Trigonometry Q2 (30/6/23)

Show that $\dfrac{d}{d\phi}\sin\phi = \dfrac{\pi}{180}\cos\phi$, when ϕ is measured in degrees.

Solution

If ϕ is the angle in degrees, and θ is the angle in radians, so that $\phi = \left(\frac{180}{\pi}\right)\theta$, then

$$\frac{d}{d\phi}\sin_{deg}\phi = \frac{d}{d\phi}\sin_{rad}\theta = \left[\frac{d}{d\theta}\sin_{rad}\theta\right]\frac{d\theta}{d\phi} = (\cos_{rad}\theta)\left(\frac{\pi}{180}\right)$$

$$= (\cos_{deg}\phi)\left(\frac{\pi}{180}\right)$$