

Write your name here

Surname

Other names

Edexcel**International GCSE**

Centre Number

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Candidate Number

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Further Pure Mathematics**Paper 1**

Thursday 17 January 2013 – Morning

Time: 2 hours

Paper Reference

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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**PEARSON**

Answer all ELEVEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 (a) On the axes below sketch the lines with equations

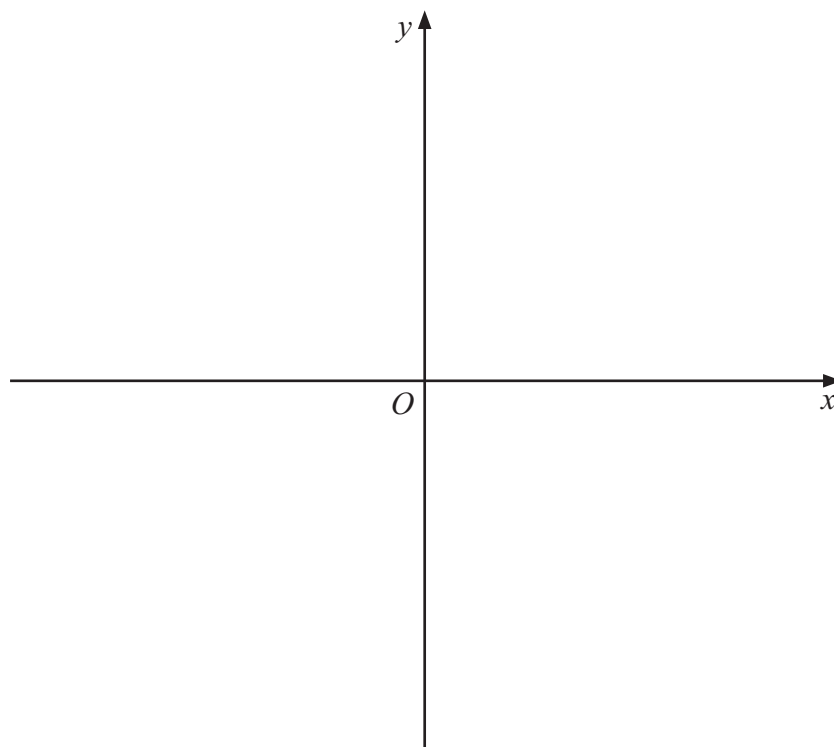
(i) $y = 8$ (ii) $y + x = 6$ (iii) $y = 3x - 4$

Show the coordinates of the points where each line crosses the coordinate axes.

(3)

(b) Show, by shading, the region R which satisfies $y \geq 3x - 4$, $y + x \geq 6$, $x \geq 0$ and $y \leq 8$

(1)



(Total for Question 1 is 4 marks)



6

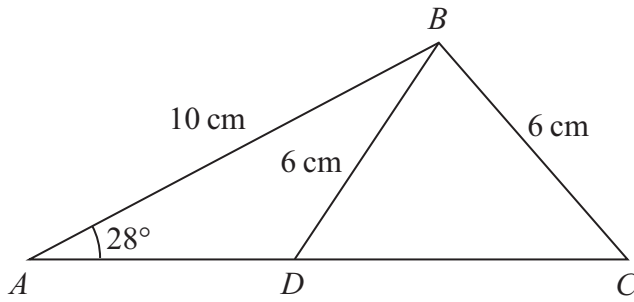


Diagram **NOT**
accurately drawn

Figure 1

Figure 1 shows triangle ABC with $AB = 10\text{ cm}$, $BC = 6\text{ cm}$ and $\angle BAC = 28^\circ$. The point D lies on AC such that $BD = 6\text{ cm}$.

- (a) Find, to the nearest 0.1° , the size of $\angle DBC$. (4)
- (b) Find, to 3 significant figures, the length of AD . (3)
- (c) Find, to 3 significant figures, the area of triangle ABC . (3)



7 The point C with coordinates $(2, 1)$ is the centre of a circle which passes through the point A with coordinates $(3, 3)$.

(a) Find the radius of the circle. (2)

The line AB is a diameter of the circle.

(b) Find the coordinates of B . (2)

The points D with coordinates $(0, 2)$ and E with coordinates $(4, 0)$ lie on the circle.

(c) Show that DE is a diameter of the circle. (2)

The point P has coordinates (x, y) .

(d) Find an expression, in terms of x and y , for the length of CP . (2)

Given that the point P lies on the circle,

(e) show that $x^2 + y^2 - 4x - 2y = 0$ (2)

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Question 7 continued

A series of horizontal dotted lines for writing.



Question 7 continued

A series of horizontal dotted lines for writing.



Question 8 continued

Handwriting practice area consisting of 25 horizontal dotted lines.



Question 8 continued

A large rectangular area with rounded corners, containing 25 horizontal dotted lines for writing.



Question 9 continued

A series of horizontal dotted lines for writing.



Question 9 continued

A series of horizontal dotted lines for writing.



