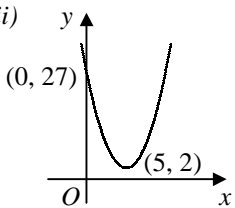
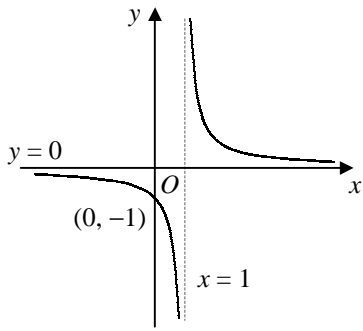


C1 Paper E – Marking Guide

1.	(i)	$= \frac{21}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} = 3\sqrt{7}$	M1 A1
	(ii)	$= \frac{1}{\sqrt[3]{8}} = \frac{1}{2}$	M1 A1 (4)
<hr/>			
2.	(i)	$= 1 - 4x$	M1 A1
	(ii)	$= -6x^{-3}$	M1 A1 (4)
<hr/>			
3.	(a)	$= (x - 5)^2 - 25 + 27$ $= (x - 5)^2 + 2$	M1 A2
	(b)	(i) (ii) 	B3 (6)
<hr/>			
4.	(i)	$y + 5 = 2(x - 4)$ $y = 2x - 13$	M1 A1
	(ii)	$3x - y = 4 \Rightarrow y = 3x - 4 \therefore \text{grad} = 3$ $\text{grad } l_2 = \frac{-1}{3} = -\frac{1}{3}$ $\therefore y - 0 = -\frac{1}{3}(x - 3) \quad [y = -\frac{1}{3}x + 1]$	M1 A1 A1
	(iii)	$2x - 13 = -\frac{1}{3}x + 1$ $x = 6$ $\therefore (6, -1)$	M1 A1 A1 (8)
<hr/>			
5.	(i)	real roots $\therefore b^2 - 4ac \geq 0$ $(-k)^2 - [4 \times 4 \times (k - 3)] \geq 0$ $k^2 - 16k + 48 \geq 0$	M1 A1
	(ii)	$(k - 4)(k - 12) \geq 0$ $k \leq 4$ or $k \geq 12$	M1 M1 A1
	(iii)	$k = 4$ $4x^2 - 4x + 1 = 0$ $(2x - 1)^2 = 0$ $x = \frac{1}{2}$	B1 M1 A1 (8)
<hr/>			
6.	(i)	$= (\frac{-2+4}{2}, \frac{6-1}{2}) = (1, \frac{5}{2})$	M1 A1
	(ii)	radius = dist. $(-2, 6)$ to $(1, \frac{5}{2}) = \sqrt{9 + \frac{49}{4}} = \sqrt{\frac{85}{4}}$ $\therefore (x - 1)^2 + (y - \frac{5}{2})^2 = (\sqrt{\frac{85}{4}})^2$ $x^2 - 2x + 1 + y^2 - 5y + \frac{25}{4} = \frac{85}{4}$ $x^2 + y^2 - 2x - 5y - 14 = 0$	M1 A1 M1 A1 A1
	(iii)	$(2, 7)$, LHS = $4 + 49 - 4 - 35 - 14 = 0 \therefore R$ lies on circle $\angle PRQ = 90^\circ$	B1 B1 (9)

7.	(i)	translation by 1 unit in the positive x -direction	B2	
	(ii)		B3	
	(iii)	$\frac{1}{x-1} = 2 + \frac{1}{x}$ $x = 2x(x-1) + (x-1)$ $2x^2 - 2x - 1 = 0$ $x = \frac{2 \pm \sqrt{4+8}}{4}$ $x = \frac{2 \pm 2\sqrt{3}}{4}$ $x = \frac{1}{2} \pm \frac{1}{2}\sqrt{3}$	M1 A1 M1 M1 A1	(10)
<hr/>				
8.	(i)	$x(x^2 + 3x - 4) = 0$ $x(x+4)(x-1) = 0$ $x = 0 \text{ (at } O), -4, 1$ $\therefore (-4, 0), (1, 0)$	M1 M1 A1	
	(ii)	$\frac{dy}{dx} = 3x^2 + 6x - 4$ $\text{grad} = -4$ $\therefore y = -4x$	M1 A1 M1 A1	
	(iii)	$x^3 + 3x^2 - 4x = -4x$ $x^3 + 3x^2 = 0$ $x^2(x+3) = 0$ $x = 0 \text{ (at } O), -3$ $\therefore (-3, 12)$	M1 M1 A1 A1	(11)
<hr/>				
9.	(i)	$\frac{dy}{dx} = 3x^{\frac{1}{2}} - 4x^{-\frac{1}{2}}$	M1 A2	
	(ii)	$3x^{\frac{1}{2}} - 4x^{-\frac{1}{2}} = 0$ $x^{-\frac{1}{2}}(3x - 4) = 0$ $x = \frac{4}{3}$	M1 M1 A1	
	(iii)	$x = 2 \therefore y = 2(2\sqrt{2}) - 8(\sqrt{2}) = -4\sqrt{2}$ $\text{grad} = 3\sqrt{2} - \frac{4}{\sqrt{2}} = 3\sqrt{2} - 2\sqrt{2} = \sqrt{2}$ $\therefore y + 4\sqrt{2} = \sqrt{2}(x - 2)$ $y = \sqrt{2}x - 6\sqrt{2}$	M1 A1 M1 A1 M1 A1	(12)
				<hr/>
				Total (72)