Question Number	Scheme	Marks
8.	(a) $15+2x-x^2=0$	M1
	$(5-x)(3+x)=0 \Rightarrow x=5, x=-3$	M1 A1
	(b) $\int_{-3}^{5}(15+2x-x^2)\mathrm{d}x$	M1
	$=\left[15x+x^2-\frac{1}{3}x^3\right]_{-3}^{5}$	A1
	$=(75+25-\frac{125}{3})-(-45+9+9)$	M1
	$=85\frac{1}{3}$	A1
	(c) $x+9=15+2x-x^2$	M1
	$x^2-x-6=0 \Rightarrow (x-3)(x+2)=0 \Rightarrow x=3,\ x=-2$	M1 A1
	(d) $M=85\frac{1}{3}-\int_{-2}^{3}\left\{(15+2x-x^2)-(x+9)\right\}\mathrm{d}x$	M1
	$=85\frac{1}{3}-\int_{-2}^{3}\left\{6+x-x^2\right\}\mathrm{d}x$	
	$=85\frac{1}{3}-[6x+\frac{1}{2}x^2-\frac{1}{3}x^3]_{-2}^{3}$	A1
	$=85\frac{1}{3}-\left\{(18+4\frac{1}{2}-9)-(-12+2+\frac{8}{3})\right\}$	M1
	$=85\frac{1}{3}-20\frac{5}{6}=64\frac{1}{2}$	A1 (14)
	Alternative	
	(d) $M=\int_{-3}^{-2}(15+2x-x^2)\mathrm{d}x+\frac{1}{2}(7+12)5+\int_{3}^{5}(15+2x-x^2)\mathrm{d}x$	M1
	$=[15x+x^2-\frac{1}{3}x^3]_{-3}^{-2}+\frac{95}{2}+[15x+x^2-\frac{1}{3}x^3]_{3}^{5}$	A1
	$=(-30+4+\frac{8}{3})-(-45+9+9)+47\frac{1}{2}+(75+25-\frac{125}{3})-(45+9-9)$	M1
	$=3\frac{2}{3}+47\frac{1}{2}+13\frac{1}{3}=64\frac{1}{2}$	A1

Notes

Question 8

(a)

M1 for setting $15 + 2x - x^2 = 0$

M1 for solving the quadratic as far as x = ……

A1 for $x = 5,\ x = -3$

(b)

Ignore limits for **first** M1 and A1

M1 for an attempt at $\int_{-3}^{5} 15x + 2x - x^2 dx$ (Usual rules) ft their values of x in (a)

A1 for a fully correct integrated expression

M1 for an evaluation of their integrated expression with their limits

A1 for an area = $85\frac{1}{3}$ or $\frac{256}{3}$ or awrt 85.33 (with a **minimum** of 2dp) cso.

(c)

M1 for equating line l with curve C $(x + 9 = 15 + 2x - x^2)$

M1 for forming a 3TQ and attempting to solve as far as x =

A1 for $x = 3,\ x = -2$

(d)

M1 for forming a COMPLETE expression of the area, either from,

M = $85\frac{1}{3}$ (or their area in part (b)) $- \int_{-2}^{3} \{(15 + 2x - x^2) - (x + 9)\}\, dx$

or, $M = \int_{-3}^{-2} (15 + 2x - x^2) dx + \frac{1}{2}(7 + 12)5 + \int_{3}^{5} (15 + 2x - x^2) dx$

using their limits found in (c)

A1 for correct integration of their expression for the area

dM1 for evaluating their integrated expression for the area

A1 either, $= 85\frac{1}{3} - 20\frac{5}{6} = 64\frac{1}{2}$, or $= 3\frac{2}{3} + 47\frac{1}{2} + 13\frac{1}{3} = 64\frac{1}{2}$ oe – **exact answer only**

NOTE: If they do not form a **complete** expression for the area, then M0 A0 dM0 A0