

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 2</h2>	
Friday 24 May 2013 – Afternoon Time: 2 hours	Paper Reference 4PM0/02
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

You must write down all stages in your working.

Diagram **NOT**
accurately drawn

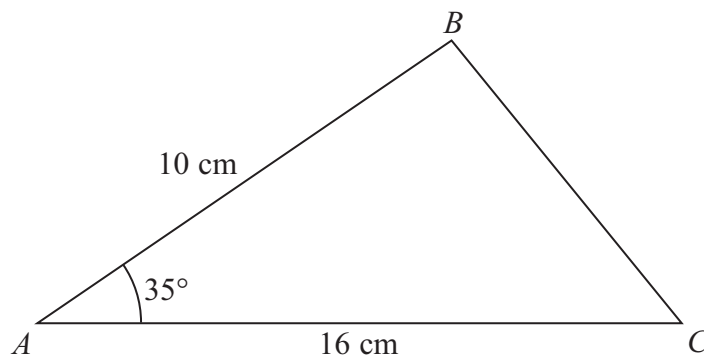


Figure 1

(2)

(5)



This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.



(4)

(3)

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(a) (i) Find $\int \left(1 + 3x - \frac{2}{x^2}\right) dx$

(4)

(4)

[illegible]

(Total for Question 3 is 8 marks)



- (3)

[illegible]

Question 4 continued

(Total for Question 4 is 8 marks)



5

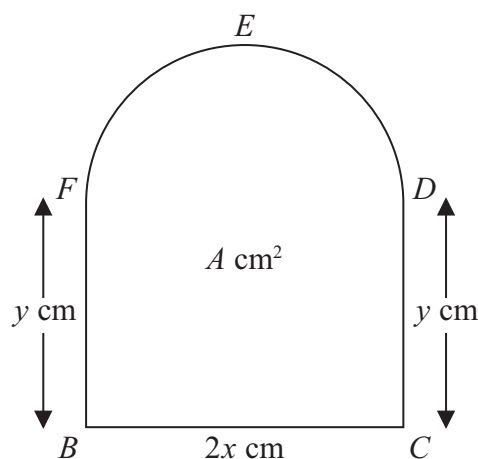


Diagram **NOT**
accurately drawn

Figure 2

Figure 2 shows a shape $BCDEF$ of area $A \text{ cm}^2$. In the shape, $BCDF$ is a rectangle and DEF is a semicircle with FD as diameter.

$BF = CD = y$ cm and $BC = FD = 2x$ cm. The perimeter of the shape $BCDEF$ is 30 cm.

- (a) Find an expression for y in terms of x . (2)
- (b) Show that $A = 30x - 2x^2 - \frac{1}{2}\pi x^2$ (2)
- (c) Find, to 2 significant figures, the maximum value of A , justifying that the value you have found is a maximum. (7)

[illegible]

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(Total for Question 3 is 11 marks)

$$p(x) = 2x^3 + 13x^2 - 17x - 70$$

- (b) Solve the equation $p(x) = 0$ (4)

