# Edexcel GCE
# Core Mathematics C1
# Practice Paper B2
# (Mark scheme)


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| Question number | | Scheme | Marks |
|---|---|---|---|
| **1.** | (a) | $x = -\frac{1}{2}$ | B1 |
| | | $4 = 2^2$ and $\sqrt{2} = 2^{\frac{1}{2}}$ $\quad y = 2\frac{1}{2}$ | M1 A1 (3) |
| | (b) | $y - x = 3$ $\quad 2^3 = 8$ $\quad$ (or: $4\sqrt{2} \div \frac{1}{\sqrt{2}} = 8$) | M1 A1 (2) |
| | | | **(5 marks)** |
| **2.** | (a) | $(x^4 - 6x^2 + 9)$ | M1 |
| | | $(x^4 - 6x^2 + 9) \div x^3 = x - 6x^{-1} + 9x^{-3}$ (*) | A1 (2) |
| | (b) | $f'(x) = 1 + 6x^{-2} - 27x^{-4}$ First A1: 2 terms correct (unsimplified) | M1 A1 A1 (3) |
| | | Second A1: all 3 correct (simplified) | |
| | | | **(5 marks)** |
| **3.** | (a) | 77 $\quad$ 74 | B1 B1 (2) |
| | (b) | $d = 74 - 77 = -3$ | B1 (1) |
| | (c) | $S_{50} = \frac{1}{2}n\left[2a + (n-1)d\right] = 25\left[(2 \times 77) + (49 \times -3)\right]$ | M1 |
| | | $= 175$ | |
| | | $= 175$ | A1 (3) |
| | | | **(6 marks)** |

| Question number | | Scheme | Marks |
|---|---|---|---|
| **4.** | (a) | $6x - 2x < 3 + 7$ $\quad x < 2\frac{1}{2}$ | M1 A1 (2) |
| | (b) | $(2x - 1)(x - 5)$ $\quad$ Critical values $\frac{1}{2}$ and 5 | M1 A1 |
| | | $\frac{1}{2} < x < 5$ | M1 A1 ft (4) |
| | (c) | $\frac{1}{2} < x < 2\frac{1}{2}$ | B1 ft (1) |
| | | | **(7 marks)** |
| **5.** | (a) | $b^2 - 4ac \geq 0$ $\quad (5k)^2 - 8k \geq 0,$ $\quad k(25k - 8) \geq 0$ * | M1, A1 (2) |
| | (b) | Critical values: $\quad k = 0,$ $\quad k = \frac{8}{25}$ | B1 B1 |
| | | $k \leq 0,$ $\quad k \geq \frac{8}{25}$ $\quad \longleftarrow\!\bullet_{k_1} \quad \bullet_{k_2}\!\longrightarrow$ | M1 A1 ft (4) |
| | | A1 requires ≤ and ≥ | |
| | (c) | $k = 0$ $\quad k = \frac{8}{25}$ $\quad$ (Clearly seen as a soln. for (c)) | B1 (1) |
| | | | **(7 marks)** |

| Question number | Scheme | Marks |
|---|---|---|
| **6.** (a) | $u_1 = 1.05 \times 500\,000 - 15\,000 = 510\,000$ | M1 |
| | $u_2 =$ 520 500 | |
| | $u_3 =$ 531 525 | A1 (all 3) |
| | The population is <u>increasing</u> | B1 (3) |
| (b) | $\begin{pmatrix} u_1 = 425000 \\ u_2 = 346250 \\ u_3 = 263562.5 \\ u_4 = 176740.625 \end{pmatrix}$ $u_5 = 85577.64\ldots..$ | M1 |
| | $u_6 = -10143.46\ldots..$ | A1 |
| | $u_5 > 0$, $u_6 < 0$ so population died out during 6th year | B1 (3) |
| (c) | Require $u_1 = u_0$ i.e $1.05 \times 500000 - d = 500000$ | M1 |
| | i.e $d = 0.05 \times 500000$ | |
| | i.e $d = 25000$ | A1 (2) |
| | | **(8 marks)** |

