Question Number	Scheme	Marks
7(a)	y coordinate $=12$	B1
		(1)
(b)	Gradient of $l_1 = -\frac{3}{4}$ $\Rightarrow$ Gradient of $l_2 = \frac{4}{3} \Rightarrow (y-6) = "\frac{4}{3}"(x-8)$ y coordinate $= -\frac{14}{3}$ *	B1 M1 A1* cso
		(3)
(c)	Radius $= "12" + \frac{14}{3} = \frac{50}{3}$ Length of arc $= "\frac{50}{3}" \times 1.8 = 30$	B1ft M1A1cao
		(3)
(d)	Area of sector $= \frac{1}{2} \times ("\frac{50}{3}")^2 \times 1.8 \quad (=250)$ $"250" + \frac{1}{2} \times "\frac{50}{3}" \times 8 = "250" + "\frac{200}{3}"$ $= \frac{950}{3}$ (units^2)	M1 M1 A1cao
		(3)
		(10 marks)

Mark all parts together. May work in degrees.

(a)

B1 12 (Check by the question and also on the diagram). If there is a contradiction then their answer in the main solution takes precedence.

(b)

B1 States gradient of l_1 is $-\frac{3}{4}$ but can be implied by further work. Eg sight of a gradient of $\frac{4}{3}$ in their equation for l_2 can also score this mark.
The value must be identified or used so it cannot just be awarded from a rearranged equation for l_1. Circling the coefficient is acceptable but stating $-\frac{3}{4}x$ with no further work is B0.

M1 Attempts to find the gradient of the perpendicular line $"-\frac{3}{4}" \rightarrow \frac{4}{3}$ and attempts to find the equation of l_2. Look for $(y-6)="\frac{4}{3}"(x-8)$ with both of the brackets correct. If they attempt using $y=mx+c$ then they must proceed as far as $c=...$

A1* $-\frac{14}{3}$ cso must be clearly stated as the y coordinate with no errors seen after achieving a correct equation for l_2.

(c)

B1ft Finds the radius of the circle following through on their answer to (a). $"12"+\frac{14}{3}$ is acceptable for this mark or it may be implied by their length of the arc. May be seen on the diagram or in other parts.

M1 Attempts to find the length of the arc with $\theta=1.8$ and their $r="12"+\frac{14}{3}$

A1 30 cao

(d)

M1 Attempts to find the area of the sector with $\theta=1.8$ and their $r="12"+\frac{14}{3}$

M1 **Adds the area of their sector with a correct method to find the area of the triangle**.

There are various ways to find the area of the triangle. They may find the lengths *CD* and *DE* using Pythagoras and proceed to find the area of the triangle:

Eg $CD=\sqrt{6^2+8^2}=10$ and $DE=\sqrt{8^2+\left(\frac{32}{3}\right)^2}=\frac{40}{3} \Rightarrow \text{Area}=\frac{1}{2}\times 10\times\frac{40}{3}=\frac{200}{3}$

Alternatively, via the shoelace method:

Eg $\frac{1}{2}\begin{vmatrix}0 & 12\\ 8 & 6\\ 0 & -\frac{14}{3}\\ 0 & 12\end{vmatrix}=\frac{1}{2}\times\left|\left(8\times-\frac{14}{3}\right)-(12\times 8)\right|=\frac{200}{3}$

A1 $\frac{950}{3}$ cao (accept $316\frac{2}{3}$ or $316.\dot{6}$ but not 316.7)

Question Number	Scheme	Marks
8(a)	$3x^2+6x+9=3(x\pm...)^2\pm...\qquad a=3$	B1
	$3x^2+6x+9=3(x+1)^2\pm...\qquad a=3\ \&\ b=1$	M1
	$3x^2+6x+9=3(x+1)^2+6$	A1
		(3)
(b)	$(-1,\ 6)$	B1ft
		(1)
(c)	$y=\alpha(x+4)(x+2)(x-3)$	B1
	$6=\alpha(-1+4)(-1+2)(-1-3)$	M1
	$\alpha=-\frac{1}{2}$	A1
	$y="-\frac{1}{2}"(x+4)(x+2)(x-3)\Rightarrow y=...x^3+...x^2+...x+...$	M1
	$A=-\frac{1}{2},\ B=-\frac{3}{2},\ C=5,\ D=12$	A1
		(5)
Alt (c)	$-64A+16B-4C+D=0$ $-8A+4B-2C+D=0$ $27A+9B+3C+D=0$	B1
	$-A+B-C+D=6$	M1
	One of $A=-\frac{1}{2},\ B=-\frac{3}{2},\ C=5,\ D=12$	A1
	Fully solves their simultaneous equations	M1
	$A=-\frac{1}{2},\ B=-\frac{3}{2},\ C=5,\ D=12$	A1
		(9 marks)

(a)