FOR OCR

GCE Examinations

Advanced / Advanced Subsidiary

Core Mathematics C1

Paper K

MARKING GUIDE

This guide is intended to be as helpful as possible to teachers by providing concise solutions and indicating how marks could be awarded. There are obviously alternative methods that would also gain full marks.

Method marks (M) are awarded for using a valid method.

Accuracy marks (A) can only be awarded when a correct method has been used.

(B) marks are independent of method marks.

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C1 Paper K – Marking Guide

1. $= \sqrt{25\times 2} + 3\sqrt{4\times 2} = 5\sqrt{2} + (3\times 2\sqrt{2})$ M1 A1

$= 11\sqrt{2}$ A1 **(3)**

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2. $\frac{dy}{dx} = 1 - 8x^{-3}$ M1 A1

for SP, $1 - 8x^{-3} = 0$ M1

$x^3 = 8$

$x = 2 \ \therefore (2, 3)$ A2 **(5)**

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3. cubic, coeff of $x^3 = 1$, crosses x-axis at $(-1, 0)$, touches at $(3, 0)$

$\therefore \ y = (x + 1)(x - 3)^2$ M1 A1

$= (x + 1)(x^2 - 6x + 9)$

$= x^3 - 6x^2 + 9x + x^2 - 6x + 9$ M1

$= x^3 - 5x^2 + 3x + 9$

$\therefore \ a = -5, b = 3, c = 9$ A2 **(5)**

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4. *(i)* $y = x^2 - 2ax + a^2$ B1

$\frac{dy}{dx} = 2x - 2a = 2x - 6$ M1 A1

$\therefore \ a = 3$ A1

(ii) translation by 3 units in the negative x-direction B2 **(6)**

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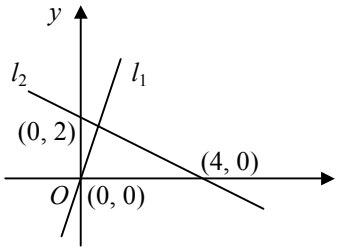
5. *(i)*



B2 B2

(ii) $l_1 \Rightarrow 6x - 2y = 0$

l_2: $x + 2y - 4 = 0$

adding $7x - 4 = 0$

$x = \frac{4}{7}$ M1 A1

$\therefore$ intersect at $(\frac{4}{7}, \frac{12}{7})$ A1 **(7)**

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6. *(a)* *(i)* $2^{x+2} = 2^2 \times 2^x = 4y$ M1 A1

(ii) $2^{3-x} = \frac{2^3}{2^x} = \frac{8}{y}$ M1 A1

(b) $2^{x+2} + 2^{3-x} = 33 \Rightarrow 4y + \frac{8}{y} = 33$

$4y^2 + 8 = 33y$ M1

$4y^2 - 33y + 8 = 0$ A1

(c) $(4y - 1)(y - 8) = 0$ M1

$y = \frac{1}{4}, 8$ A1

$2^x = \frac{1}{4}, 8$

$x = -2, 3$ A2 **(10)**

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7. *(i)* centre = (2, 3) — B1

radius = $\sqrt{4+9} = \sqrt{13}$ — M1

$\therefore\ (x-2)^2 + (y-3)^2 = (\sqrt{13})^2$ — M1

$(x-2)^2 + (y-3)^2 = 13$ — A1

(ii) $y = 0\ \therefore (x-2)^2 + 9 = 13$ — M1

$x = 2 \pm \sqrt{4} = 0$ (at O) or 4 $\therefore B\ (4, 0)$ — A1

(iii) grad of radius = $\frac{0-3}{4-2} = -\frac{3}{2}$ — M1

$\therefore$ grad of tangent = $\frac{-1}{-\frac{3}{2}} = \frac{2}{3}$ — M1 A1

$\therefore\ y - 0 = \frac{2}{3}(x-4)$ — M1

$3y = 2x - 8$

$2x - 3y = 8$ — A1 **(11)**

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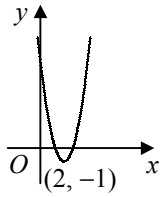
8. *(i)* $= 3[x^2 - 4x] + 11$ — M1

$= 3[(x-2)^2 - 4] + 11$ — M1

$= 3(x-2)^2 - 1$ — A2

(ii)



B3

(iii) $3(x-2)^2 - 1 = 0$

$(x-2)^2 = \frac{1}{3}$ — M1

$x = 2 \pm \frac{1}{\sqrt{3}} = 2 \pm \frac{1}{3}\sqrt{3}$ — M1 A1

$AB = (2 + \frac{1}{3}\sqrt{3}) - (2 - \frac{1}{3}\sqrt{3}) = \frac{2}{3}\sqrt{3}$ — M1 A1 **(12)**

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9. *(i)* $x^3 - 5x^2 + 7x = 0$

$x(x^2 - 5x + 7) = 0$ — M1

$x = 0$ or $x^2 - 5x + 7 = 0$

$b^2 - 4ac = (-5)^2 - (4 \times 1 \times 7) = -3$ — M1

$b^2 - 4ac < 0\ \therefore$ no real roots — A1

$\therefore$ only crosses x-axis at one point — A1

(ii) $\frac{dy}{dx} = 3x^2 - 10x + 7$ — M1 A1

grad of tangent = 27 – 30 + 7 = 4 — M1

grad of normal = $\frac{-1}{4} = -\frac{1}{4}$ — A1

$\therefore\ y - 3 = -\frac{1}{4}(x-3)$ — M1

$4y - 12 = -x + 3$

$x + 4y = 15$ — A1

(iii) $x = 0 \Rightarrow y = \frac{15}{4}$

$y = 0 \Rightarrow x = 15$ — M1

area = $\frac{1}{2} \times \frac{15}{4} \times 15 = \frac{225}{8} = 28\frac{1}{8}$ — M1 A1 **(13)**

Total **(72)**

Performance Record – C1 Paper K

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	surds	SP	cubic	diff., transform.	straight lines	indices	circle	compl. square	diff., normal	
Marks	3	5	5	6	7	10	11	12	13	72
Student										