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Surname

Other names

**Pearson Edexcel
International GCSE**

Centre Number

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Candidate Number

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Mathematics B

Paper 2R



Thursday 8 June 2017 – Morning
Time: 2 hours 30 minutes

Paper Reference

4MB0/02R

You must have: Ruler graduated in centimetres and millimetres, protractor, 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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Question 1 continued

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Area with horizontal dotted lines for writing.

(Total for Question 1 is 7 marks)



Question 2 continued

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Area with horizontal dotted lines for writing.

(Total for Question 2 is 6 marks)



3

Diagram NOT accurately drawn

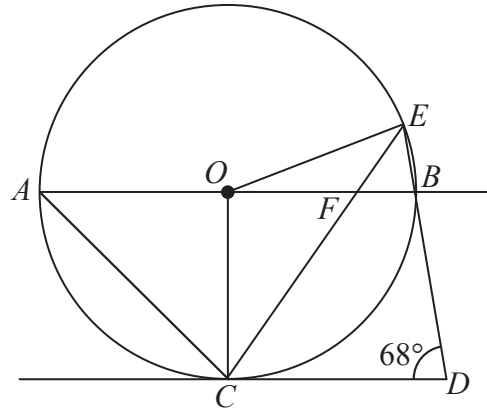


Figure 1

Figure 1 shows a circle with centre O . The points A , C , B and E lie on the circle. AOB is a diameter of the circle and DC is the tangent to the circle at C . CFE and DBE are straight lines. AB is parallel to CD and $\angle CDE = 68^\circ$

- (a) Write down the size of $\angle OCD$ (1)

- (b) Find the size of $\angle OAC$ (1)

- (c) Giving reasons, find the size in degrees of
 - (i) $\angle FBE$ (2)
 - (ii) $\angle CEB$ (2)
 - (iii) $\angle EFB$ (2)

- (d) Find the size, in degrees, of the obtuse angle AOE . (1)

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Question 3 continued

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(Total for Question 3 is 9 marks)



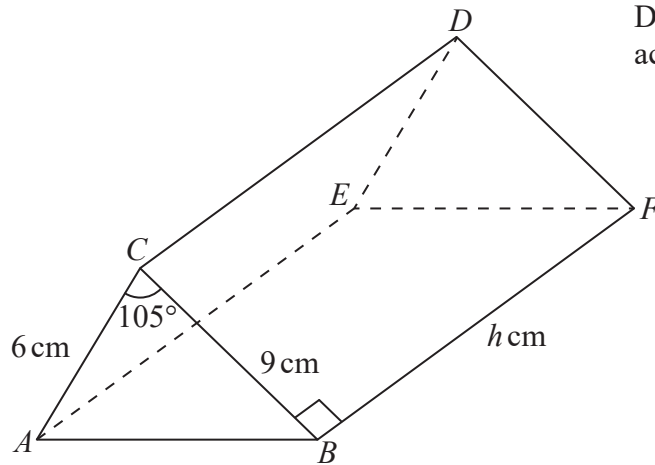


Diagram NOT accurately drawn

Figure 2

Figure 2 shows a solid triangular prism $ABCDEF$.
 $AC = 6$ cm, $BC = 9$ cm and angle $ACB = 105^\circ$

(a) Calculate the length, in cm to 3 significant figures, of AB . (3)

(b) Calculate the area, in cm^2 to 3 significant figures, of triangle ABC . (2)

$BF = h$ cm and angle $CBF = 90^\circ$
 The volume of the prism is 352 cm^3

(c) Calculate the value, to 3 significant figures, of h . (2)

(d) Calculate the total surface area, in cm^2 to 3 significant figures, of the prism. (2)

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$$\left[\begin{array}{l} \text{Area of triangle} = \frac{1}{2} ab \sin C \\ \text{Cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A \end{array} \right]$$



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Question 4 continued

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Handwriting practice area with horizontal dotted lines.



Question 4 continued

Handwriting practice area consisting of 25 horizontal dotted lines.

