

Write your name here	
Surname	Other names
Edexcel	Centre Number
International GCSE	Candidate Number
<h1 style="margin: 0;">Further Pure Mathematics</h1> <h2 style="margin: 0;">Paper 1</h2>	
Thursday 19 January 2012 – Morning	Paper Reference
Time: 2 hours	4PM0/01
Calculators 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.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

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.

Turn over ►

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6/6/6/6/4/2/2



PEARSON

3 Solve the inequality $6x^2 - 19x - 7 < 0$

(4)

A series of horizontal dotted lines for writing the solution to the inequality.

(Total for Question 3 is 4 marks)



- 4 Find the coefficient of x^7 in the expansion of $\left(1 + \frac{x}{\sqrt{3}}\right)^{10}$, giving your answer in the form $a\sqrt{3}$, where a is a rational number.

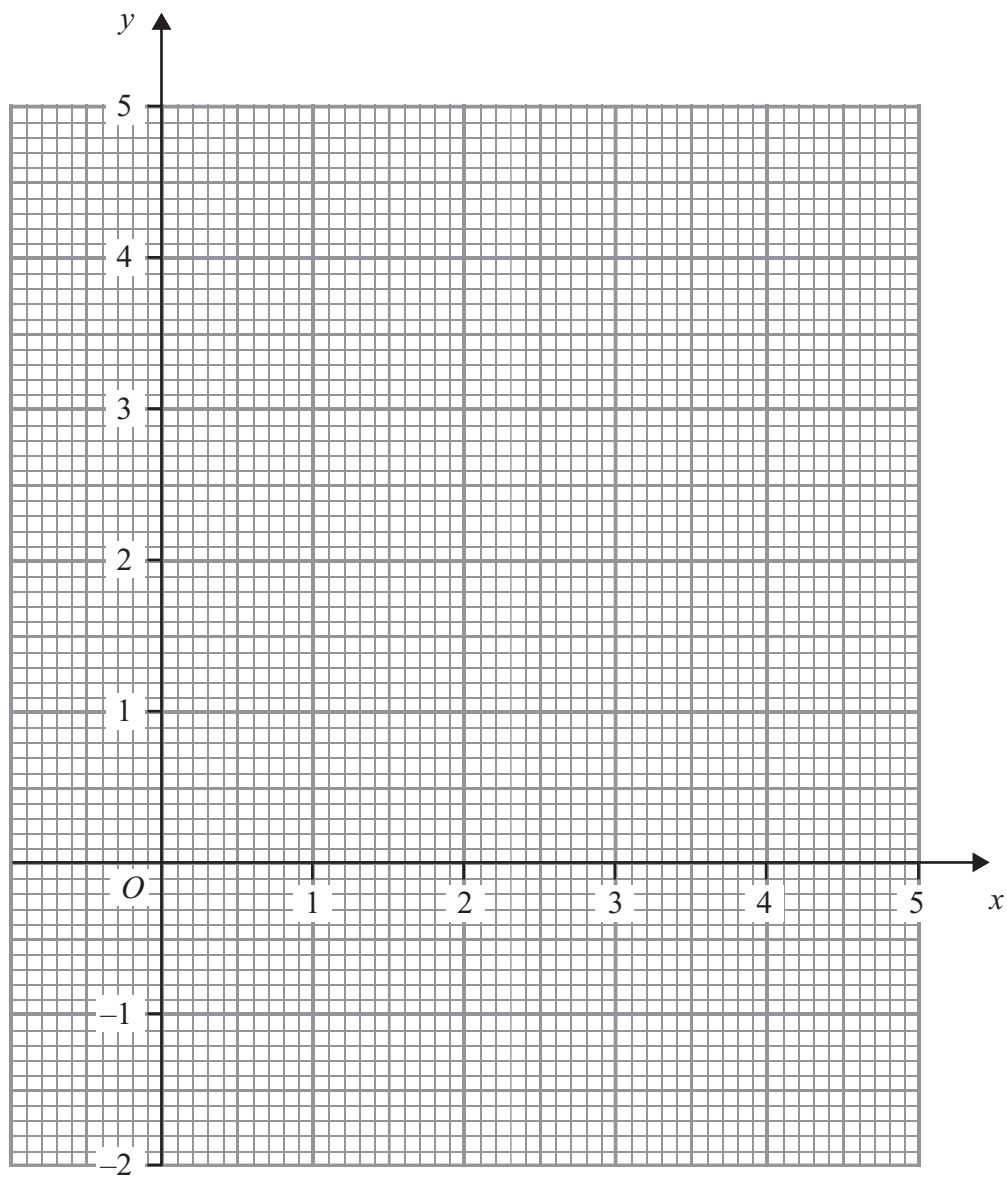
(4)

(Total for Question 4 is 4 marks)



