Write your name here

Surname	Other names

Pearson Edexcel
International Advanced Level

Centre Number | Candidate Number

Core Mathematics C1

Advanced Subsidiary

Monday 13 January 2014 – Morning
Time: 1 hour 30 minutes

Paper Reference
6663A/01

You must have:
Mathematical Formulae and Statistical Tables (Pink)

Total Marks

Calculators may NOT be used in this examination.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B). Coloured pencils and highlighter pens must not be used.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.

Information

- The total mark for this paper is 75.
- 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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over

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1. Simplify fully

(a) $(2\sqrt{x})^2$

(1)

(b) $\dfrac{5+\sqrt{7}}{2+\sqrt{7}}$

(3)

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Leave blank

Question 1 continued

(Total 4 marks)

Q1

Leave blank

2. $$y = 2x^2 - \frac{4}{\sqrt{x}} + 1, \qquad x > 0$$

(a) Find $\frac{dy}{dx}$, giving each term in its simplest form. **(3)**

(b) Find $\frac{d^2y}{dx^2}$, giving each term in its simplest form. **(2)**

Leave blank

Question 2 continued

(Total 5 marks)

Q2

Leave blank

3. Solve the simultaneous equations

$$x - 2y - 1 = 0$$

$$x^2 + 4y^2 - 10x + 9 = 0$$

(7)

Leave blank

Question 3 continued

Q3

(Total 7 marks)

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4.

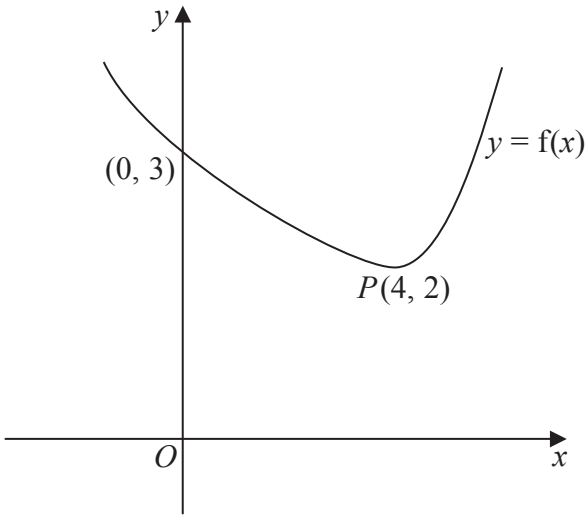

Figure 1

Figure 1 shows a sketch of a curve with equation $y = \mathrm{f}(x)$.

The curve crosses the y-axis at (0, 3) and has a minimum at P (4, 2).

On separate diagrams, sketch the curve with equation

(a) $y = \mathrm{f}(x + 4)$,

(2)

(b) $y = 2\mathrm{f}(x)$.

(2)

On each diagram, show clearly the coordinates of the minimum point and any point of intersection with the y-axis.

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Question 4 continued

Q4

(Total 4 marks)

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5. Given that for all positive integers n,

$$\sum_{r=1}^{n} a_r = 12 + 4n^2$$

(a) find the value of $\sum_{r=1}^{5} a_r$

(2)

(b) Find the value of a_6

(3)

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Question 5 continued

(Total 5 marks)

Q5

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6.

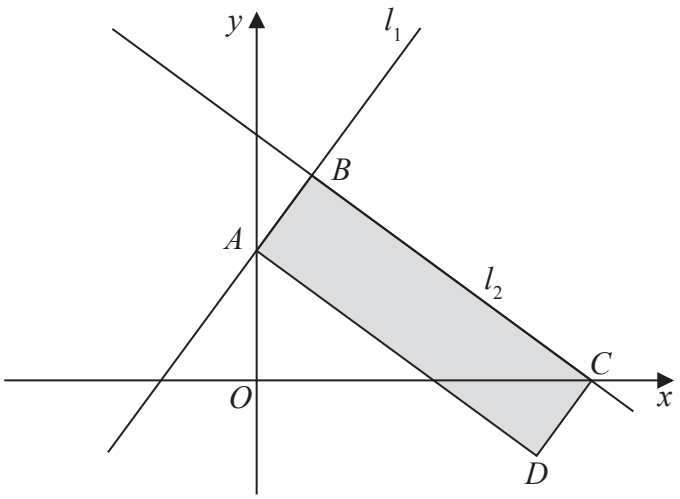

Figure 2

The straight line l_1 has equation $2y = 3x + 7$

The line l_1 crosses the y-axis at the point A as shown in Figure 2.

(a) (i) State the gradient of l_1

(ii) Write down the coordinates of the point A.

(2)

Another straight line l_2 intersects l_1 at the point B (1, 5) and crosses the x-axis at the point C, as shown in Figure 2.

Given that $\angle ABC = 90°$,

(b) find an equation of l_2 in the form $ax + by + c = 0$, where a, b and c are integers.

(4)

The rectangle $ABCD$, shown shaded in Figure 2, has vertices at the points A, B, C and D.

(c) Find the exact area of rectangle $ABCD$.

(5)

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

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Question 6 continued

Leave blank

Question 6 continued

Leave blank

Question 6 continued

(Total 11 marks)

Q6

Leave blank

7. Shelim starts his new job on a salary of £14 000. He will receive a rise of £1500 a year for each full year that he works, so that he will have a salary of £15 500 in year 2, a salary of £17 000 in year 3 and so on. When Shelim's salary reaches £26 000, he will receive no more rises. His salary will remain at £26 000.

(a) Show that Shelim will have a salary of £26 000 in year 9.

(2)

(b) Find the total amount that Shelim will earn in his job in the first 9 years.

(2)

Anna starts her new job at the same time as Shelim on a salary of £A. She receives a rise of £1000 a year for each full year that she works, so that she has a salary of £(A + 1000) in year 2, £(A + 2000) in year 3 and so on. The maximum salary for her job, which is reached in year 10, is also £26 000.

(c) Find the difference in the total amount earned by Shelim and Anna in the first 10 years.

(6)

Leave blank

Question 7 continued

Leave blank

Question 7 continued

Leave blank

Question 7 continued

(Total 10 marks)

Q7

Leave blank

8. The equation $2x^2 + 2kx + (k + 2) = 0$, where k is a constant, has two distinct real roots.

(a) Show that k satisfies

$$k^2 - 2k - 4 > 0$$

(3)

(b) Find the set of possible values of k.

(4)

Leave blank

Question 8 continued

Q8

(Total 7 marks)

Leave blank

9. A curve with equation $y = \mathrm{f}(x)$ passes through the point (3, 6). Given that

$$\mathrm{f}'(x) = (x - 2)(3x + 4)$$

(a) use integration to find $\mathrm{f}(x)$. Give your answer as a polynomial in its simplest form.
(5)

(b) Show that $\mathrm{f}(x) \equiv (x - 2)^2(x + p)$, where p is a positive constant. State the value of p.
(3)

(c) Sketch the graph of $y = \mathrm{f}(x)$, showing the coordinates of any points where the curve touches or crosses the coordinate axes.
(4)

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Q9

(Total 12 marks)

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10. The curve C has equation $y = x^3 - 2x^2 - x + 3$

The point P, which lies on C, has coordinates (2, 1).

(a) Show that an equation of the tangent to C at the point P is $y = 3x - 5$

(5)

The point Q also lies on C.

Given that the tangent to C at Q is parallel to the tangent to C at P,

(b) find the coordinates of the point Q.

(5)

Leave blank

Question 10 continued

Leave blank

Question 10 continued

Q10

(Total 10 marks)

TOTAL FOR PAPER: 75 MARKS

END

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