Question number	Scheme	Marks
10 (a)	$6x - x^2 = -\left(x^2 - 6x\right)$ $-\left(x^2 - 6x\right) = -\left\{(x-3)^2 - 9\right\} \Rightarrow f(x) = -(x-3)^2 + 9$ $D = -1, \ E = -3 \ \text{and} \ F = 9$	M1A1A1 [3]
(b)	(i) $\ f(x)_{max} = 9$ (ii) $\qquad x = 3$	B1ft B1ft [2]
(c)	$6x - x^2 = x^2 - 4x + 8 \Rightarrow 2x^2 - 10x + 8 = 0$ $2x^2 - 10x + 8 = (2x - 2)(x - 4) \Rightarrow x = 1, \ x = 4$ $y = 5, \ y = 8$ Coordinates are $\ (1, 5)$ and $(4, 8)$	M1 M1A1 A1 [4]
(d)	$\text{Area} = \int_1^4 \left(6x - x^2\right) dx - \int_1^4 \left(x^2 - 4x + 8\right) dx = \int_1^4 \left[-2x^2 + 10x - 8\right] dx$ $= \left[\dfrac{-2x^3}{3} + \dfrac{10x^2}{2} - 8x\right]_1^4$ $= \left(\dfrac{-2 \times 4^3}{3} + \dfrac{10 \times 4^2}{2} - 8 \times 4\right) - \left(\dfrac{-2 \times 1^3}{3} + \dfrac{10 \times 1^2}{2} - 8 \times 1\right) = 9 \ (\text{units}^2)$	M1 M1 M1A1 [4]
		Total 13 marks
(a) M1	An attempt to factorise to make x^2 positive e.g. $-(x \pm a)^2 \pm b$	
A1	Complete the square to obtain an expression in the form $-(x \pm 3)^2 \pm q$ **NB** Any expression in this form will score M1A1	
A1	$D = -1, \ E = -3 \ \text{and} \ F = 9$	
(b) B1 ft	$\left(f(x)_{max} =\right) 9$ or follow through their value for *F*.	
B1 ft	$(x =) 3$ or follow through their value for *E*.	
(c) M1 M1 A1 A1	Equating the two curves and simplifying to a 3 term quadratic Solve their 3 term quadratic $x = 1, \ x = 4$ $(1, 5)$ and $(4, 8)$	
(d) M1	Use of $\int_a^b \left(f(x) - g(x)\right) dx$ or $\int_a^b f(x) dx - \int_a^b g(x) dx$ Ignore limits ($f(x)$ and $g(x)$ can be either way round)	
M1 M1 A1	Attempt the integration. Limits not needed. Substitute the correct limits. $9 \ (\text{units}^2)$	
	NB A correct answer with no working will score 4 out of 4	