

Please check the examination details below before entering your candidate information

Candidatesurname					Other names			
<b>Pearson Edexcel International GCSE</b>		Centre Number			Candidate Number			
		<input type="text"/>	<input type="text"/>					
Time 2 hours 30 minutes		Paper reference		<b>4MB1/02</b>				
<b>Mathematics B PAPER 2</b>								
<b>You must have:</b> 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.
- Good luck with your examination.

Turn over ►

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**Answer ALL ELEVEN questions.**

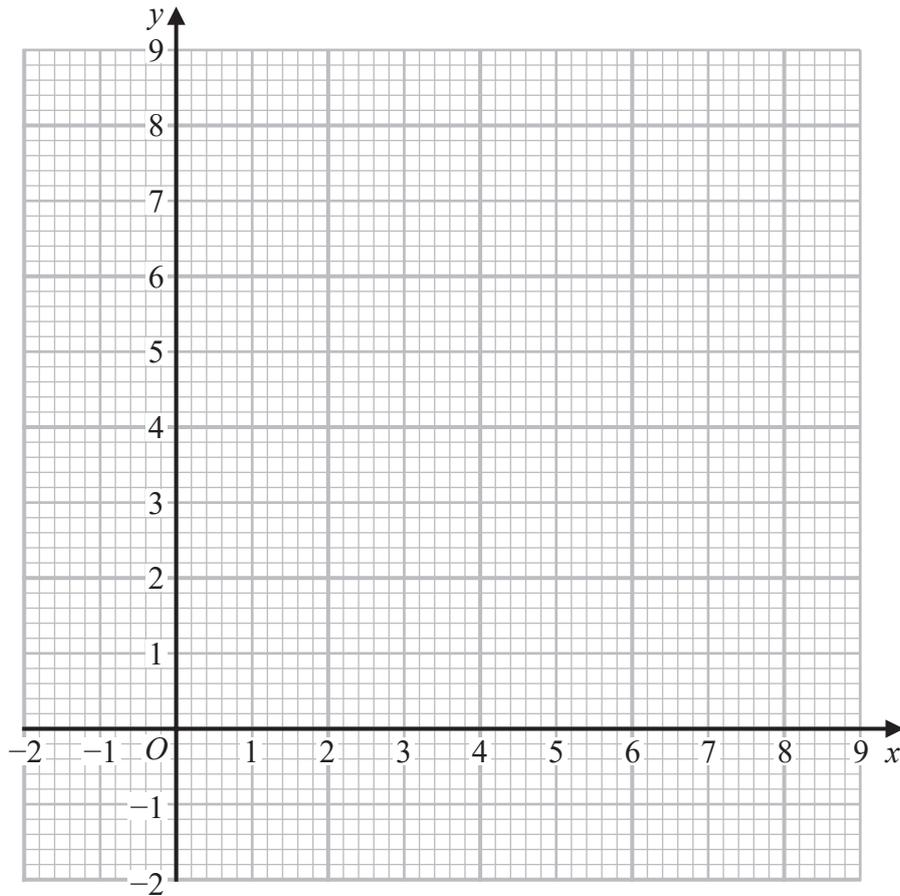
**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

- 1 (a) By drawing suitable straight lines on the grid below, show, by shading, the region  $R$  defined by all of the inequalities

$$y \leq x \quad x + y \leq 8 \quad y \geq 2$$

Label the region  $R$ .



(3)

The point  $P$  with coordinates  $(x, y)$  is a point of the region  $R$ .

Given that  $x$  and  $y$  are **integers** and that  $P$  lies on the straight line with equation  $x - 2y + 2 = 0$

(b) write down the coordinates of **all** possible points  $P$ .

