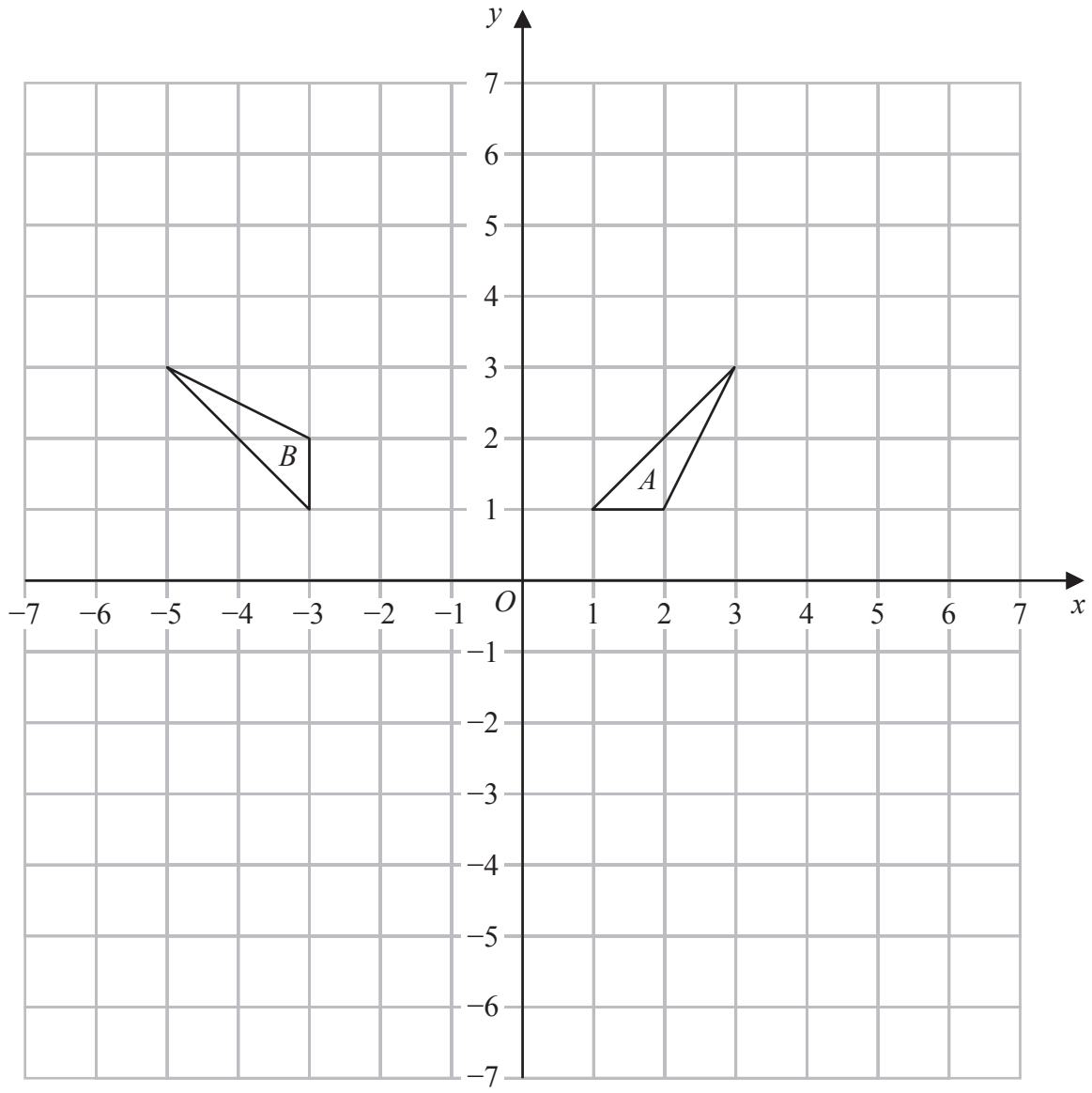
Question 3 continued

Only use this grid if you need to redraw your triangles.



