

Question number	Scheme	Marks
1.	$7+x=x^2-3x+2$ $x^2-4x-5=0$ $(x-5)(x+1)=0$ $x=5 \quad y=12$ $x=-1 \quad y=6$ $y=(y-7)^2-3(y-7)+2$ $y^2-18y+72=0$ $(y-6)(y-12)=0$ $y=6 \quad y=12$ $x=-1 \quad x=5$	M1 A1 M1 A1 A1 (5)
2.	(a) $\log_a b = \frac{\log_b b}{\log_b a} = \frac{1}{\log_b a}$ (b) $\log_x 8 - 6\log_8 x = 1$ $\log_x 8 - \frac{6}{\log_x 8} = 1$ $(\log_x 8)^2 - \log_x 8 - 6 = 0$ $(\log_x 8 - 3)(\log_x 8 + 2) = 0$ $\log_x 8 = 3 \Rightarrow 8 = x^3 \quad x = 2$ $(\log_x 8 = -2 \quad x \notin \mathbf{Z}^+)$ $\frac{1}{\log_8 x} - 6\log_8 x = 1$ $6(\log_8 x)^2 + \log_8 x - 1 = 0$ $(3\log_8 x - 1)(2\log_8 x + 1) = 0$ $\log_8 x = \frac{1}{3} \quad x = 8^{\frac{1}{3}} = 2$ $(\log_8 x = -\frac{1}{2}, x = 8^{-\frac{1}{2}} \notin \mathbf{Z}^+)$	M1A1 M1 M1 M1 M1A1 (7)
3.	(a) $\frac{dy}{dx} = 2e^{2x} \sin 3x + 3e^{2x} \cos 3x$ (b) $\frac{d^2 y}{dx^2} = 4e^{2x} \sin 3x + 6e^{2x} \cos 3x + 6e^{2x} \cos 3x - 9e^{2x} \sin 3x$ $\frac{d^2 y}{dx^2} = 2\frac{dy}{dx} - 9y + 6e^{2x} \cos 3x$ or $\frac{dy}{dx} = 2y + 3e^{2x} \cos 3x$ $\frac{d^2 y}{dx^2} = 2\frac{dy}{dx} - 9e^{2x} \sin 3x + 6e^{2x} \cos 3x$ $= 2\frac{dy}{dx} - 9y + 6e^{2x} \cos 3x$	M1A1A1 M1A1 M1A1 (7)