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Question 4 continued

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(Total for Question 4 is 9 marks)



P 4 8 4 6 7 A 0 1 1 3 6

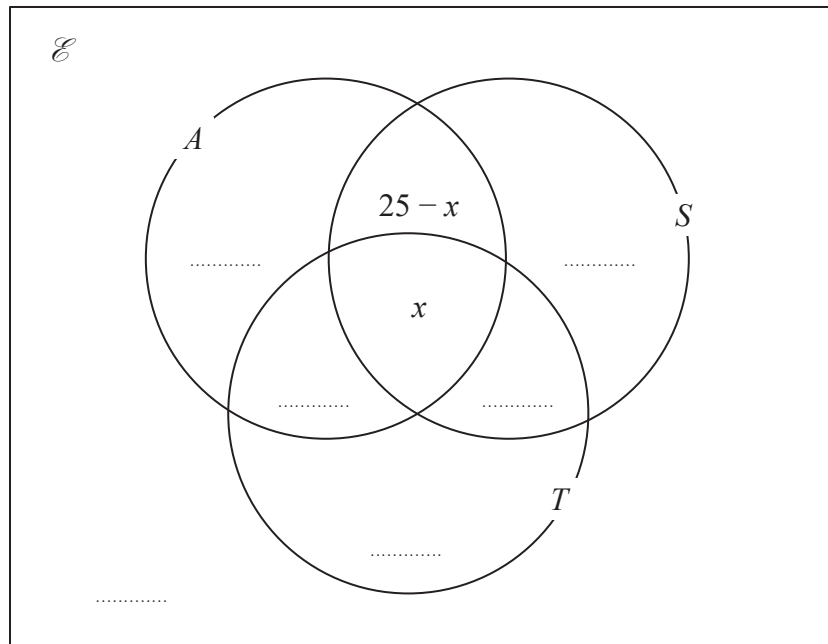
- 5 A travel agent asked each person in a random sample of 100 people if they have visited any of Australia (A), Sri Lanka (S) and Thailand (T).

Here is some information about their answers.

$$n(\mathcal{E}) = 100, n(A) = 55, n(S) = 48, n(T) = 43, n(A \cap S) = 25, n(S \cap T) = 21,$$

$$n(A \cap T) = 23, n([A \cup S \cup T]') = 7, n(A \cap S \cap T) = x$$

This information is to be shown in a Venn diagram. The Venn diagram has been started below.



- (a) Complete the Venn diagram to show the number of elements in each appropriate subset. (3)
- (b) Calculate the value of x (2)
- (c) Find $n([A \cup S] \cap T)$ (2)

One person is selected at random from the 100 people in the sample.
Given that this person has visited Australia,

- (d) find the probability that this person has also visited Sri Lanka. (1)

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Question 5 continued

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(Total for Question 5 is 8 marks)



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- 6 A fuel consumption test is carried out on 100 cars. The table shows information about the results.

Fuel consumption (x km/litre)	Number of cars
$12 < x \leq 16$	24
$16 < x \leq 18$	22
$18 < x \leq 22$	28
$22 < x \leq 26$	20
$26 < x \leq 32$	6

- (a) Calculate an estimate for the mean fuel consumption of the 100 cars. (4)
- (b) On the grid opposite, draw a histogram to represent the information in the table.
Two bars have been drawn for you. (3)
- (c) Calculate an estimate for the number of the 100 cars that have a fuel consumption of more than 25 km/litre. (2)