(Total for Question 3 is 10 marks)

4 (a) Solve the inequality $4x + 3 \leqslant 31$

(2)

(b) Solve the inequality $1 < 2x + 3 < 21$

(2)

(c) Hence represent on the number line opposite, the set of values of x for which

$$4x + 3 \leqslant 31 \quad \text{and} \quad 1 < 2x + 3 < 21$$

(2)

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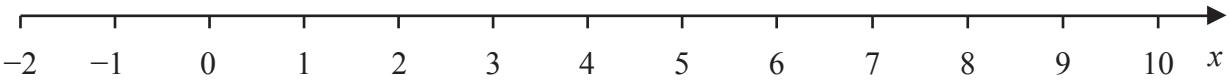
Question 4 continued



(Total for Question 4 is 6 marks)

5 (a) Complete the table of values for $y = 2x^3 - 5x + 3$

x	−2	−1.5	−1	−0.5	0	0.5	1	1.5	2
y		3.75	6	5.25	3	0.75		2.25	

(2)

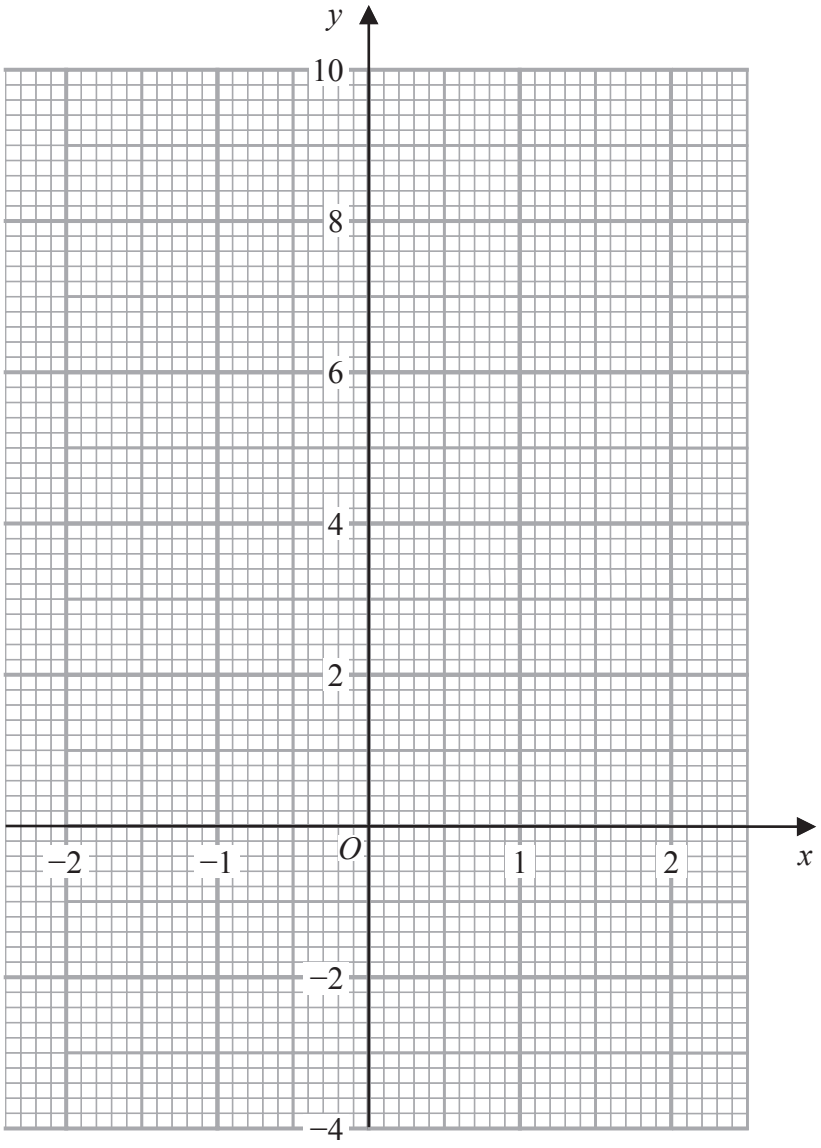
(b) On the grid opposite, plot the points from your completed table and join them to form a smooth curve.

