3 (i)	$\frac{d}{dx}\ln\left(\sin^2 3x\right)=\frac{1}{\sin\cancel{3x}}\times 2\cancel{\sin 3x}\times 3\cos 3x=6\cot 3x$	M1 A1 **(2)**
(ii) (a)	$\frac{d}{dx}\left(3x^2-4\right)^6=36x\left(3x^2-4\right)^5$	M1 A1 **(2)**
(b)	$\int x\left(3x^2-4\right)^5 dx=\frac{1}{36}\left(3x^2-4\right)^6$	B1ft
	$\int_0^{\sqrt{2}} x\left(3x^2-4\right)^5 dx=\left[\frac{1}{36}\left(3x^2-4\right)^6\right]_0^{\sqrt{2}}=\frac{1}{36}(2)^6-\frac{1}{36}(-4)^6=-112$	M1 A1cso **(3)** **(7 marks)**

Question Number	Scheme	Marks
6 (a)	$y=(4x-7)^{\frac{1}{2}} \Rightarrow\left(\frac{dy}{dx}=\right)2(4x-7)^{-\frac{1}{2}}$ (see notes)	M1 A1
	At $(8,5)$ gradient of tangent is $2(4\times 8-7)^{-\frac{1}{2}}\left(=\frac{2}{5}\right)$	dM1
	Equation for l is $y-5=-\frac{5}{2}(x-8)$	ddM1
	$2y-10=-5x+40\Rightarrow 5x+2y-50=0$ *	A1* **(5)**
(b)	$\int (4x-7)^{\frac{1}{2}} dx=\left[\frac{(4x-7)^{\frac{3}{2}}}{6}\right]$ (see notes)	M1, A1
	Complete area $=\int_{\frac{7}{4}}^{8}(4x-7)^{\frac{1}{2}} dx=\left[\frac{(4x-7)^{\frac{3}{2}}}{6}\right]_{\frac{7}{4}}^{8}+5$	dM1
	$=\frac{155}{6}$	A1 **(4)** **(9 marks)**

5(i)	$\cos 6x=1-2\sin^2 3x\Rightarrow\sin^2 3x=\frac{1}{2}-\frac{1}{2}\cos 6x$ $\int\sin^2 3x\,dx=\int\left(\frac{1}{2}-\frac{1}{2}\cos 6x\right)dx$	M1
	$=\frac{1}{2}x-\frac{1}{12}\sin 6x(+c)$	A1
		(2)
(ii)	$\int x\left(x^2+4\right)^{\frac{3}{2}} dx=\frac{1}{5}\left(x^2+4\right)^{\frac{5}{2}}(+c)$	M1A1
		(2)
		Total 4

3(a)	$(\cos 2A \equiv)\cos A\cos A - \sin A\sin A \equiv \cos^2 A - (1-\cos^2 A)$	M1
	$\Rightarrow \cos 2A \equiv 2\cos^2 A - 1$ *	A1*
		(2)
(b)	$\int (3-2\cos 6x)\,dx = 3x - \frac{\sin 6x}{3}$ $(+c)$	M1A1
	$\left[3x - \frac{\sin 6x}{3}\right]_{\frac{\pi}{12}}^{\frac{\pi}{8}} = \left(3\left(\frac{\pi}{8}\right) - \frac{\sin\left(6\times\frac{\pi}{8}\right)}{3}\right) - \left(3\left(\frac{\pi}{12}\right) - \frac{\sin\left(6\times\frac{\pi}{12}\right)}{3}\right) = \frac{1}{8}\pi + \frac{2-\sqrt{2}}{6}$	dM1A1
		(4)
		(6 marks)

4(a)	Any correct constant, so for $A=2$ or $B=3$ or $C=-1$ or $D=5$	B1
	$2x^4+15x^3+35x^2+21x-4 = Ax^2(x+3)^2 + Bx(x+3)^2 + C(x+3)^2 + D$ $\Rightarrow A=\ldots, B=\ldots, C=\ldots, D=\ldots$ or $2x^4+15x^3+35x^2+21x-4 \div (x^2+6x+9) = \ldots x^2 + \ldots x + \ldots + \frac{\ldots}{(x+3)^2}$	M1
	2 correct of $A=2, B=3, C=-1, D=5$	A1
	$A=2, B=3, C=-1, D=5$	A1
		(4)
(b)	$\int f(x)\,dx = \int \left(2x^2+3x-1+\frac{5}{(x+3)^2}\right)dx = \frac{2x^3}{3} + \frac{3x^2}{2} - x - \frac{5}{x+3}(+c)$	M1A1ftA1
		(3)
		Total 7

2	$g(x) = \frac{2x^2-5x+8}{x-2}$	
(a)	Sets $2x^2-5x+8 = (Ax+B)(x-2)+C$ with an attempt at one constant	M1
	Attempts all 3 constants. E.g. Sets $x=2 \Rightarrow C=\ldots, -2B+C=8 \Rightarrow B=\ldots$	dM1
	and compares x^2 terms gives $A=\ldots$ $2x-1+\frac{6}{x-2}$	A1
		(3)
(b)	$\int 2x-1+\frac{6}{x-2}\,dx = x^2-x+6\ln(x-2)$	M1 A1ft
	$\int_4^8 2x-1+\frac{6}{x-2}\,dx = \left[x^2-x+6\ln(x-2)\right]_4^8 = 56+6\ln 6-12-6\ln 2$ $= 44+6\ln 3$	dM1 A1
		(4)
		(7 marks)