Question Number	Scheme	Marks
9 (a)	$8 - 2x - x^2 = 0, \Rightarrow (4 + x)(2 - x), \Rightarrow x = 2, x = -4$	M1A1 A1 (3)
(b)	$\text{Area} = \int_{-4}^{2} 8 - 2x - x^2 \,dx = \left[8x - x^2 - \dfrac{x^3}{3} \right]_{-4}^{2}$	M1A1
	$\text{Area} = \left[8 \times 2 - 2^2 - \dfrac{2^3}{3} \right] - \left[8 \times -4 - (-4)^2 - \dfrac{(-4)^3}{3} \right] = 36$	M1A1 (4)
(c)	$8 - 2x - x^2 = x^2 + x + 6 \Rightarrow 2x^2 + 3x - 2 = 0$	
	$\Rightarrow (2x - 1)(x + 2) + 0, \Rightarrow x = \dfrac{1}{2}, -2$	M1A1 (2)
(d)	$\text{Area} = \int_{-2}^{0.5} (8 - 2x - x^2) - (x^2 + x + 6)\,dx$	
	$\text{Area} = \int_{-2}^{0.5} (2 - 3x - 2x^2)\,dx = \left[2x - \dfrac{3x^2}{2} - \dfrac{2x^3}{3} \right]_{-2}^{0.5}$	M1A1ft
	$\text{Area} = \left[2 \times 0.5 - \dfrac{3(0.5)^2}{2} - \dfrac{2(0.5)^3}{3} \right] - \left[2 \times (-2) - \dfrac{3(-2)^2}{2} - \dfrac{2(-2)^3}{3} \right] = \dfrac{125}{24}$	M1dA1 (4)
		(13)

Notes

(a)

M1   for setting the equation for the curve = 0 and attempting to solve the 3TQ

A1   for correct factorisation, or completion of square or correct use of the formula

A1   for the correct values of x

(b)

M1   for an attempt at integrating $\pm$ the equation of the curve. For this mark, they do not need limits.

A1   for $\pm$ the correct integrated expression (with or without limits)

M1   for substitution of their values from (a) into their **integrated** expression

A1   for the correct area = 36   **Note:** -36 is AO but allow recovery to 36.

NOTE: Answers without calculus get 0000

(c)

M1   for equating the equations of the curves, achieving a 3TQ, and attempting to solve

A1   for both correct x coordinates

(d)

M1   for a correct expression for the area **INCLUDING** both of their limits from part (c) with an attempt to integrate. This must be the difference of two expressions, either way around, or they can work with two separate integrals and subtract at the end.

A1ft   for a fully correct integrated expression for the area, including their limits from (c). Need not be simplified. Ft their limits from (c).

M1d   for substituting their limits the correct way around

A1   for the correct area of $\dfrac{125}{24}$, or 5.208. Accept awrt 5.21. This must be positive, but allow recovery if they subtract the other way around to give a negative, but write their final answer as a positive.

Do not isw if they go on to further processing, for example $36 - \dfrac{125}{24} = \dfrac{739}{24}$ written after $\dfrac{125}{24}$ is found as the answer to their subtracted integrals.