(2)

(c) By drawing a suitable straight line on your grid, find estimates to one decimal place, for the solutions of the equation $2x^3 - 5x + 3 = 2$ in the range $-2 \leqslant x \leqslant 2$

(2)

Question 5 continued



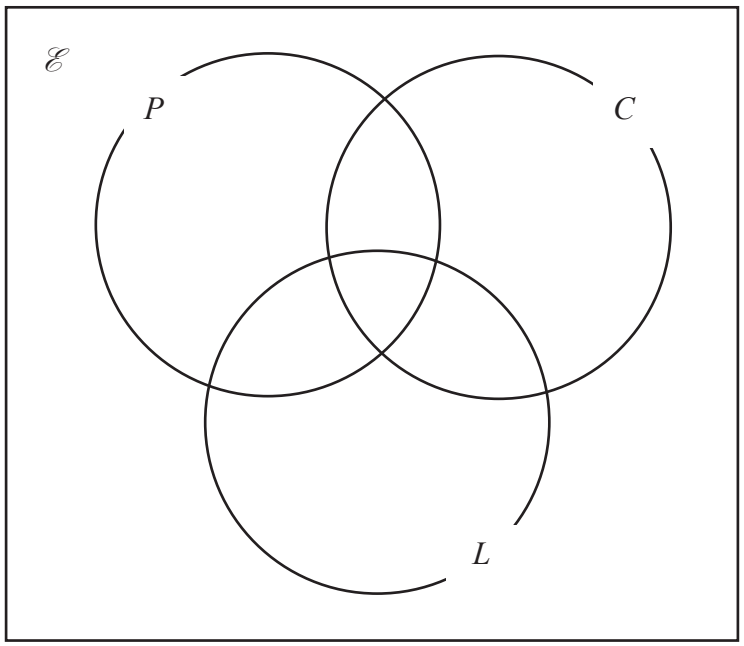
(Total for Question 5 is 6 marks)

6 80 gardeners were asked if they grow potatoes (P), carrots (C) or lettuce (L)

Of these gardeners

9 grow potatoes, carrots and lettuce
17 grow potatoes and carrots
23 grow carrots and lettuce
19 grow potatoes and lettuce
48 grow carrots
49 grow lettuce
2 grow none of these three crops

(a) Using this information, complete the Venn diagram below to show the number of gardeners in each subset.



(3)

(b) Find $n(C \cap L')$

(1)

One of the gardeners is chosen at random.

Given that this gardener grows carrots,

(c) find the probability that this gardener also grows lettuce.

(2)

Question 6 continued

(Total for Question 6 is 6 marks)

7 $\mathbf{A} = \begin{pmatrix} 10 & -6 \\ -8 & 5 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} -15 & 10 \\ 14 & -5 \end{pmatrix}$ $\mathbf{C} = \begin{pmatrix} 1 & -3 & 1 \\ 2 & -4 & -2 \end{pmatrix}$

(a) Find $4\mathbf{A} + 2\mathbf{B}$

(2)

(b) Find $\mathbf{AC}$

(3)

(c) Find the matrix $\mathbf{D}$ such that $\mathbf{A}^{-1} + \mathbf{D} = 2\mathbf{I}$ where $\mathbf{I} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

(4)

$$\left[\text{The inverse of matrix } \begin{pmatrix} a & b \\ c & d \end{pmatrix} \text{ is } \frac{1}{ad - bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix} \right]$$

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Question 7 continued

(Total for Question 7 is 9 marks)

8 Aalia delivers letters and parcels.

(a) Last week Aalia worked for 5 days and wrote down 5 integers that represent the distance, in miles, she drove each day.

For these integers

the mode is 15
the median is 16
the largest − the smallest = 7

Find 5 integers that Aalia could have written down.

(3)

(b) Aalia has 8 letters to deliver to Tom.
The mean weight of the 8 letters is 104 grams.