P 4 0 6 1 6 A 0 5 3 2

Question 6 continued



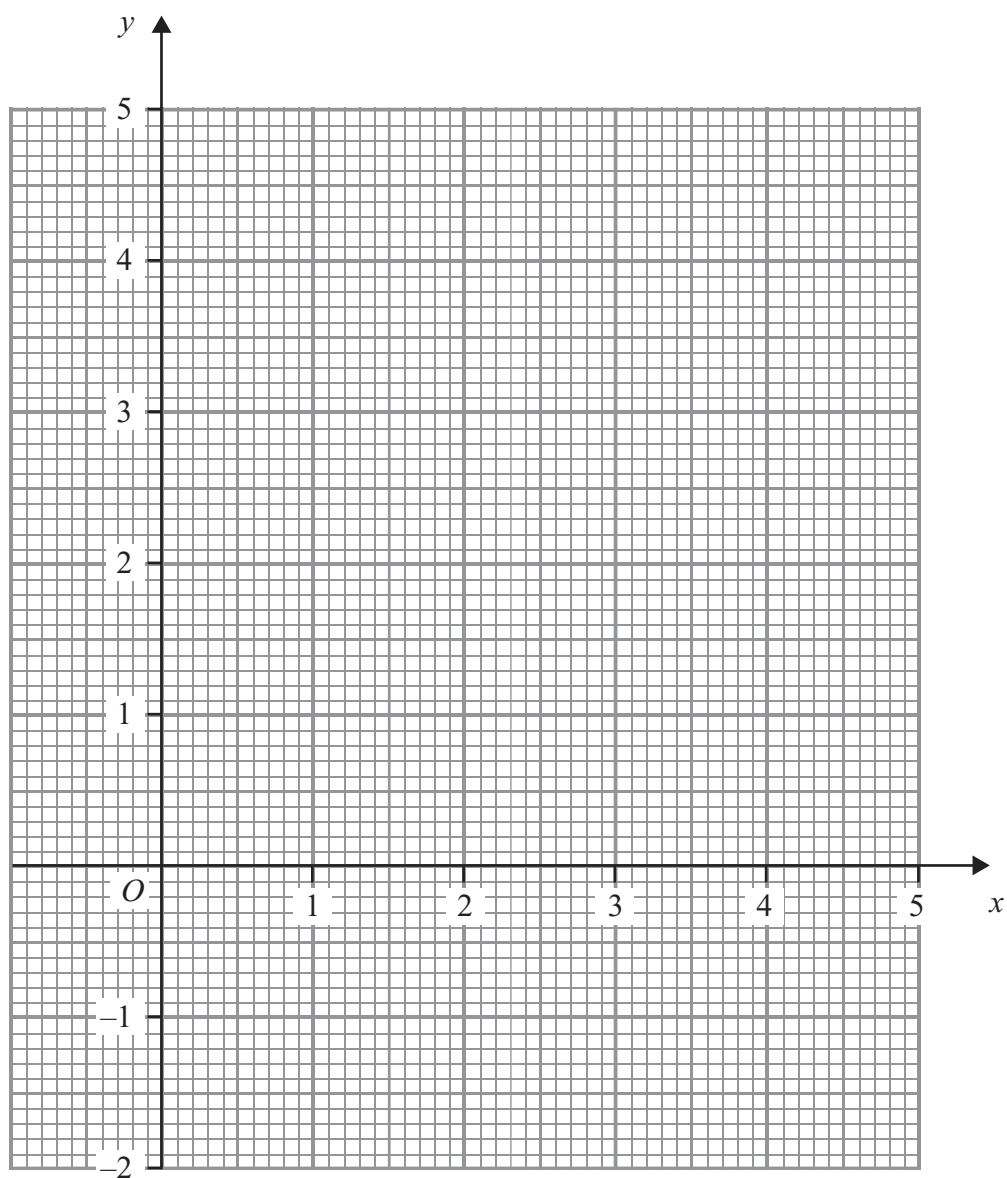
Question 6 continued

Handwriting practice area consisting of 25 horizontal dotted lines.



Question 6 continued

Use this page only if you need to redraw your graph.



(Total for Question 6 is 8 marks)



Question 7 continued

Handwriting practice area consisting of 25 horizontal dotted lines.



Question 8 continued

Handwriting practice area consisting of 25 horizontal dotted lines.



Question 9 continued

Handwriting practice area consisting of 20 horizontal dotted lines.