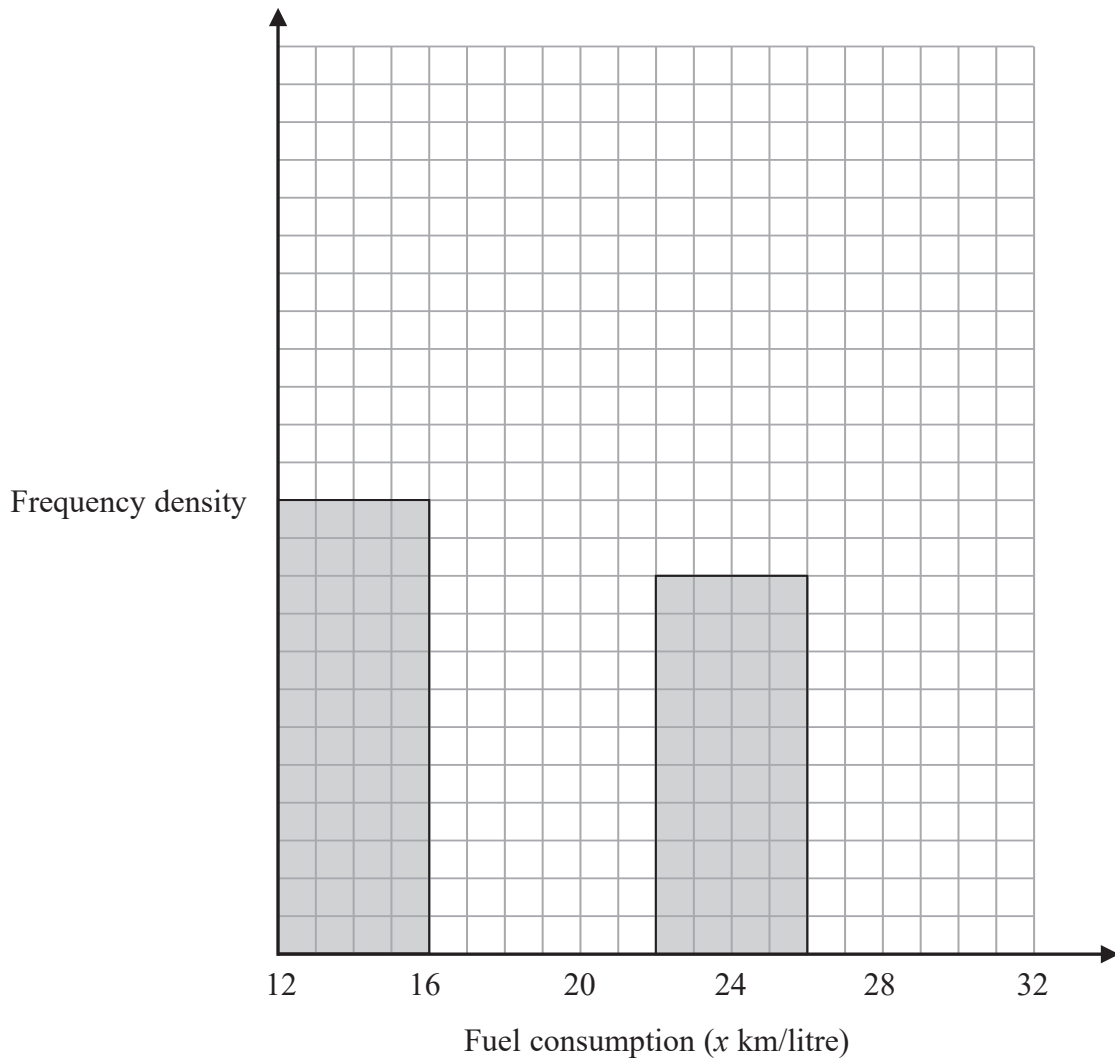
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Question 6 continued