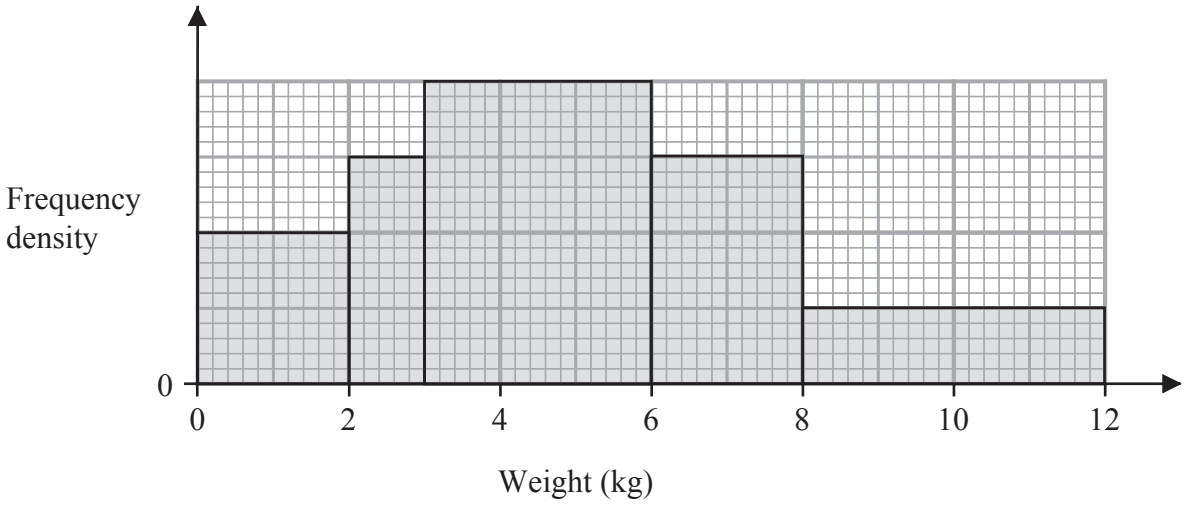
5 of the letters are each of weight 89 grams.

The mean weight of the remaining letters is A grams.

Work out the value of A

(3)

The histogram shows information about the weights of all the parcels Aalia has in her delivery van on Friday.



75 of the parcels in the van each have a weight between 2 kg and 6 kg.

Aalia takes 2 parcels at random from the van.

(c) Find an estimate for the probability that both parcels weigh more than 4 kg.

(5)

Question 8 continued

Question 8 continued

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Question 8 continued

(Total for Question 8 is 11 marks)

9

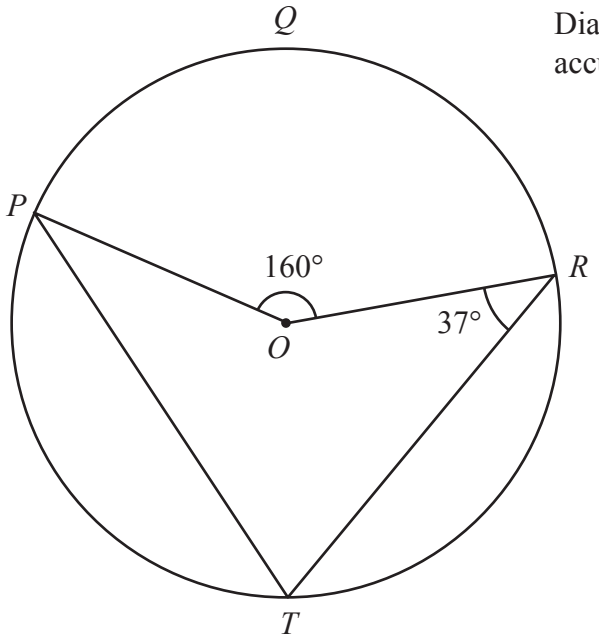

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Figure 2

Figure 2 shows the points P, Q, R and T on a circle centre O

$\angle POR = 160°$ $\angle ORT = 37°$

(a) (i) Work out the size, in degrees, of $\angle PTR$

(1)

(ii) Give a reason for your answer.

