Samples **Differentiation SOLUTIONS**

1. Let $u = -2x^5 - 2$, so $y = u^3$.

Now $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$.

$\dfrac{dy}{du} = 3 \times u^{3-1} = 3u^2$

$\dfrac{du}{dx} = -2 \times 5 \times x^{5-1} = -10x^4$

So, $\dfrac{dy}{dx} = 3u^2 \times \left(-10x^4\right) = 3\left(-2x^5 - 2\right)^2 \times \left(-10x^4\right) = -30x^4\left(-2x^5 - 2\right)^2$.

Hence $\dfrac{dy}{dx} = -30x^4\left(-2x^5 - 2\right)^2$.

2. Let $u = -8x^4 + 7$, so $y = u^7$.

Now $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$.

$\dfrac{dy}{du} = 7 \times u^{7-1} = 7u^6$

$\dfrac{du}{dx} = -8 \times 4 \times x^{4-1} = -32x^3$

So, $\dfrac{dy}{dx} = 7u^6 \times \left(-32x^3\right) = 7\left(-8x^4 + 7\right)^6 \times \left(-32x^3\right) = -224x^3\left(-8x^4 + 7\right)^6$.

Hence $\dfrac{dy}{dx} = -224x^3\left(-8x^4 + 7\right)^6$.

3. Let $u = 4x^6 - 2$, so $y = \dfrac{1}{u^2} = u^{-2}$.

Now $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$.

$\dfrac{dy}{du} = -2 \times u^{-2-1} = -2u^{-3}$

$\dfrac{du}{dx} = 4 \times 6 \times x^{6-1} = 24x^5$

So, $\dfrac{dy}{dx} = -2u^{-3} \times 24x^5 = -2\left(4x^6 - 2\right)^{-3} \times 24x^5 = -48x^5\left(4x^6 - 2\right)^{-3} = -\dfrac{48x^5}{\left(4x^6 - 2\right)^3}$.

Hence $\dfrac{dy}{dx} = -\dfrac{48x^5}{\left(4x^6 - 2\right)^3}$.