Question number	Scheme	Marks
8 (a)	$y=15-7x, = x^2-6x+9$	M1
	$x^2+x-6=0$	A1
	$(x+3)(x-2)=0$	dM1
	$x=-3 \quad y=36 \qquad (-3,36)$	A1
	$x=2 \quad y=1 \qquad (2,1)$	A1 [5]
(b)	Area $=\int_{-3}^{2}\left((15-7x)-\left(x^2-6x+9\right)\right)\mathrm{d}x=\int_{-3}^{2}\left(-x^2-x+6\right)\mathrm{d}x$	M1
	$=\left[-\frac{1}{3}x^3-\frac{1}{2}x^2+6x\right]_{-3}^{2}$	M1A1
	$=-\frac{1}{3}\times 2^3-\frac{1}{2}\times 2^2+12-\left(\frac{27}{3}-\frac{1}{2}\times 9-18\right)$	M1
	$=20\frac{5}{6}$	A1 [5]
		Total 10 marks

Notes		
(a)	M1	Sets the equation of $l =$ the equation of C and attempts to form a 3TQ
	A1	Correct 3TQ $x^2 + x - 6 = 0$
	dM1	For any acceptable attempt to solve their 3TQ (please see general guidance for the definition of an attempt using either factorisation, formula or completing the square. This mark is dependent on the first M mark. Their 3TQ must have come from an attempt to equate and rearrange the equations of the line and the curve.
	A1	For either $(-3, 36)$ or $(2, 1)$ Accept $x = 1, y = 1$ or $x = -3, y = 36$
	A1	For **both** $(-3, 36)$ and $(2, 1)$ Accept $x = 1, y = 1$ and $x = -3, y = 36$
Method 1 Line – Curve combined		
(b)	M1	For the correct method to find the area using integration. ft their limits which must be the correct way around for this mark. Follow through their combined equation from part (a) $\text{Area} = \int_{'-3'}^{'2'} (\text{equation of line} - \text{equation of curve})\ \mathrm{d}x$ Accept $\text{Area} = \int_{'-3'}^{'2'} (\text{equation of curve} - \text{equation of line})\ \mathrm{d}x$
	M1	For an attempt to integrate the combined expression even if there are errors when combined. Ignore limits for this mark. Please see General Guidance for the definition of an attempt.
	A1	For the correct integrated expression either way (line – curve or curve – line) Ignore limits for this mark. $I = \pm\left(-\frac{1}{3}x^3 - \frac{1}{2}x^2 + 6x\right)$
	M1	For substituting in the limits '2 'and '—3' the correct way around into their combined integrated expression. ft through their values given in their initial statement.
	A1	For $20\frac{5}{6}$ or $\frac{125}{6}$ only. — If they find a negative value (from curve – line) allow only of they give a final positive value for the area.
Method 2 Line – Curve separately		
(b)	M1	For the correct method to find the area using integration. ft their limits which must be the correct way around for this mark and must be the same for the curve and the line. $\text{Area} = \int_{'-3'}^{'2'} \text{equation of line}\ \mathrm{d}x - \int_{'-3'}^{'2'} \text{equation of curve}\ \mathrm{d}x$ Accept for this mark $\text{Area} = \int_{'-3'}^{'2'} \text{equation of curve}\ \mathrm{d}x - \int_{'-3'}^{'2'} \text{equation of line}\ \mathrm{d}x$
	M1	For an attempt to integrate the expression for the curve **and** the line Ignore limits for this mark. Please see General Guidance for the definition of an attempt.
	A1	For correct integrals of the line **and** the curve. $\mathrm{I}_l = \int 15 - 7x\ \mathrm{d}x = 15x - \frac{7}{2}x^2, \quad \mathrm{I}_C = \int x^2 - 6x + 9\ \mathrm{d}x = \frac{x^3}{3} - 3x^2 + 9x$
	M1	For substituting in the limits '2' and '—3' the correct way around individually into **both**, and attempting to evaluate the area. They must find a value for the area for this mark. ft through their values given in their initial statement. If they only substitute limits into the equation of a curve OR a line, withhold this mark.
	A1	For $20\frac{5}{6}$ or $\frac{125}{6}$ only. — If they find a negative value (from curve – line) allow only if they give a final positive value for the area.
Method 3 Trapezium – curve		

(b)	M1	For the correct method to find the area using a trapezium and curve. Area = $\frac{'5'}{2}('36'+'1') - \int_{'-3'}^{'2'} \text{curve } dx$ or accept Area = $\int_{'-3'}^{'2'} \text{curve } dx - \frac{'5'}{2}('36'+'1')$	
	M1	For an attempt to integrate the given expression for the area under the curve. Ignore limits for this mark Please see General Guidance for the definition of an attempt. **Integrating the curve only without evidence of an attempt to find the area of the trapezium (or equivalent) is M0.**	
	A1	For Area of curve = $\left[\frac{x^3}{3} - 3x^2 + 9x\right]_{-3}^{2}$ **and** area of trapezium (or equivalent) of $92\frac{1}{2}$ Ignore limits for this mark.	
	M1	For substituting their limits '2' and '-3' the correct way around and combining this either way round with their trapezium to evaluate the area. They must find a value for the area for this mark. ft through their values given in their initial statement.	
	A1	For $20\frac{5}{6}$ or $\frac{125}{6}$ only.	If they find a negative value (from trapezium – line) allow only if they give a final positive value for the area.