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



Question 6 continued

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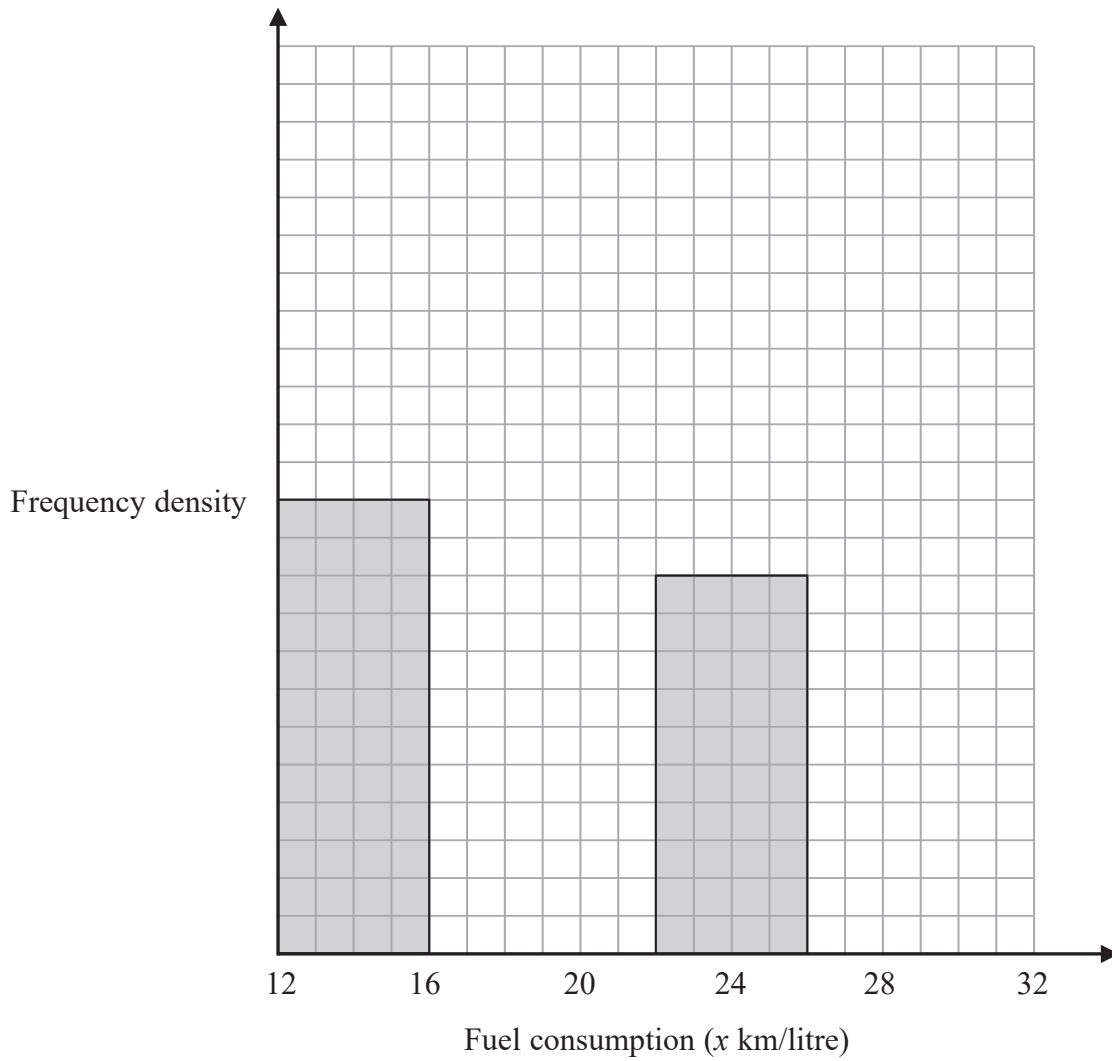
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Question 6 continued

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(Total for Question 6 is 9 marks)



7 The entrance fee for a museum is 8 dollars.
One day the number of visitors to the museum was 250

(a) Calculate the total entrance fees paid for this day. (1)

The entrance fee is increased from 8 dollars by 20%
The day after this increase the number of visitors to the museum decreased from 250 by 10%

(b) Calculate the total entrance fees paid on the day after the price increase. (3)

The museum estimates that the number of visitors in a day will decrease from 250 by $r\%$ when the entrance fee is increased from 8 dollars by $(2r)\%$
After the entrance fee is increased from 8 dollars by $(2r)\%$, the total entrance fees paid in a day is T dollars.

(c) Using the museum's estimate, show that

$$T = 2000 + 20r - 0.4r^2 \quad (4)$$

(d) Find the value of r for which T is a maximum.
Show clear algebraic working. (3)

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Question 7 continued

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Question 7 continued

Handwriting practice area with 25 horizontal dotted lines.

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Question 7 continued

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(Total for Question 7 is 11 marks)



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

x	-1.5	-1	-0.5	0	0.5	1	1.5
y	-0.25		3.25	2		1	4.25

(2)

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

(3)

- (c) Using your curve, find estimates, to 1 decimal place, of the solutions of the equation $4x^3 - 6x + 1 = 0$

(3)

- (d) By drawing a suitable straight line on your grid, find an estimate, to 1 decimal place, for the range of values of x for which $2x^3 + x + 1 > 0$

(4)

