

Worked Solutions

Pure Maths, Differential Calculus,

sheet PM_DIF_QR_01

The Quotient Rule Q.3

differentiate the function $y = \frac{3x+2}{2x-1}$

The **Quotient Rule** for differentiation states that for a function defined as:

$$y = \frac{u}{v}$$

where both u and v are differentiable functions of x , then the derivative of y with respect to x is given by:

$$\frac{dy}{dx} = \frac{v \cdot \frac{du}{dx} - u \cdot \frac{dv}{dx}}{v^2}$$

let $u = 3x + 2$ and $v = 2x - 1$

then $\frac{du}{dx} = 3$ and $\frac{dv}{dx} = 2$

substituting into the Quotient Rule equation,

$$\frac{dy}{dx} = \frac{(2x-1) \cdot 3 - (3x+2) \cdot 2}{(2x-1)^2}$$

simplifying,

$$\frac{dy}{dx} = \frac{3(2x-1) - 2(3x+2)}{(2x-1)^2}$$

$$= \frac{6x-3-6x-4}{(2x-1)^2}$$

$$= \frac{-7}{(2x-1)^2}$$

answer,

$$\frac{dy}{dx} = \frac{-7}{(2x-1)^2}$$