(2)

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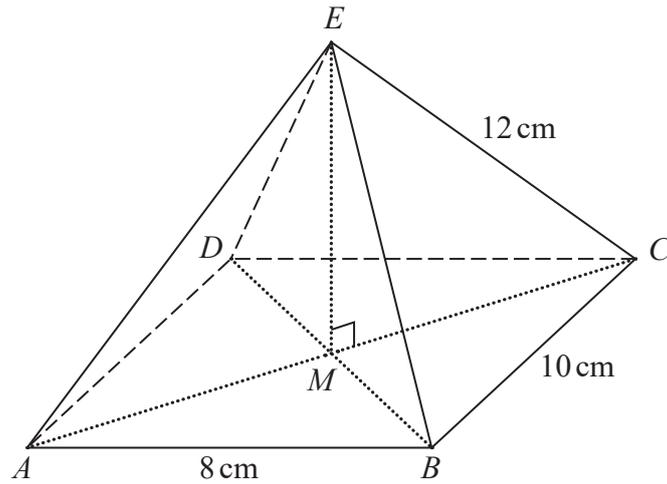
Diagram **NOT**  
accurately drawn

Figure 1

Figure 1 shows a right pyramid  $ABCDE$  with horizontal rectangular base  $ABCD$  and vertex  $E$ .

$$AB = 8 \text{ cm} \quad BC = 10 \text{ cm} \quad EA = EB = EC = ED = 12 \text{ cm}$$

$M$  is the midpoint of the base.

- (a) Calculate the **total** surface area, in  $\text{cm}^2$  to 3 significant figures, of the pyramid. (4)

The point  $P$  is the midpoint of  $AB$  and the point  $Q$  is the midpoint of  $BC$ .

