

## Moment of a Force

F4-2

$$M_o = -100 \cos \theta \cdot 2 - 100 \sin \theta \cdot 5$$

[ -ve because sense of rotation is clockwise ]

$$M_o = -100 \left( \frac{4}{5} \right) \cdot 2 - 100 \left( \frac{3}{5} \right) \cdot 5 = -460 \text{ Nm}$$

Vector formulation

$$\vec{F} = 80\mathbf{i} - 60\mathbf{j}$$

$$\vec{r} = 5\mathbf{i} + 2\mathbf{j}$$

$$M_o = \vec{F} \times \vec{r} = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ 80 & -60 & 0 \\ 5 & 2 & 0 \end{vmatrix}$$

$$= 0\mathbf{i} - 0\mathbf{j} + (80 \cdot 2 + 60 \cdot 5)\mathbf{k}$$

$$= 460\mathbf{k}$$

using right hand rule, rotation is in clockwise sense (fingers) and thumb is pointing into the page.