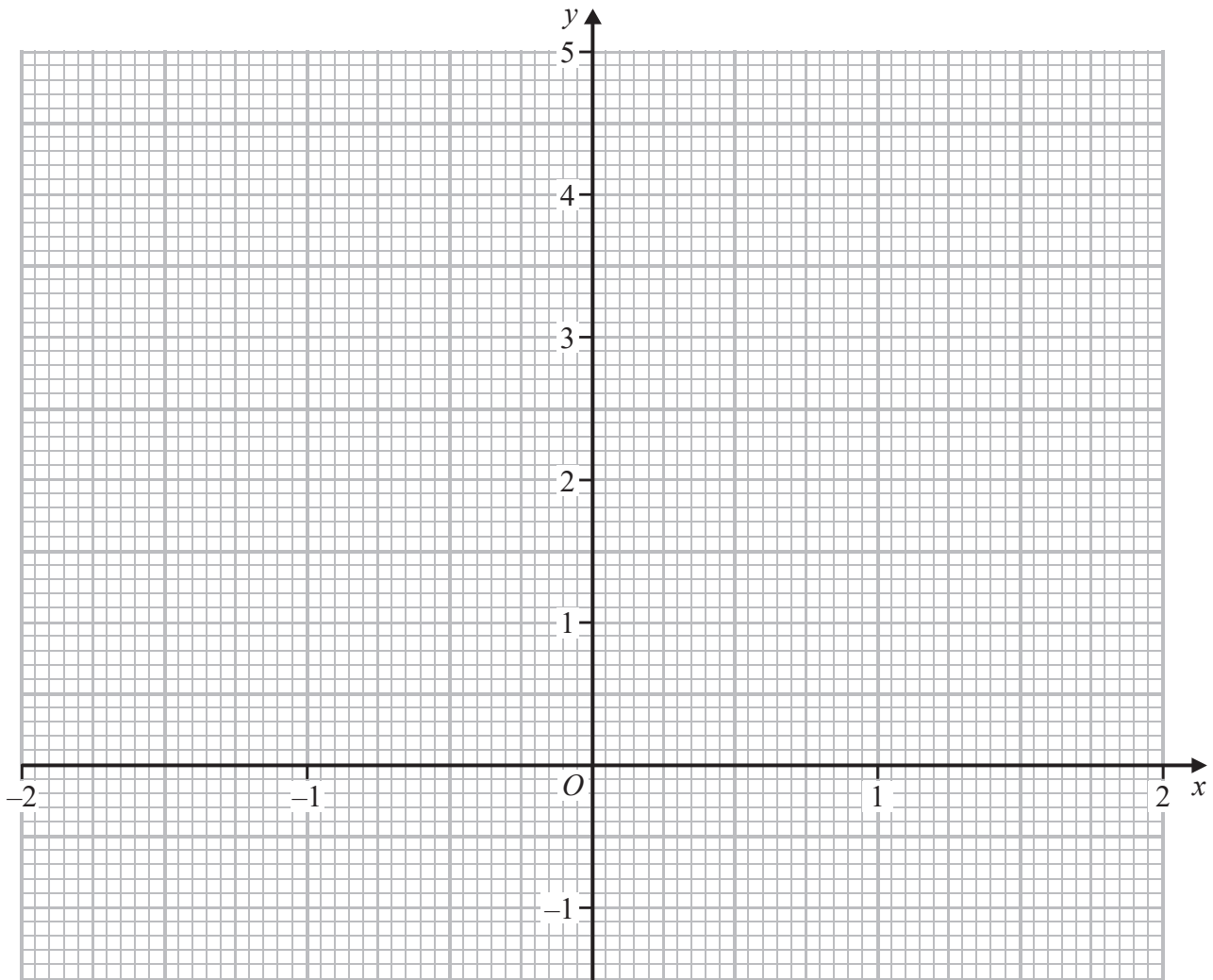
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Question 8 continued



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



Question 8 continued

Handwriting practice area with 25 horizontal dotted lines.