- (b) Calculate the size, in degrees to one decimal place, of  $\angle PEQ$ . (4)

$$[\text{Cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A]$$



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**Question 2 continued**

Area with horizontal dotted lines for writing.

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





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**Question 3 continued**

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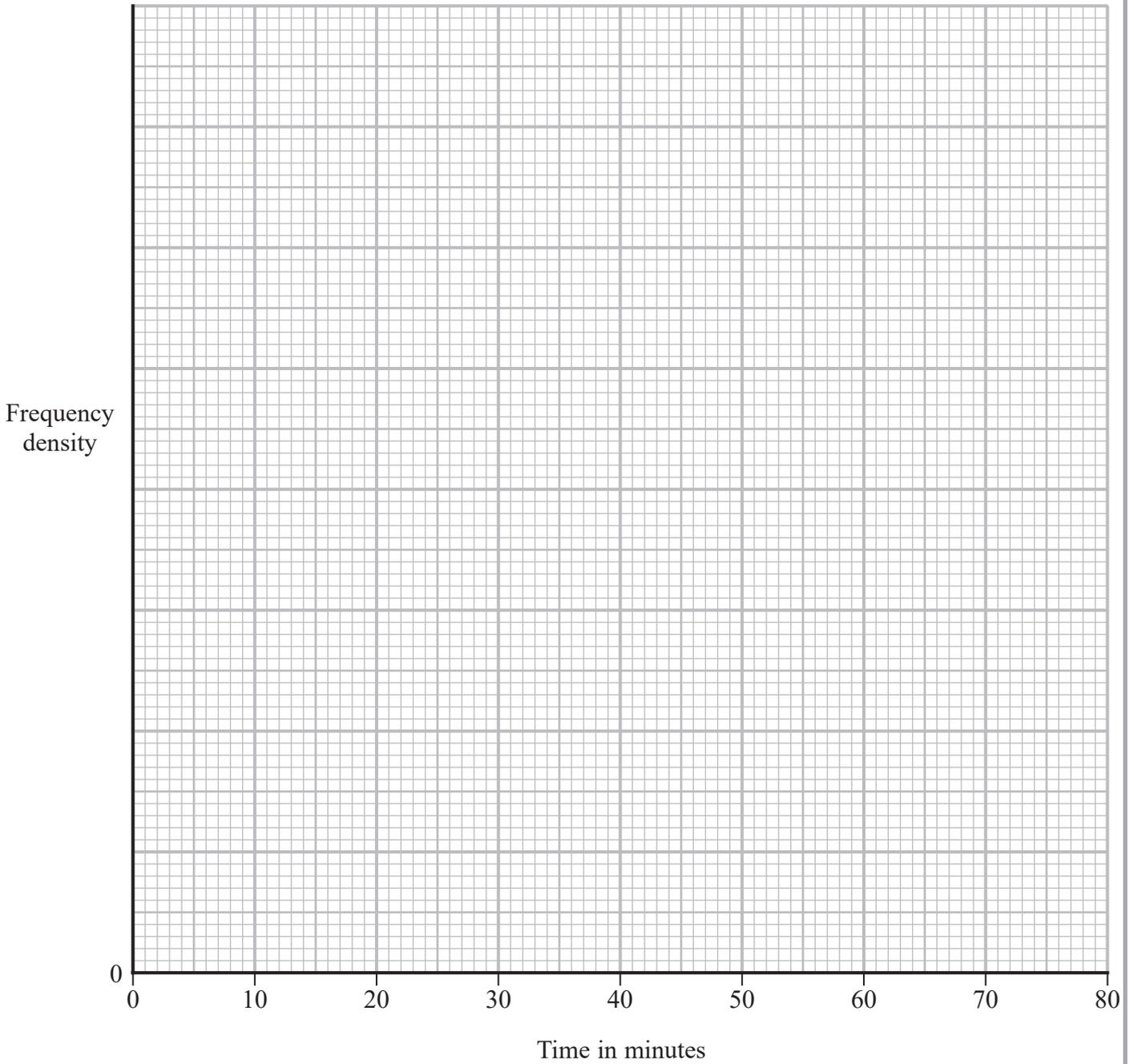
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**(Total for Question 3 is 9 marks)**



