

Integration by Substitution Writing Frame

What I'm asked to integrate...

1) The substitution

$u =$	\longrightarrow	$x =$
\downarrow		
$\frac{du}{dx} =$		
\downarrow		
$\frac{dx}{du} =$		

2) Rewrite the question. If any x terms cancel then do so, otherwise include substitutions for all x variables. Decide if you will convert the x limits into u limits or integrate without limits and re-substitute for x .

3) Do the integration

4) Evaluate the integral between the limits

Integration by Substitution Writing Frame

What I'm asked to integrate...

$$\int_1^4 (2x - 3)^2 dx$$

1) The substitution

$$u = 2x - 3 \longrightarrow x = \frac{u + 3}{2}$$

$$\frac{du}{dx} = 2$$

$$\frac{dx}{du} = \frac{1}{2}$$

2) Rewrite the question. If any x terms cancel then do so, otherwise include substitutions for all x variables. Decide if you will convert the x limits into u limits or integrate without limits and re-substitute for x .

$$\int_{2 \times 1 - 3}^{2 \times 4 - 3} u^2 \frac{dx}{du} du$$

or

$$\int u^2 \frac{dx}{du} du$$

$$\int_{-1}^5 u^2 \times \frac{1}{2} du$$

$$\int u^2 \times \frac{1}{2} du$$

$$\int_{-1}^5 \frac{u^2}{2} du$$

$$\int \frac{u^2}{2} du$$

3) Do the integration

$$\int_{-1}^5 \frac{u^2}{2} du$$

or

$$\int \frac{u^2}{2} du$$

$$\left[\frac{u^3}{6} \right]_{-1}^5$$

$$\left[\frac{u^3}{6} \right]$$

4) Evaluate the integral between the limits

$$\frac{5^3}{6} - \frac{(-1)^3}{6}$$

or

$$\left[\frac{(2x - 3)^3}{6} \right]_1^4$$

$$\frac{125}{6} + \frac{1}{6} = \frac{126}{6} = \frac{63}{3} = 21$$

$$\left(\frac{(2 \times 4 - 3)^3}{6} \right) - \left(\frac{(2 \times 1 - 3)^3}{6} \right)$$

$$\left(\frac{5^3}{6} \right) - \left(\frac{(-1)^3}{6} \right)$$

$$\frac{125}{6} + \frac{1}{6} = \frac{126}{6} = \frac{63}{3} = 21$$