10

$$f(x) = 2x^2 - 5x + 1$$

The equation $f(x) = 0$ has roots α and β . Without solving the equation

(a) find the value of $\alpha^2 + \beta^2$ (3)

(b) show that $\alpha^4 + \beta^4 = \frac{433}{16}$ (2)

(c) form a quadratic equation with integer coefficients which has roots

$$\left(\alpha^2 + \frac{1}{\alpha^2}\right) \text{ and } \left(\beta^2 + \frac{1}{\beta^2}\right) \quad (7)$$



Question 10 continued

A large area of the page is filled with horizontal dotted lines, providing space for the student to write their answer to Question 10.



Question 10 continued

A series of horizontal dotted lines for writing.



11

$$f(x) = x^3 + px^2 + qx + 6 \quad p, q \in \mathbb{Z}$$

Given that $f(x) = (x - 1)(x - 3)(x + r)$

(a) find the value of r .

(1)

Hence, or otherwise,

(b) find the value of p and the value of q .

(3)

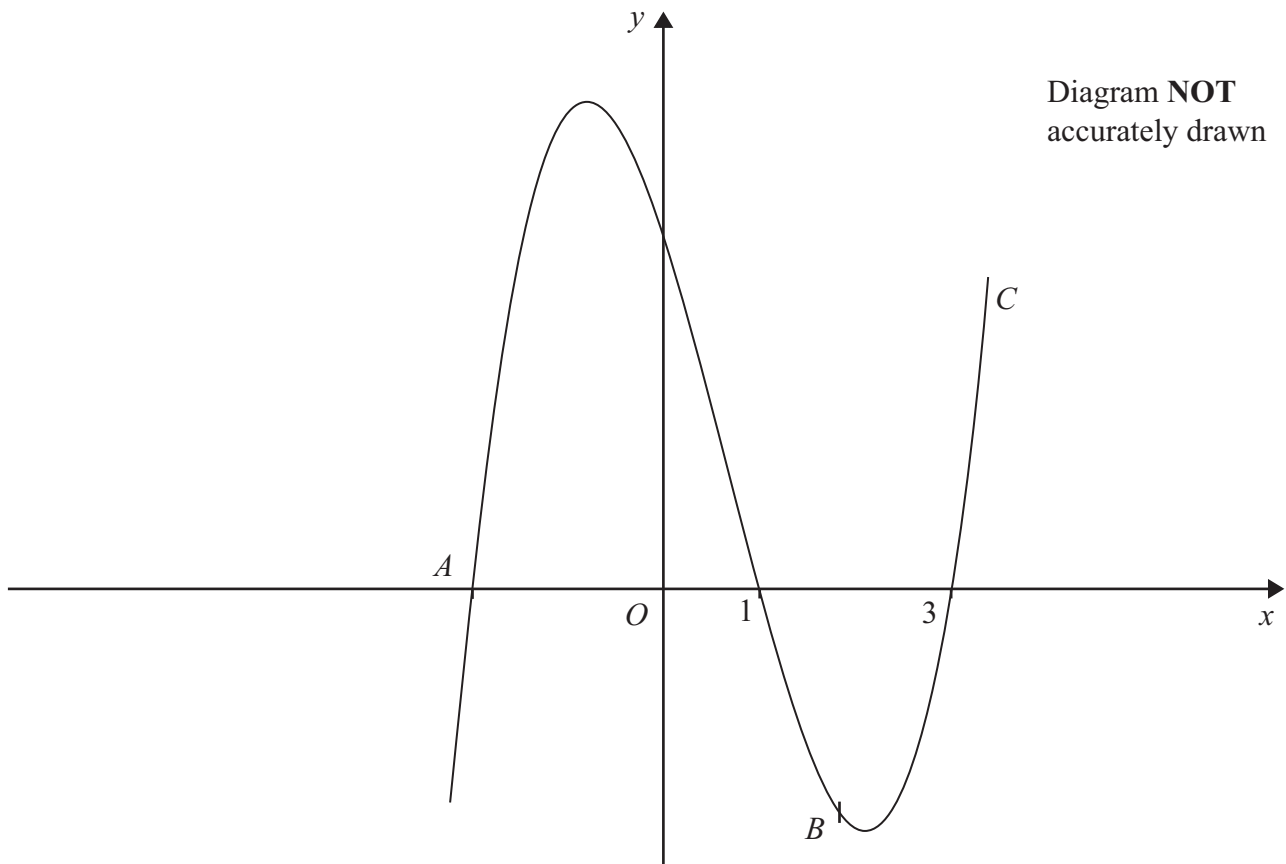


Diagram **NOT**
accurately drawn

Figure 2

Figure 2 shows the curve C with equation $y = f(x)$ which crosses the x -axis at the points with coordinates $(3, 0)$ and $(1, 0)$ and at the point A . The point B on C has x -coordinate 2

(c) Find an equation of the tangent to C at B .

(5)

(d) Show that the tangent at B passes through A .

(2)

(e) Use calculus to find the area of the finite region bounded by C and the tangent at B .

(5)

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Question 11 continued

A series of horizontal dotted lines for writing.



Question 11 continued

A series of horizontal dotted lines for writing.



Question 11 continued

Handwriting practice area consisting of 20 horizontal dotted lines.



