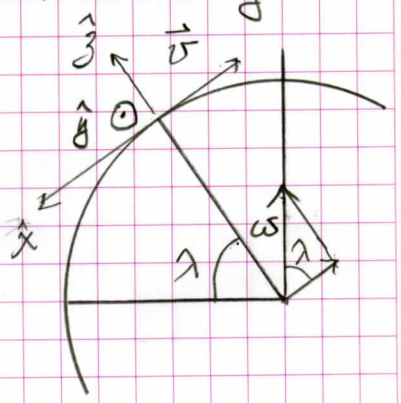
TM5 Pr 10.19

FIND THE CORIOLIS FORCE ON A CAR OF $m = 1300\,kg$ DRIVING NORTH AT 100 km/h AND 65°N.



WRITE $\vec{v}$ & $\vec{\omega}$ IN

$$\vec{v} = -v_0\hat{x} + 0\hat{y} + 0\hat{z}$$

$$\vec{\omega} = -\omega\cos\lambda\,\hat{x} + 0\hat{y} + \omega\sin\lambda\,\hat{z}$$

FIND $F_{CORIOLIS}$

$$\vec{F}_{cor} = -2m\vec{\omega}\times\vec{v} = -2m\begin{vmatrix} \hat{x} & \hat{y} & \hat{z} \\ -\omega\cos\lambda & 0 & \omega\sin\lambda \\ -v_0 & 0 & 0 \end{vmatrix}$$

$$\vec{F}_{cor} = 2m\left[-\left(0 + \omega v_0\sin\lambda\right)\right]\hat{y} = +2m\omega v_0\sin\lambda\,\hat{y}$$

$$= 2(1300)(7.27\times10^{-5})\left[100\,\frac{km}{h}\left(\frac{1000\,m}{km}\right)\left(\frac{h}{3600\,s}\right)\right]\sin 65^\circ$$

$$\boxed{F_{cor} = 4.76\,N \text{ EASTWARD}}$$