| Question number | Scheme | Marks |
|---|---|---|
| **7.** (*a*) | (2, 0) (or $x = 2,\ y = 0$) | B1 (1) |
| (*b*) | $y^2 = 4\left(\frac{3y+12}{2} - 2\right)$ or $\left(\frac{2x-12}{3}\right)^2 = 4(x-2)$ | M1 |
| | $y^2 - 6y - 16 = 0$ or $x^2 - 21x + 54 = 0$ (or equiv. 3 terms) | A1 |
| | $(y+2)(y-8) = 0$, $y = \ldots$ or $(x-3)(x-18) = 0$, $x = \ldots$ (3 term quad.) | M1 |
| | $y = -2,\ y = 8$ or $x = 3,\ x = 18$ | A1 |
| | $x = 3,\ x = 18$ or $y = -2,\ y = 8$ (attempt <u>one</u> for M mark) (A1ft requires both values) | M1 A1ft (6) |
| (c) | Grad. of $AQ = \frac{8-0}{18-2}$, Grad. of $AP = \frac{0-(-2)}{2-3}$ (attempt <u>one</u> for M mark) | M1 A1ft |
| | $m_1 \times m_2 = \frac{1}{2} \times -2 = -1$, so $\angle PAQ$ is a right angle (A1 is c.s.o.) | M1 A1 (4) |
| | <u>Alternative:</u> Pythagoras: Find 2 lengths [M1] | |
| | $AQ = \sqrt{320}$, $AP = \sqrt{5}$, $PQ = \sqrt{325}$ (O.K. unsimplified) [A1ft] | |
| | (if decimal values only are given, with no working shown, require at least 1 d.p. accuracy for M1(implied) A1) | |
| | $AQ^2 + AP^2 = PQ^2$, so $\angle PAQ$ is a right angle [M1, A1] | |
| | M1 requires attempt to use Pythag. for right angle at $A$, and A1 requires correct <u>exact</u> working + conclusion. | **(11 marks)** |

| Question number | | Scheme | Marks |
|---|---|---|---|
| **8.** | (*a*) | Gradient of $AB = \frac{4}{8} = \frac{1}{2}$ | M1 A1 (2) |
| | (*b*) | Gradient of $BC = -2$, $\frac{4-2}{k-7} = -2$ (or full Pythag. Method) | M1 |
| | | $k = 6$ | A1 (2) |
| | (*c*) | $AB = \sqrt{(4^2 + 8^2)}$ | |
| | | $= \sqrt{80} = \sqrt{16}\,\sqrt{5} = 4\sqrt{5}$ | A1 (3) |
| | (*d*) | $BC = \sqrt{(1^2 + 2^2)} = \sqrt{5}$ (or $AC = \sqrt{(7^2 + 6^2)} = \sqrt{85}$) | B1 ft |
| | | Area of $ABC = \frac{1}{2}(4\sqrt{5} \times \sqrt{5} = 10$ | M1 A1 (3) |
| | | Other exact methods can score M1 A2. | |
| | | Non-exact methods score M1 A0 (but may gain the B1). | |
| | (e) | $y - 2 = -2\,(x - 7)$ | B1 |
| | | $2x + y - 16 = 0$ | B1 (2) |
| | | | **(12 marks)** |
| **9** | (*a*) | Integrate: $y = x3 - 10x^2 + 29x\,(+C)$ | M1 M1 |
| | | $6 = 8 - 40 + 58 + C \Rightarrow C = -20$ $(y = x^3 - 10x^2 + 29x - 20)$ | M1 A1 (4) |
| | (*b*) | Subs. $x = 4$: $64 - 160 + 116 - 20 = 0$ | M1 A1 (2) |
| | (*c*) | At $x = 2$, $\frac{dy}{dx} = 12 - 40 + 29 = 1$ | B1 |
| | | Tangent: $y - 6 = x - 2$ $(y = x + 4)$ | M1 A1 (3) |
| | (*d*) | $\frac{dy}{dx} = 1$ | M1 |
| | | $3x^2 - 20x + 28 = 0$ | M1 |
| | | $(3x - 14)(x - 2) = 0$ | M1 A1 |
| | | $x = \frac{14}{3}$ | A1 (5) |
| | | | **(14 marks)** |