- 4 Ella sells jars of jam, jars of honey and jars of chutney from her market stall.

On Thursday, the total number of jars she sold was 320  
55% of the jars were jars of jam.

The ratio of the number of jars of honey to the number of jars of chutney that Ella sold on Thursday was 5 : 3

- (a) Calculate the number of jars of chutney that Ella sold on Thursday. (4)

On Friday, Ella sold 99 jars of strawberry jam.

This was  $\frac{9}{20}$  of the total number of jars of jam that she sold on Friday.

The number of jars of jam that Ella sold increased from Thursday to Friday.

Given that this increase =  $\frac{1}{n} \times$  the number of jars of jam that Ella sold on Thursday,

- (b) find the value of  $n$ . (3)

Ella increases the price of a jar of jam from 3.20 euros to 3.50 euros.

- (c) Calculate the percentage increase in the price of a jar of jam. (2)

Ella increases the price of a jar of honey by 6.25%

The price of a jar of honey after the price increase is 5.10 euros.

- (d) Calculate the price of a jar of honey before the price increase. (3)

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**Question 4 continued**

Area with horizontal dotted lines for writing.

**(Total for Question 4 is 12 marks)**







**Question 5 continued**

Handwriting practice area consisting of 20 horizontal dotted lines for writing.

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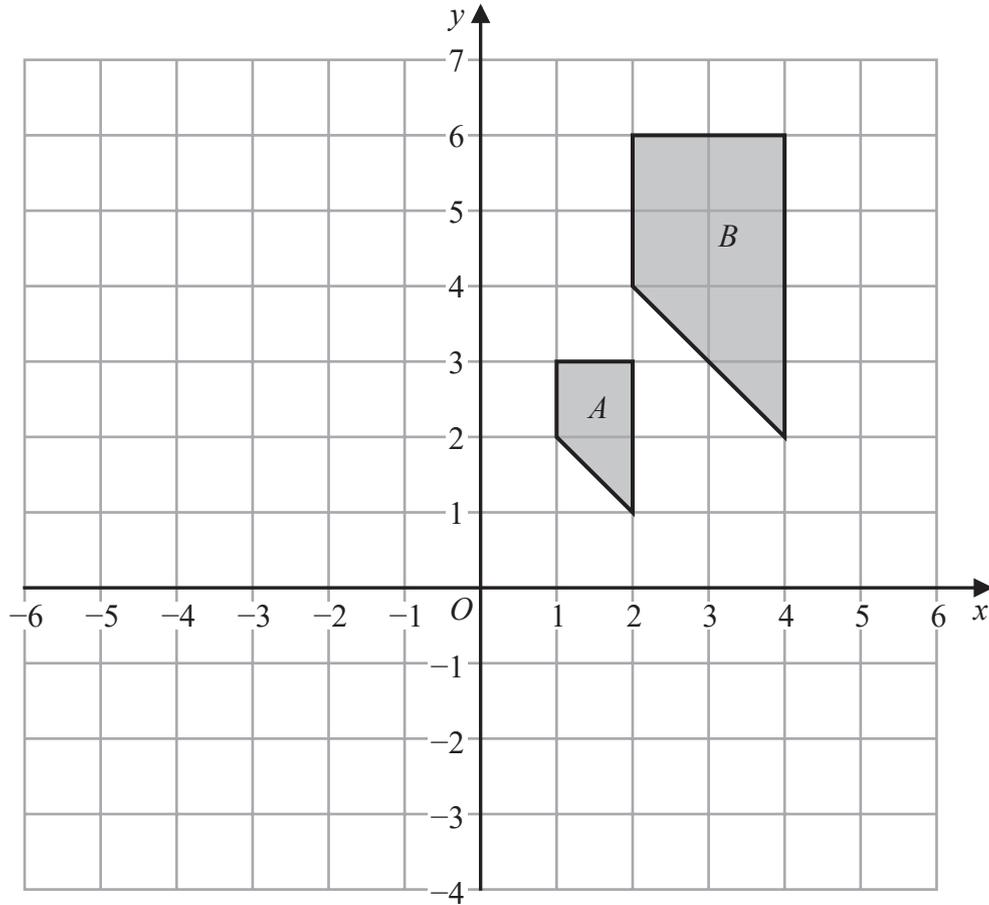
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## Question 5 continued

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



(Total for Question 5 is 11 marks)



- 6 The point  $A$  has coordinates  $(5, 4)$  and the point  $B$  has coordinates  $(-7, -1)$

The point  $C$  is such that  $\overrightarrow{BC} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$

- (a) Find the coordinates of the point  $C$ .

(2)

The point  $D$  is such that  $ABCD$  is a parallelogram with diagonals  $AC$  and  $BD$ .

The length of  $BC$  is 5 cm.

- (b) Find the area, in  $\text{cm}^2$ , of the parallelogram  $ABCD$ .

(5)

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



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**Question 6 continued**

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**(Total for Question 6 is 7 marks)**