13

P 4 2 0 6 7 A 0 1 3 2 8

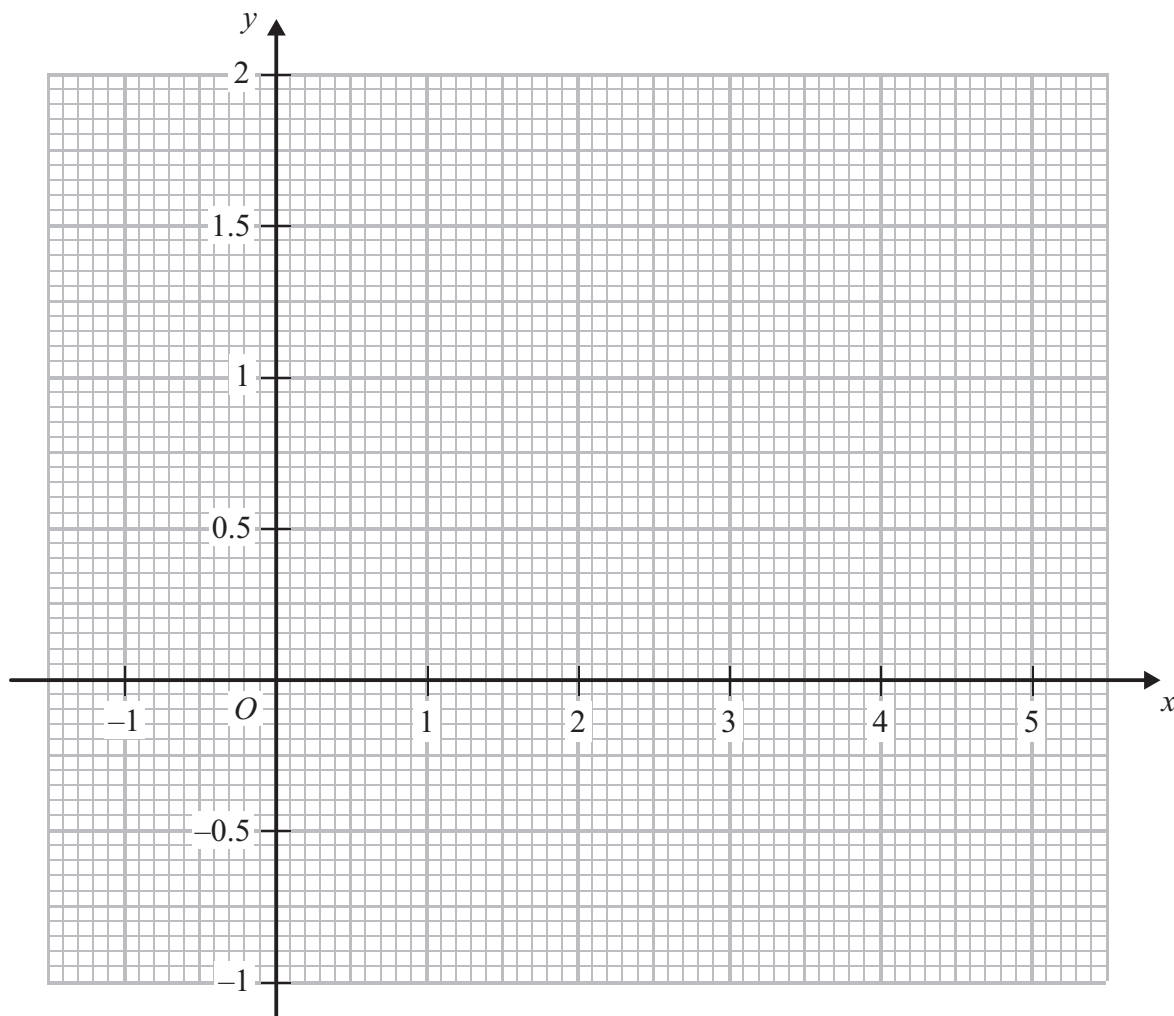
- | | | | | | | | |
|-----|----|------|------|---|---|---|-------|
| x | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
| y | 1 | 1.51 | 1.39 | | | | -0.77 |

(2)

- (2)

- (4)

[illegible]