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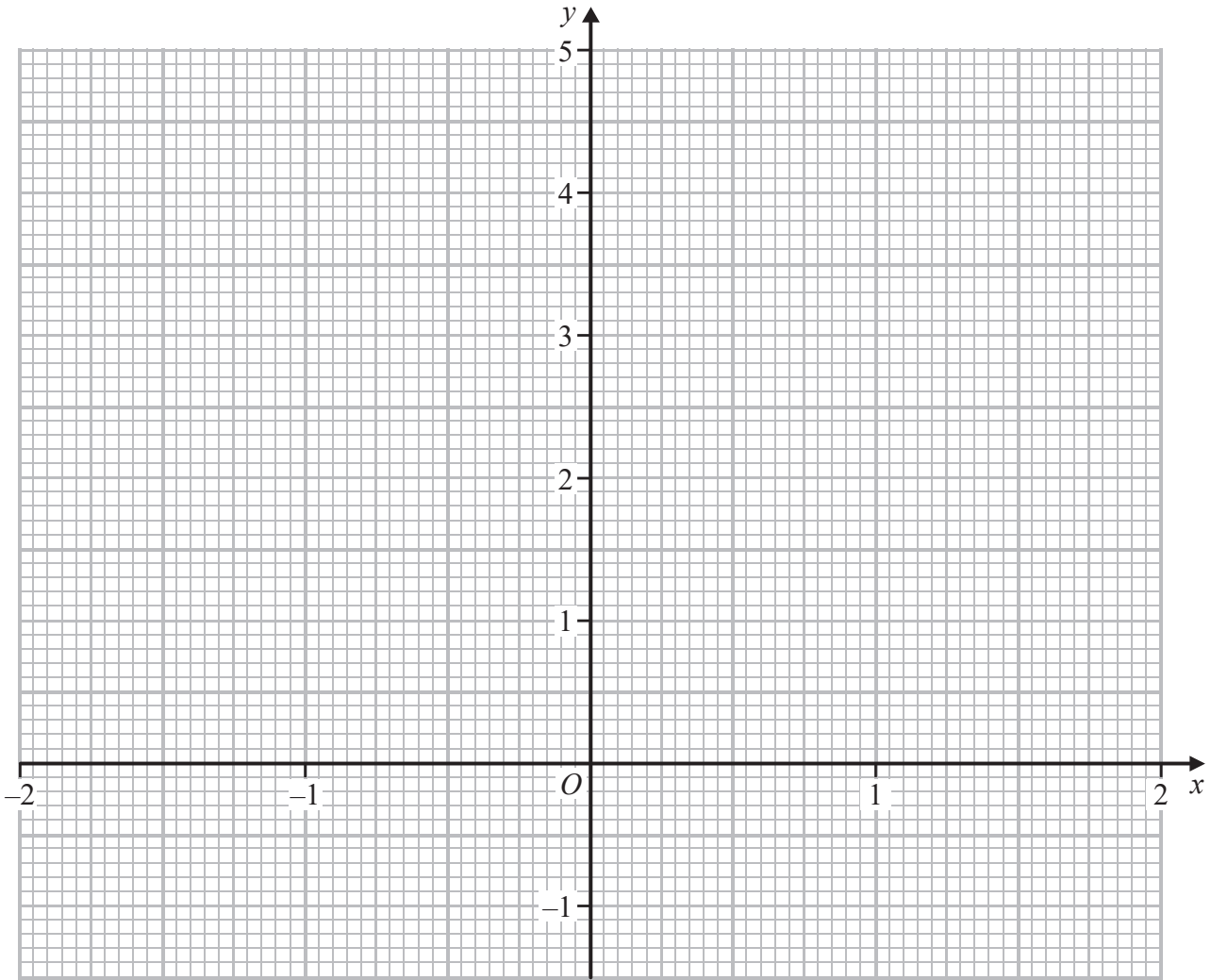
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Question 8 continued

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



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(Total for Question 8 is 12 marks)



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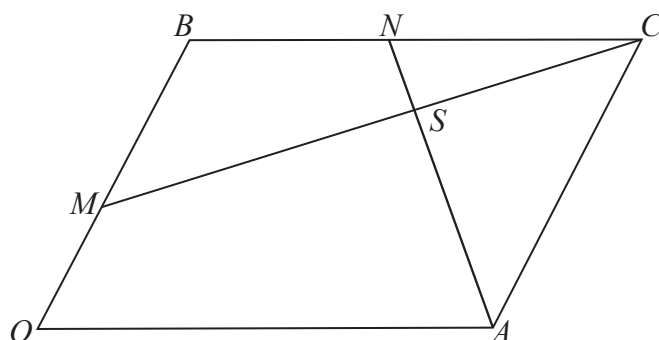


Diagram NOT accurately drawn

Figure 3

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Figure 3 shows a parallelogram $OACB$ in which $\vec{OA} = 8\mathbf{a}$ and $\vec{OB} = 6\mathbf{b}$.
The point M lies on OB such that $OM:MB = 1:2$.
 N is the midpoint of BC .

(a) Find, in terms of \mathbf{a} or \mathbf{b} , or \mathbf{a} and \mathbf{b} ,

- (i) \vec{MB} (ii) \vec{MC} (iii) \vec{NA}

(3)

The lines MC and AN intersect at the point S .