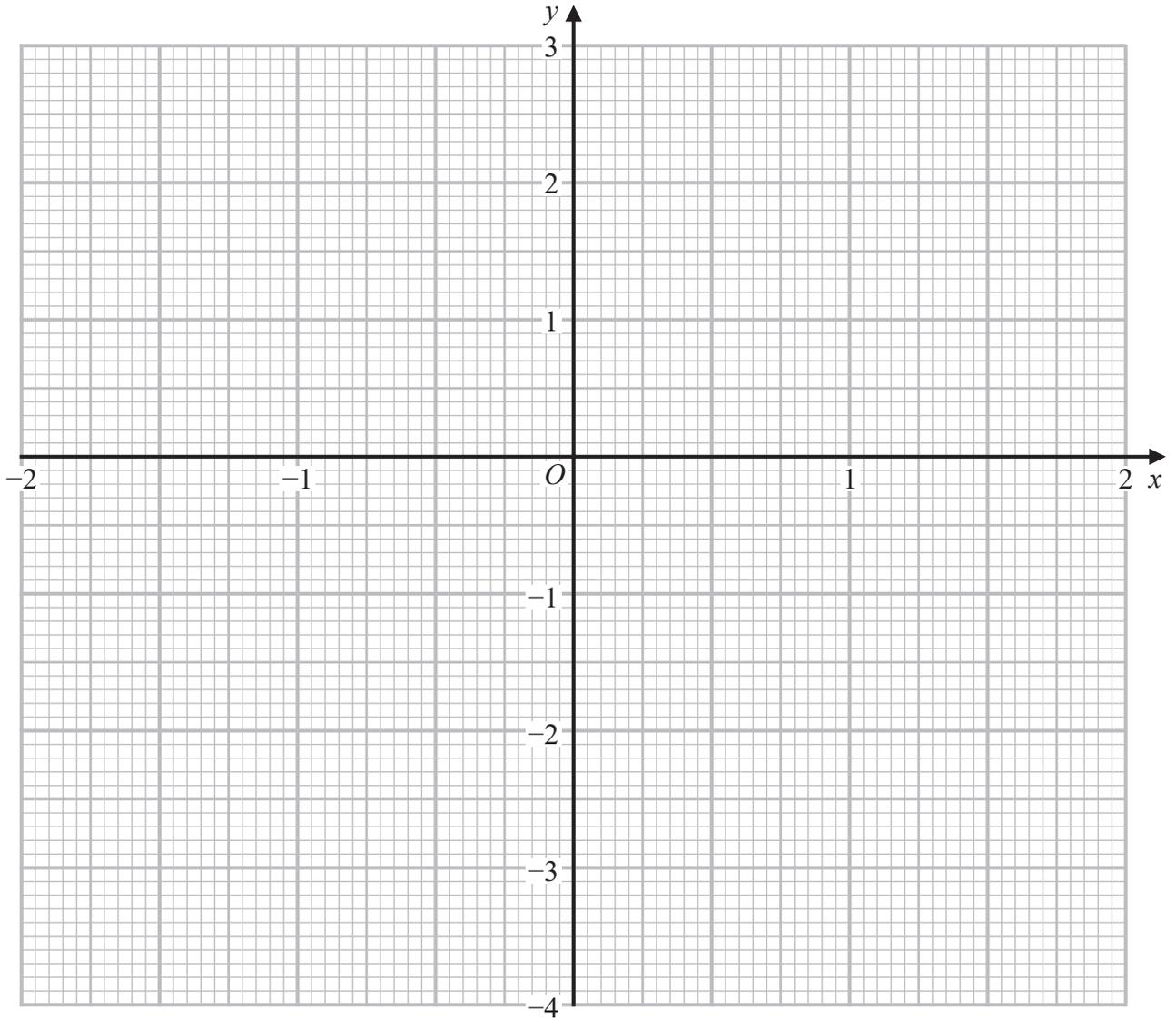


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**Question 7 continued**



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

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**Question 7 continued**

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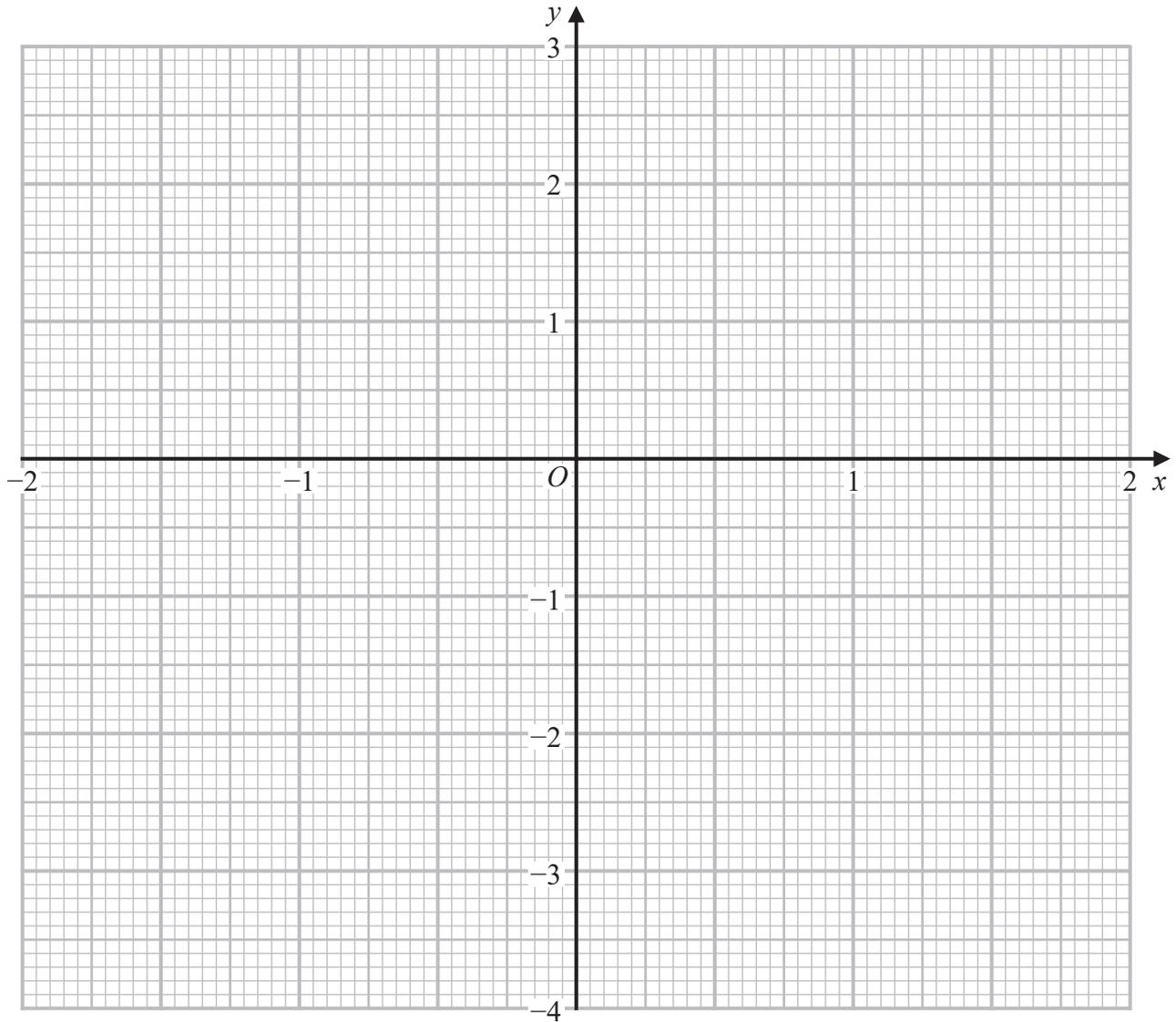