10

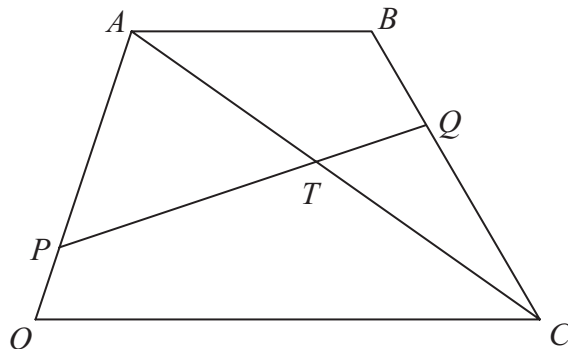


Figure 2

Figure 2 shows a trapezium $OABC$ in which AB is parallel to OC and $AB = \frac{1}{2} OC$. The point P divides OA in the ratio 1:3 and the point Q divides BC in the ratio 1:2

The line AC intersects the line PQ at the point T .

$$\vec{OA} = \mathbf{a} \text{ and } \vec{OC} = \mathbf{c}$$

(a) Find, as simplified expressions in terms of \mathbf{a} and \mathbf{c}

(i) \vec{BC}

(ii) \vec{PQ}

(5)

(b) (i) Given that $\vec{PT} = \lambda \vec{PQ}$, find an expression for \vec{AT} in terms of λ , \mathbf{a} and \mathbf{c}

(ii) Given also that $\vec{AT} = \mu \vec{AC}$, find an expression for \vec{AT} in terms of μ , \mathbf{a} and \mathbf{c}

(2)

(c) Use your answers from part (b) to find the value of λ and hence write down the ratio $PT : TQ$

(6)

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Question 10 continued

A series of horizontal dotted lines for writing.



P 4 0 6 1 6 A 0 2 5 3 2

Question 10 continued

A large rectangular area with a rounded border containing 28 horizontal dotted lines for writing.



Question 10 continued

Ruled area with 25 horizontal dotted lines for writing.

(Total for Question 10 is 13 marks)



11

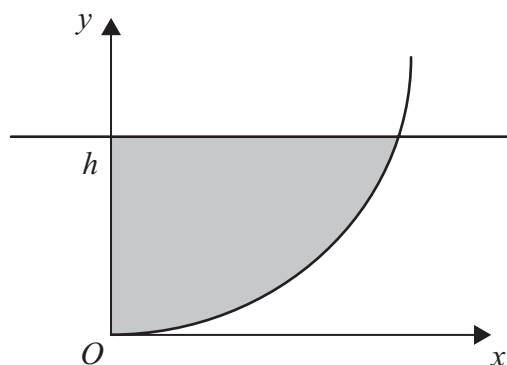


Figure 3

The centre of the circle C , with equation $x^2 + y^2 - 10y = 0$, has coordinates $(0, 5)$. The circle passes through the origin O . The region bounded by the circle, the positive y -axis and the line $y = h$, where $h < 5$, is shown shaded in Figure 3. The shaded region is rotated through 2π radians about the y -axis.

(a) Show that the volume of the solid formed is $\frac{1}{3}\pi h^2(15 - h)$.

(5)

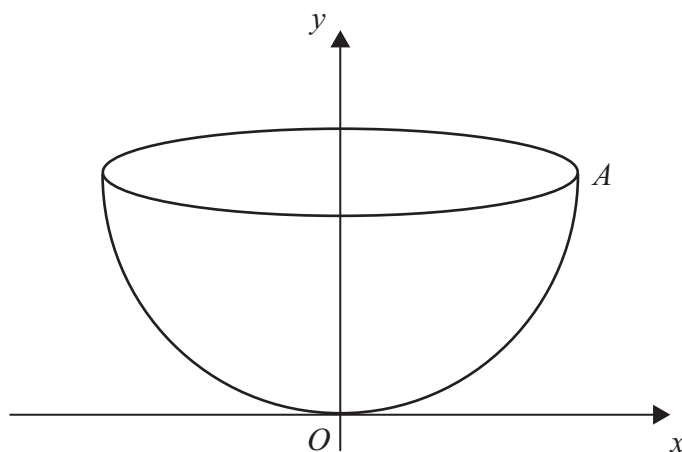


Figure 4

The point A with coordinates $(5, 5)$ lies on C . A bowl is formed by rotating the arc OA through 2π radians about the y -axis, as shown in Figure 4. Water is poured into the bowl at a constant rate of $6 \text{ cm}^3/\text{s}$. The volume of water in the bowl is $V \text{ cm}^3$ when the depth of water above O is $h \text{ cm}$.

(b) Use the formula given in part (a) to find an expression for $\frac{dV}{dh}$ in terms of h .

(1)

(c) Find, to 3 significant figures, the rate at which h is changing when the water above O is 1.5 cm deep.

(4)

The area of the surface of the water is $W \text{ cm}^2$ when the depth of water above O is $h \text{ cm}$.

(d) Show that, for $0 < h < 5$, the rate of change of the depth of water above O is $\frac{k}{W}$, stating the value of k .

(3)



Question 11 continued

A series of horizontal dotted lines for writing.



Question 11 continued

Handwriting practice area with 25 horizontal dotted lines.



Question 11 continued

A series of horizontal dotted lines for writing.



Question 11 continued

A series of horizontal dotted lines for writing.

(Total for Question 11 is 13 marks)

TOTAL FOR PAPER IS 100 MARKS

