(b)	$f(x)=\frac{7x}{(x-3)} \Rightarrow f'(x)=\frac{(x-3)\times 7-7x\times 1}{(x-3)^2}$	M1
	$f(x)=\frac{7x}{(x-3)} \Rightarrow f'(x)=-\frac{21}{(x-3)^2}$	A1
		(2)
(b) ALT	$f(x)=\frac{7x}{(x-3)}=7+\frac{21}{x-3} \Rightarrow f'(x)=-\frac{21}{(x-3)^2}$	M1A1
		Total 5

(b)

M1: Attempts to differentiate using the quotient rule or product rule.

For the quotient rule it requires achieving $f'(x)=\frac{\alpha(x-3)-\beta x}{(x-3)^2}$ $\alpha,\beta>0$

If they use a substitution then similar conditions apply e.g. $u=x-3 \Rightarrow f'(u)=\frac{\alpha u-\beta(u+3)}{u^2}$ $\alpha,\beta>0$

For the product rule it requires achieving $f'(x)=A(x-3)^{-1}-Bx(x-3)^{-2}$ $A,B>0$

If they use a substitution then similar conditions apply e.g. $u=x-3 \Rightarrow f'(u)=Au^{-1}-B(u+3)u^{-2}$ $A,B>0$

A1: Correct simplified expression. Allow simplified equivalents e.g. $-21(x-3)^{-2}$

Allow $-\frac{21}{x^2-6x+9}$ or e.g. $-21(x^2-6x+9)^{-1}$

Isw once a correct simplified answer is seen.

Alternative:

M1: Expresses $\frac{7x}{(x-3)}$ as $\alpha+\frac{\beta}{(x-3)}$ and differentiates to obtain $\frac{\ldots}{(x-3)^2}$ or e.g. $\alpha+\frac{\beta}{u}$ where $u = x - 3$

and differentiates to obtain $\frac{\ldots}{u^2}$

A1: Correct simplified expression. Allow simplified equivalents e.g. $-21(x-3)^{-2}$

Allow $-\frac{21}{x^2-6x+9}$ or e.g. $-21(x^2-6x+9)^{-1}$

Isw once a correct simplified answer is seen.

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

Notes:

(i)

M1: Uses $\cos 6x = \pm 1 \pm 2\sin^2 3x$ in an attempt to obtain an integrable form.

An alternative would be to change $\int \sin^2 3x\,\mathrm{d}x$ to $\int\left(1-\cos^2 3x\right)\mathrm{d}x$ and then use $\cos 6x = \pm 2\cos^2 3x \pm 1$ in an attempt to obtain an integrable form.

May be implied by an answer of $\alpha x + \beta \sin 6x\,(+c)$

A1: Correct integration. Condone the omission of "+ *c*"

Condone spurious notation e.g. $\int \sin^2 3x\,\mathrm{d}x == \frac{1}{2}x-\frac{1}{12}\sin 6x\,\mathrm{d}x$

(ii)

M1: Obtains $\int x\left(x^2+4\right)^{\frac{3}{2}}\mathrm{d}x = k\left(x^2+4\right)^{\frac{5}{2}}(+c)$

May be implied by e.g. $\int x\left(x^2+4\right)^{\frac{3}{2}}\mathrm{d}x = \frac{2}{5}x\left(x^2+4\right)^{\frac{5}{2}} \times \frac{1}{2x}(+c)$

Note this may also be implied by an attempt at substitution e.g.

$u = x^2+4 \Rightarrow \int x\left(x^2+4\right)^{\frac{3}{2}}\mathrm{d}x = \int x\left(x^2+4\right)^{\frac{3}{2}}\frac{\mathrm{d}x}{\mathrm{d}u}\mathrm{d}u = \int x u^{\frac{3}{2}}\frac{1}{2x}\mathrm{d}u = \frac{1}{5}u^{\frac{5}{2}}+c$

Score M1 for a complete method leading to $ku^{\frac{5}{2}}(+c)$

A1: Correct integration. Condone the omission of "+ *c*"

Allow equivalent correct expressions but do not allow $\frac{x\left(x^2+4\right)^{\frac{5}{2}}}{5x}$ without the *x*'s cancelled.

Condone spurious notation e.g. $\int x\left(x^2+4\right)^{\frac{3}{2}}\mathrm{d}x = \frac{1}{5}\left(x^2+4\right)^{\frac{5}{2}}\mathrm{d}x$