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**Question 7 continued**

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**(Total for Question 7 is 10 marks)**



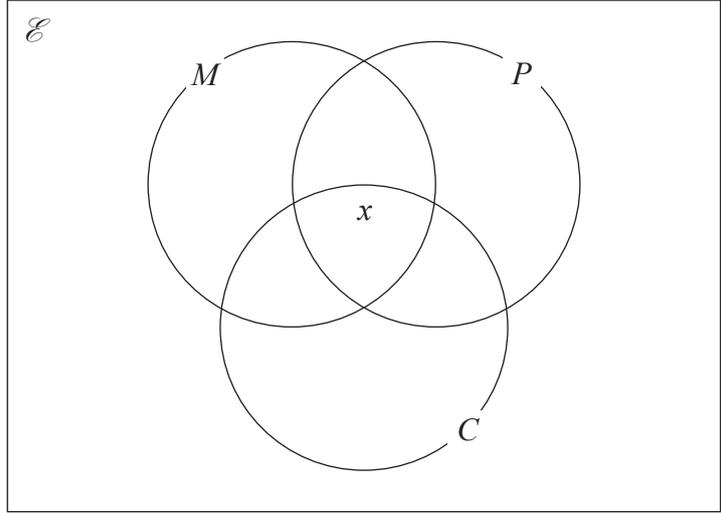


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**Question 8 continued**



Area with horizontal dotted lines for writing.

