

Q	Marking instructions	AO	Marks	Typical solution
8	Obtains $5x^4$ PI by $\frac{1}{5}(u-2)^{-\frac{4}{5}}$	1.1b	B1	$u = x^5 + 2$ $\frac{du}{dx} = 5x^4$
	Substitutes for denominator and dx operator PI by fully correct substitution Condone any limits or missing integral sign or du Condone dx in place du	1.1a	M1	$\int \frac{x^9}{u^3} \frac{1}{5x^4} du$ $\frac{1}{5} \int_2^3 \frac{u-2}{u^3} du$ $= \frac{1}{5} \int_2^3 u^{-2} - 2u^{-3} du$
	Substitutes $x^5 = u - 2$ or $x = (u - 2)^{\frac{1}{5}}$ in at least one place	1.1a	M1	$\frac{1}{5} [-u^{-1} + u^{-2}]_2^3$
	Obtains $\frac{1}{5} \int \frac{u-2}{u^3} du$ Condone missing or incorrect $\frac{1}{5}$ or any limits Must have du	1.1b	A1	$= \frac{1}{5} \left(\left(\frac{1}{9} - \frac{1}{3} \right) - \left(\frac{1}{4} - \frac{1}{2} \right) \right)$ $= \frac{1}{180}$
	Integrates u^{-2} or u^{-3} correctly	1.1a	M1	
	Obtains $\frac{1}{5} [-u^{-1} + u^{-2}]$ Condone any limits	1.1b	A1	
	Completes reasoned argument by substituting correct limits consistent with their variable to show the given result AG R1 could be scored if du is missing throughout	2.1	R1	
Question 8 Total			7	