

Question			Answer	Marks	AO	Guidance
8	(a)		Curve intersects $y = 3x + 5$ when $3x + 5 = k - kx - x^2$ $x^2 + x(k + 3) + (5 - k) = 0$	M1 M1	3.1a 1.1	Attempts to solve simultaneously Collects terms. Must see $= 0$. May be implied by correct discriminant
			Tangent when equal roots so discriminant $= 0$ $(k + 3)^2 - 4(5 - k) = 0$ $k^2 + 10k - 11 = 0$ Giving $k = -11, 1$	M1 A1	1.1a 1.1	Forms discriminant of their equation and equates to zero cao
			Alternative method For curve $\frac{dy}{dx} = -k - 2x = 3$ at point of contact $3x + 5 = k - kx - x^2$ Either substitute $x = -\left(\frac{k+3}{2}\right)$ leading to $k^2 + 10k - 11 = 0$ Giving $k = -11, 1$	M1 M1 M1 A1		Uses gradient of 3 to form an equation linking k and x Forms second equation for the point of intersection oe Uses above quadratic equation and an expression for x obtained from gradient to form a quadratic in k only cao
			Or substitute $k = -(2x + 3)$ leading to $x^2 - 2x - 8 = 0$ Giving $x = -2, 4$ which gives $k = 1, -11$	M1 A1		Uses above quadratic equation and an expression for k to form a quadratic in x only, leading to values for k cao
				[4]		
8	(b)		Intersect when $-11 + 11x - x^2 = 1 - x - x^2$ $x = 1$ $(1, -1)$	M1 A1 A1	2.1 1.1 2.1	Uses their values for k and attempts to solve simultaneously Note – using any values of k will give the same point of intersection for full credit
				[3]		