(1)

(b) Work out the size, in degrees, of $\angle TPO$

(2)

Question 9 continued

The sector, *OPQR*, is cut out from the circle in Figure 2

A hollow right circular cone is formed by joining *OP* and *OR* together as shown in Figure 3

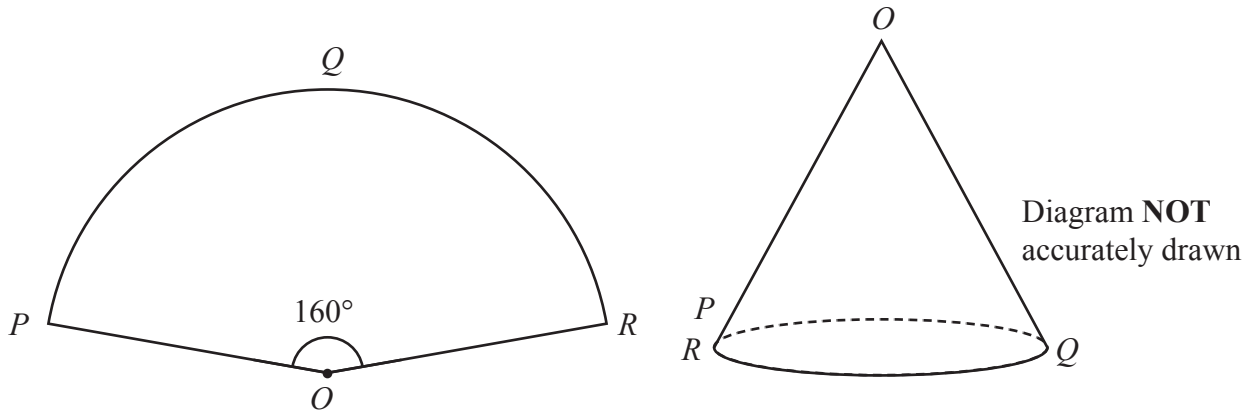

Figure 3

The curved surface area of the cone is $\frac{196}{25}\pi$ cm²

(c) Calculate the volume, in cm³ to 3 significant figures, of the cone.

(6)

$$\left(\begin{array}{l}\text{Volume of cone} = \frac{1}{3}\pi r^2 h \\ \text{Curved surface area of cone} = \pi r l\end{array}\right)$$

Question 9 continued

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Question 9 continued

(Total for Question 9 is 10 marks)

10 f and g are two functions such that

$$f : x \mapsto x^2 + 2x \quad \text{where } x > -1$$

$$g : x \mapsto \frac{13}{x+2}$$

(a) State the value of x that must be excluded from any domain of g

(1)

(b) Find f(3)

(1)

(c) Find the value of x for which $g(x) = 5$

(2)

(d) Find fg(24)

(2)

(e) Find the value of x for which $gf(x) = 4$
Show your working clearly.

(4)

The function h is such that $h : x \mapsto 5x^2 - 10x - 4 \quad \text{where } x \geqslant 1$

(f) Find the inverse of $h(x)$ in the form $h^{-1} : x \mapsto ...$

(4)

$$\left[\text{The solutions of } ax^2 + bx + c = 0 \text{ where } a \neq 0 \text{ are given by } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\right]$$

Question 10 continued

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Question 10 continued

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Question 10 continued

(Total for Question 10 is 14 marks)

11 Solve the simultaneous equations

$$x - y = 5$$
$$2x^2 + y^2 + 2xy = 85$$

Show clear algebraic working.

(6)

[The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$]

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Question 11 continued

(Total for Question 11 is 6 marks)

Turn over for Question 12

12 $\dfrac{35\times\left(\sqrt[3]{25}\right)^{6(2a-3)}}{7\times 25^{2a+1}} = 5^{w}$

Find an expression for w in terms of a
Give your answer in the form $na + m$ where n and m are integers.

(4)

(Total for Question 12 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS