Question Number	Scheme	Marks
6(a)	$\mathrm{f}'(8)=\dfrac{32}{3\times 8^2}+3-2\sqrt[3]{8}\quad\left(=-\dfrac{5}{6}\right)$	M1
	$y-2="-\dfrac{5}{6}"(x-8)$	dM1
	$y=-\dfrac{5}{6}x+\dfrac{26}{3}$	A1
		(3)
(b)	$\mathrm{f}'(x)=\dfrac{32}{3x^2}+3-2\sqrt[3]{x}=...x^{-2}+3+...x^{\frac{1}{3}}$	
	$x^{-2}\to x^{-1},\ 3\to 3x,\ x^{\frac{1}{3}}\to x^{\frac{4}{3}}$	M1
	$\mathrm{f}(x)=\int\dfrac{32}{3}x^{-2}+3-2x^{\frac{1}{3}}\mathrm{d}x=-\dfrac{32}{3}x^{-1}+3x-\dfrac{3}{2}x^{\frac{4}{3}}+c$	A1A1
	$2=-\dfrac{32}{3}\times 8^{-1}+3\times 8-\dfrac{3}{2}\times 8^{\frac{4}{3}}+c\Rightarrow c=...$	dM1
	$\left(\mathrm{f}(x)=\right)\ -\dfrac{32}{3}x^{-1}+3x-\dfrac{3}{2}x^{\frac{4}{3}}+\dfrac{10}{3}$	A1
		(5)
		(8 marks)

Ignore labelling of parts (a) and (b)

(a)

M1 Substitutes $x=8$ to find a value for $\mathrm{f}'(8)$. Condone slips in their substitution and $-\dfrac{5}{6}$ seen will imply this mark.

dM1 It is for the method of finding a line passing though $(8,2)$ using their value for $\mathrm{f}'(8)$. Score for $(y-2)="-\dfrac{5}{6}"(x-8)$ with both brackets correct. If they use $y=mx+c$ they must proceed as far as $c=\ldots$ It is dependent on the previous method mark.

A1 $y=-\dfrac{5}{6}x+\dfrac{26}{3}$

(b)

M1 Integrates by raising the power on one of the terms (ie $x^{-2} \to x^{-1}, 3 \to 3x, x^{\frac{1}{3}} \to x^{\frac{4}{3}}$)

A1 Two terms correct of $-\frac{32}{3}x^{-1}$, $+3x$ or $-\frac{3}{2}x^{\frac{4}{3}}$ seen (or unsimplified equivalents). The indices must be processed.

A1 $-\frac{32}{3}x^{-1}+3x-\frac{3}{2}x^{\frac{4}{3}}(+c)$ seen or unsimplified equivalent. Condone the lack of $+c$ for this mark. $-10.7x^{-1}$ is not a correct term but allow $-10.\dot{6}x^{-1}$.

dM1 Substitutes $x=8, y=2$ into their f(x) and proceeds to find c. It is dependent on the previous method mark and condone slips in their rearrangement to find c.

A1 $(\text{f}(x)=)\ -\frac{32}{3}x^{-1}+3x-\frac{3}{2}x^{\frac{4}{3}}+\frac{10}{3}$ or simplified equivalent. isw after a correct answer

Eg $-\frac{32}{3x}+3x-\frac{3}{2}x^{\frac{4}{3}}+\frac{10}{3}$ or $-\frac{10.\dot{6}}{x}+3x-1.5x^{\frac{4}{3}}+3.\dot{3}$ but do not accept rounded decimals for the coefficients.

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)