

Worked Solutions

Pure Maths, Differential Calculus,

sheet PM-DIFF-PR-01

The Product Rule Q.2

find the derivative of the function $y = 2x\sin(x)$

The **Product Rule** states that if $y = u(x) \cdot v(x)$,
then:

$$\frac{dy}{dx} = \frac{du}{dx} \cdot v(x) + u(x) \cdot \frac{dv}{dx}$$

let $u(x) = 2x$, then $\frac{du}{dx} = 2$.

let $v(x) = \sin(x)$, then $\frac{dv}{dx} = \cos(x)$

substituting into the Product Rule equation:

$$\frac{dy}{dx} = 2 \cdot \sin(x) + 2x \cdot \cos(x)$$

simplifying the expression:

$$\frac{dy}{dx} = 2\sin(x) + 2x\cos(x)$$