Question 7 continued

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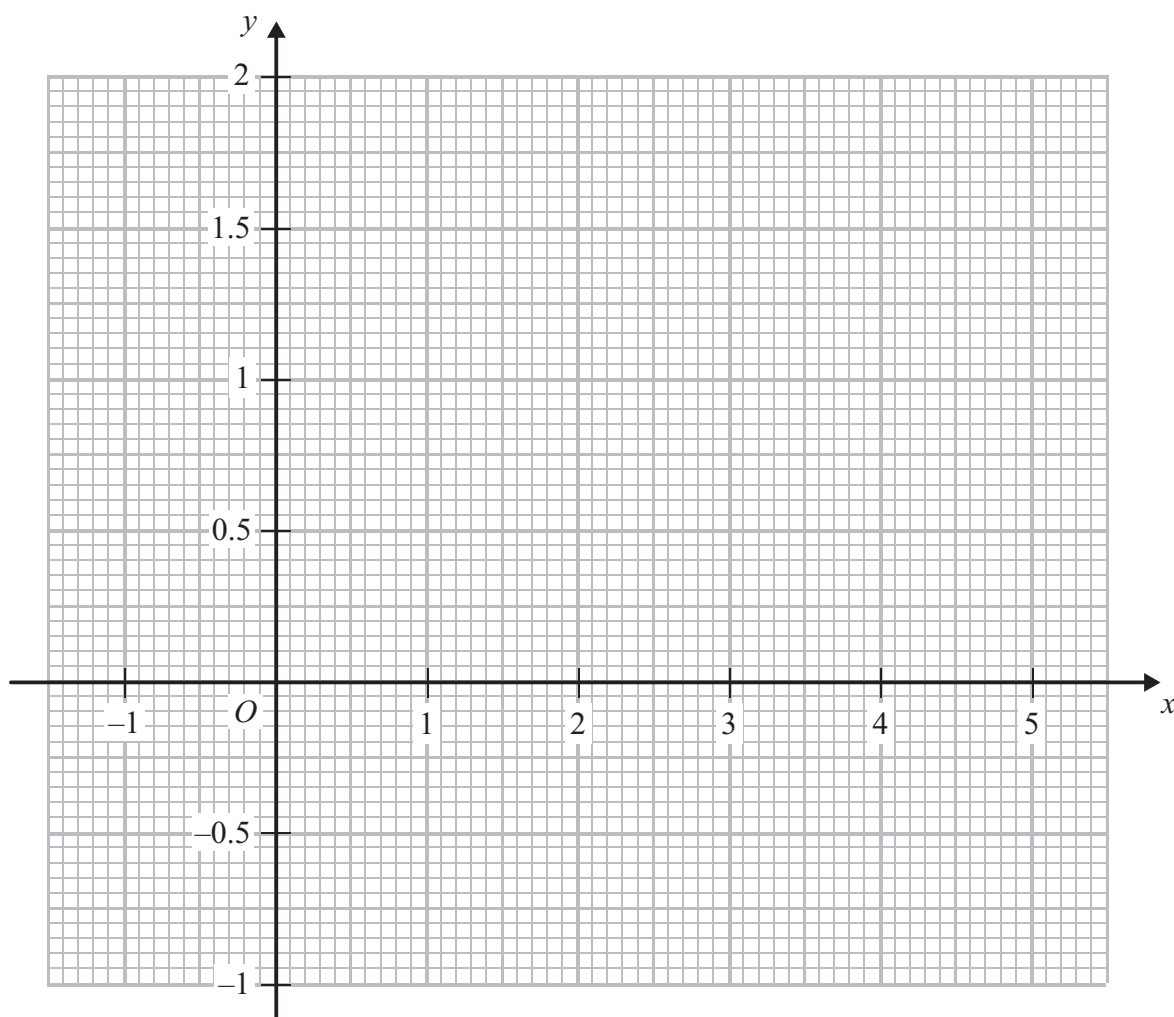
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Turn over for a spare grid if you need to redraw your graph.



Question 7 continued**Only use this grid if you need to redraw your graph.****(Total for Question 7 is 10 marks)**





(Total for Question 6 is 15 marks)



- (ii)
- $(1 - 2x)^{-1}$

(b) find the value of A and the value of B .

(ii) State the range of values of x for which this expansion is valid.

$$\text{of } \int_{0.1}^{0.2} \frac{1}{(1-2x)(1+x)} dx$$

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Question 9 continued



(Total for Question 5 is 14 marks)



10

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

A particle P is moving along a straight line. At time t seconds ($t \geq 0$) the displacement,

s metres, of P from a fixed point O on the line is given by $s = \sqrt{3} \sin \frac{1}{2}t + \cos \frac{1}{2}t$

(a) Find the exact value of s when $t = \frac{\pi}{3}$ (2)

(b) Find the exact value of t when P first passes through O . (4)

The velocity of P at time t seconds is v m/s.

(c) Find an expression for v in terms of t . (2)

(d) Show that $v = \cos\left(\frac{\pi}{6} + \frac{1}{2}t\right)$ (2)

(e) Find the exact value of t for which $v = \frac{1}{2}$ when

(i) $0 \leq t < 2\pi$

(ii) $2\pi \leq t < 4\pi$

(4)



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TOTAL FOR PAPER IS 100 MARKS