Given that $\vec{NS} = \lambda \vec{NA}$, where λ is a scalar,

(b) find, in terms of λ , \mathbf{a} and \mathbf{b} ,

- (i) \vec{NS} (ii) \vec{MS}

(2)

Given also that $\vec{MS} = \mu \vec{MC}$, where μ is a scalar,

(c) write down an expression for \vec{MS} in terms of μ , \mathbf{a} and \mathbf{b} .

(1)

(d) Hence find the value of λ and the value of μ

(5)

The area of parallelogram $OACB$ is 80 square units.

(e) Find the area of

- (i) triangle CAN ,
(ii) triangle CNS .

(2)

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Question 9 continued

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A large rectangular area with rounded corners, containing numerous horizontal dotted lines for writing.



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Question 9 continued

Handwriting practice area consisting of multiple horizontal dotted lines for writing.

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Question 9 continued

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Area with horizontal dotted lines for writing.

(Total for Question 9 is 13 marks)



P 4 8 4 6 7 A 0 2 9 3 6

10 Given that $\frac{12(2^{3x})^{x-2}6^{2x-1}}{9^x}$ can be written in the form 2^n

(a) show that $n = 3x^2 - 4x + 1$

(3)

(b) Hence solve the equation $\frac{12(2^{3x})^{x-2}6^{2x-1}}{9^x} = 32$

(3)

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Question 10 continued

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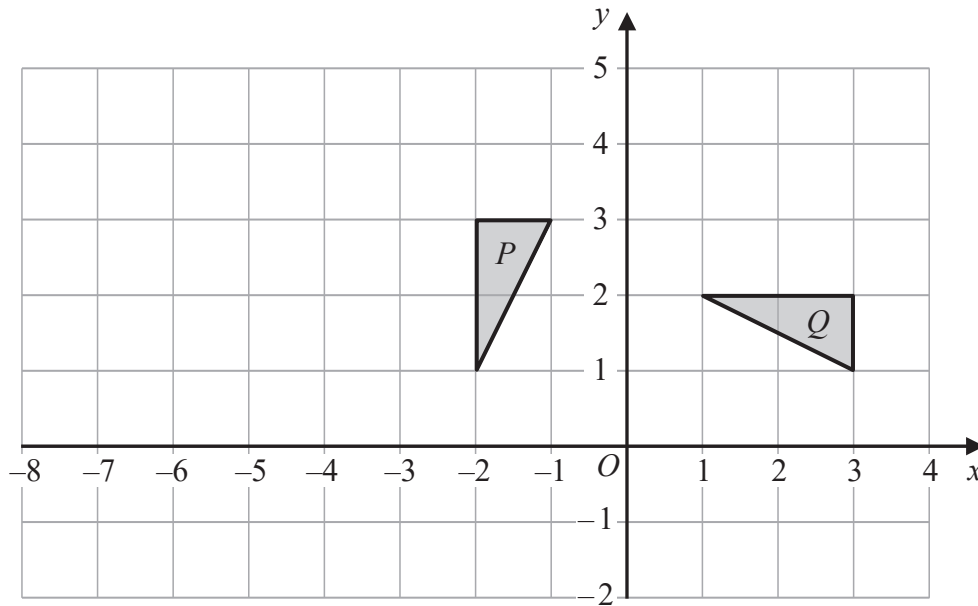
Area with horizontal dotted lines for writing.

(Total for Question 10 is 6 marks)



P 4 8 4 6 7 A 0 3 1 3 6

11



Triangles P and Q are shown on the grid.

- (a) Write down the coordinates of the vertices of triangle Q . (1)
- (b) Describe fully the **single** transformation that maps triangle P onto triangle Q . (3)
- (c) Find the matrix that represents the transformation that maps triangle P onto triangle Q . (1)

Triangle Q is transformed to triangle R under the transformation with matrix \mathbf{M} where

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

- (d) Find the coordinates of the vertices of R . (2)
- (e) Find the matrix of the transformation that maps triangle P onto triangle R . (3)

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Question 11 continued

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Area with horizontal dotted lines for writing.



Question 11 continued

Area with horizontal dotted lines for writing.

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Question 11 continued

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Handwriting practice area with 25 horizontal dotted lines.



P 4 8 4 6 7 A 0 3 5 3 6

Question 11 continued

Area with horizontal dotted lines for writing.

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(Total for Question 11 is 10 marks)

TOTAL FOR PAPER IS 100 MARKS