**(Total for Question 8 is 10 marks)**



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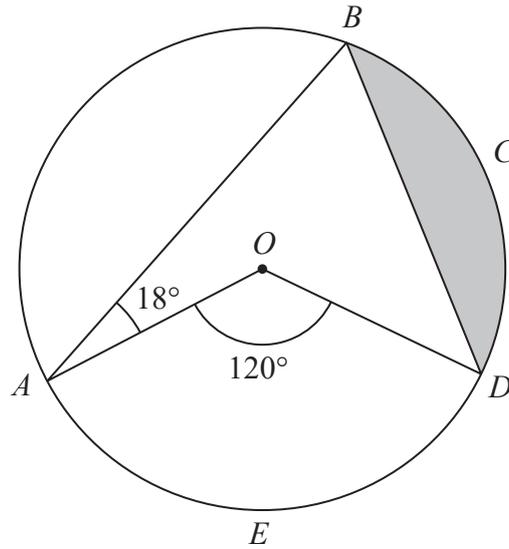
Diagram **NOT**  
accurately drawn

Figure 2

Figure 2 shows a circle  $ABCDE$  with centre  $O$ .

$$\angle BAO = 18^\circ \quad \angle AOD = 120^\circ$$

The area of segment  $BCD$ , shown shaded in Figure 2, is  $T \text{ cm}^2$

Given that the perimeter of the sector  $AODE$  is  $5(3 + \pi) \text{ cm}$ ,

calculate the value, to one decimal place, of  $T$ .

(6)

$$\left[ \text{Area of triangle} = \frac{1}{2} ab \sin C \right]$$



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**Question 9 continued**

Area with horizontal dotted lines for writing.

**(Total for Question 9 is 6 marks)**



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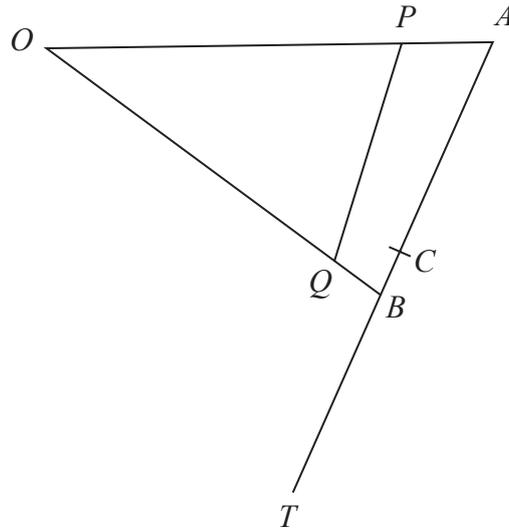
Diagram **NOT**  
accurately drawn**Figure 3**

Figure 3 shows the triangle  $OAB$  in which  $\vec{OA} = 4\mathbf{a}$  and  $\vec{OB} = 6\mathbf{b}$

$C$  is the point on  $AB$  such that  $AC:CB = 3:1$

(a) Find and simplify an expression for  $\vec{OC}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

(3)

The point  $T$  is such that  $ABT$  is a straight line and  $AC = CT$ .

The point  $P$  is such that  $\vec{OP} = \frac{3}{4}\vec{OA}$

$Q$  is the point on  $OB$  such that the points  $P$ ,  $Q$  and  $T$  are collinear.

Given that  $OQ:QB = n:1$

(b) find the value of  $n$ .

(4)

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**Question 10 continued**

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**Question 10 continued**

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**(Total for Question 10 is 7 marks)**



11 The three functions,  $f$ ,  $g$  and  $h$ , are defined as

$$f : x \mapsto 4x^3 + 4x^2 - 5x - 3$$

$$g : x \mapsto \frac{x - 7}{3 - 2x}$$

$$h : x \mapsto 2x + 1$$

- (a) Write down the value of  $x$  that must be excluded from any domain of  $g$  (1)
- (b) Find  $g(2)$  (1)
- (c) Express the inverse function  $g^{-1}$  in the form  $g^{-1}(x) = \dots$  (3)
- (d) Solve the equation  $g(x) = h(x)$  (4)
- (e) (i) Use the factor theorem to show that  $(2x + 3)$  is a factor of  $f(x)$  (2)
- (ii) Hence solve the equation  $f(x) = 0$   
Show clear algebraic working. (4)

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**Question 11 continued**

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**Question 11 continued**

Area with horizontal dotted lines for writing answers.

**(Total for Question 11 is 15 marks)**

**TOTAL FOR PAPER IS 100 MARKS**



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