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* ▶

P43134A

©2014 Pearson Education Ltd.

5/5/5/5/

P 4 3 1 3 4 A 0 1 2 8

PEARSON

Leave blank

**1.** Simplify fully

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

**(1)**

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

**(3)**



P 4 3 1 3 4 A 0 2 2 8

Leave blank

**Question 1 continued**

**Q1**

**(Total 4 marks)**

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**

**Q2**

**(Total 5 marks)**

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)**

Leave blank

**4.**

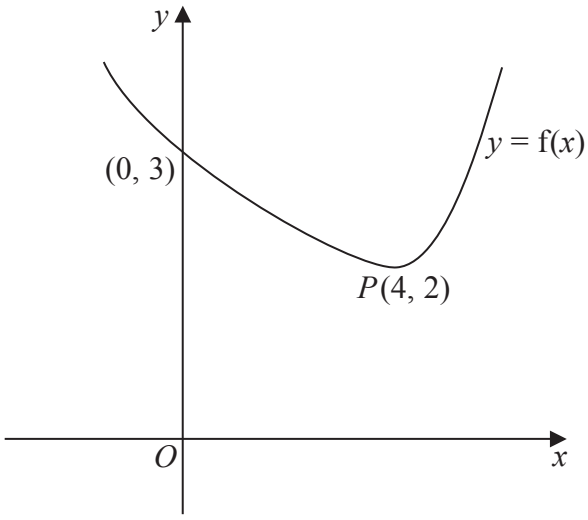


**Figure 1**

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.



P 4 3 1 3 4 A 0 8 2 8

Leave blank

**Question 4 continued**

**Q4**

**(Total 4 marks)**

Leave blank

**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)**



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

Leave blank

**Question 5 continued**

**Q5**

**(Total 5 marks)**

Leave blank

**6.**

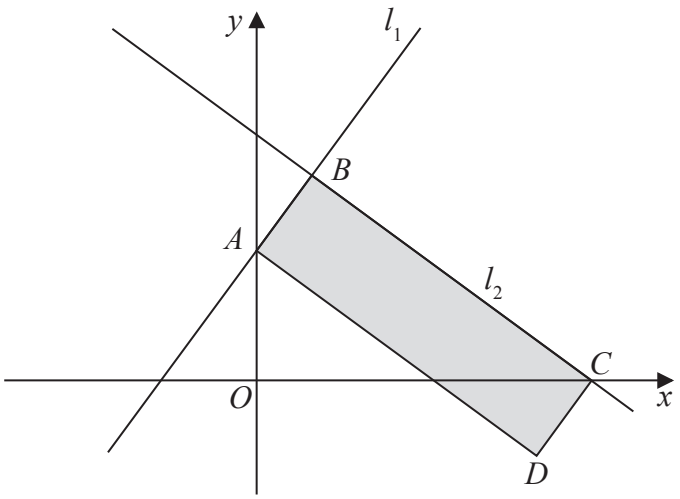


**Figure 2**

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

Leave blank

**Question 6 continued**

Leave blank

**Question 6 continued**

Leave blank

**Question 6 continued**

**Q6**

**(Total 11 marks)**

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)**

Leave blank

**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**



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