

28. $l = ?$ $m = 2 \text{ kg}$ $r = (3\hat{i} - 4\hat{j}) \text{ m}$
 $v = 30 \text{ m/s} \hat{i} + 60 \text{ m/s} \hat{j}$

$$l = \vec{r} \times \vec{p}$$

$$= \cancel{(r)(mv) \sin \phi}$$

$$= m(\vec{r} \times \vec{v})$$

$$= 2 \left[(3)(60) \hat{k} + (4)(30) \hat{k} \right]$$

$$l = 600 \text{ kgm}^2/\text{s} \hat{k}$$

b) $l = ?$ (around $x = -2 \text{ m}$ $y = -2 \text{ m}$)

$$l = \vec{r} \times \vec{p}$$

$$= m(\vec{r} \times \vec{v})$$

$$\vec{r} = 5 \text{ m} \hat{i} - 2 \text{ m} \hat{j}$$

$$\vec{v} = 30 \text{ m/s} \hat{i} + 60 \text{ m/s} \hat{j}$$

$$l = 2 \left((5)(60) \hat{k} + (2)(30) \hat{k} \right)$$

$$l = 720 \text{ kgm}^2/\text{s} \hat{k}$$

32. $\frac{dL}{dt} = ?$ $\tau_1 = 2 \text{ Nm} \hat{i}$
 $\tau_2 = -4 \text{ Nm} \hat{j}$

$$\frac{dL}{dt} = \Sigma \tau = 2 \text{ Nm} \hat{i} - 4 \text{ Nm} \hat{j}$$

$$\frac{dL}{dt} = 2 \text{ kgm}^2/\text{s} \hat{i} - 4 \text{ kgm}^2/\text{s} \hat{j}$$