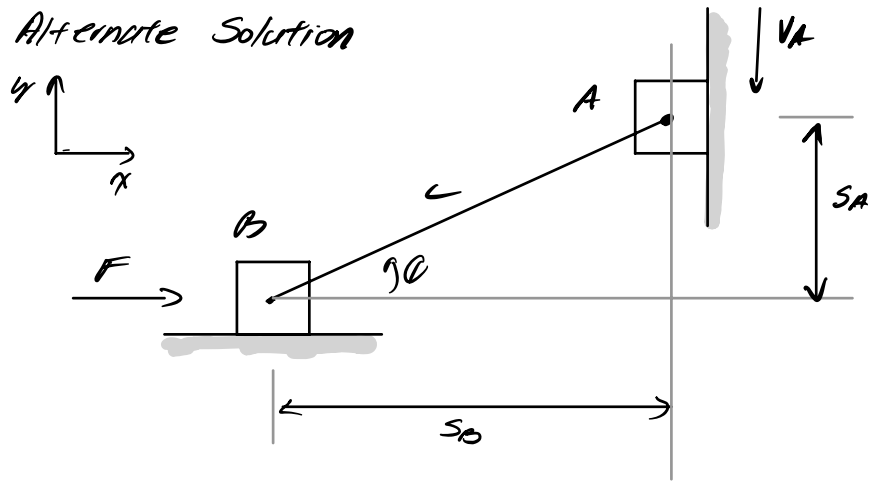
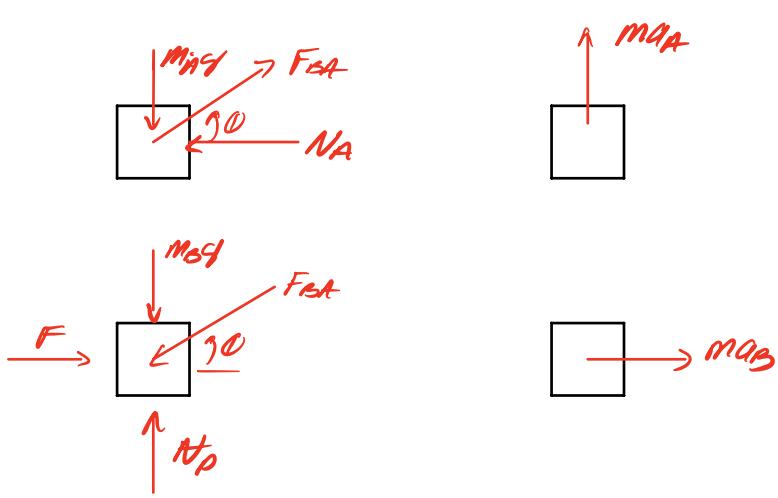
Alternate Solution



$\sin\theta = s_A/L$

$\cos\theta = s_B/L$



(A) $\xrightarrow{+} \Sigma F_x$: $F_{BA}\cos\theta - N_A = 0$

$\uparrow \Sigma F_y$: $-m_A g + F_{BA}\sin\theta = m a_A$

unknowns

N_A, N_B, F_{BA}
a_A, a_B

(B) $\xrightarrow{+} \Sigma F_x$: $-F_{BA}\cos\theta + F = m a_B$

$\uparrow \Sigma F_y$: $N_B - m_B g - F_{BA}\sin\theta = 0$

$\vec{a}_A = \vec{a}_B + \vec{\alpha} \times \vec{r}_{A/B} - \omega^2 \vec{r}_{A/B}$

$a_A \hat{j} = a_B \hat{i} + \alpha \hat{k} \times (L\cos\theta\,\hat{i} + L\sin\theta\,\hat{j}) - \omega^2 L(\cos\theta\,\hat{i} + \sin\theta\,\hat{j})$

$a_A \hat{j} = a_B \hat{i} + \alpha L\cos\theta\,\hat{j} - \alpha L\sin\theta\,\hat{i} - \omega^2 L\cos\theta\,\hat{i} - \omega^2 L\sin\theta\,\hat{j}$

$\hat{i}$ $\quad 0 = a_B - \alpha L\sin\theta - \omega^2 L\cos\theta$

$\hat{j}$ $\quad a_A = \alpha L\cos\theta - \omega^2 \sin\theta$

unknowns
a_B, a_A, α, ω

$$\vec{v}_A = \vec{v}_B + \vec{\omega} \times \vec{r}_{A/B}$$

$$-v_A \hat{j} = v_B \hat{i} + \omega \hat{k} \times (L\cos\theta \hat{i} + L\sin\theta \hat{j})$$

$$-v_A \hat{j} = v_B \hat{i} + \omega L\cos\theta \hat{j} - \omega L\sin\theta \hat{i}$$

$$\left.\begin{aligned} \hat{i}:\ & 0 = v_B - \omega L\sin\theta \\ \hat{j}\ & -v_A = \omega L\cos\theta \end{aligned}\right\} \text{ unknowns } v_B, \omega$$

In summary

1) $F_{BA}\cos\theta - N_A = 0$

2) $-m_A g + F_{BA}\sin\theta = m a_A$

3) $-F_{BA}\cos\theta + F = m a_B$

4) $N_B - m_B g - F_{BA}\sin\theta = 0$

5) $0 = a_B + \alpha L\sin\theta + \omega^2 L\cos\theta$

6) $a_A = -\alpha L\cos\theta + \omega^2 L\sin\theta$

7) $0 = v_B - \omega L\sin\theta$

8) $-v_A = +\omega L\cos\theta$

unknowns F_{BA}, N_A, N_B, a_A, a_B, v_A, α, ω

8 unknowns