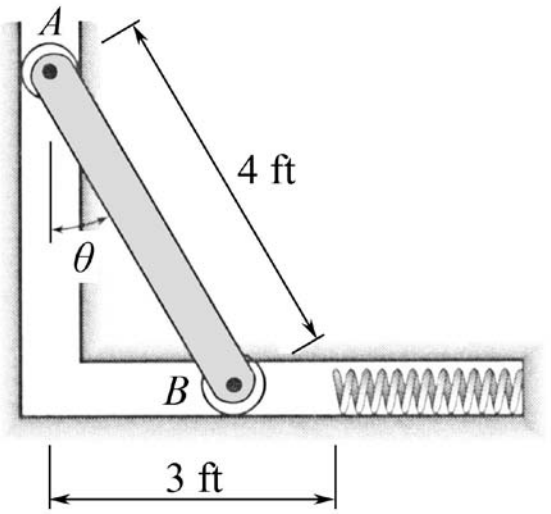
MEEG 2013 Quiz #7.m25.102

1. ② Define (*a*) *work of a moment* on a body, (*b*) *kinetic energy of a rigid body* in plane motion.

2. ⑧ The 25-lb rod *AB* is released from rest when θ is essentially equal to zero. If the modulus of the spring is k = 70 lb/ft, determine $\mathbf{v}_B$ of the end *B* when (*a*) $\theta = 30°$, (*b*) $\theta = 70°$.



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1. (*a*) *Work of a moment* on a body is equal to the moment on the body times the angular displacement of the body in the direction of the moment. ① (*b*) *Kinetic energy of a rigid body* in plane motion is equal to one half of the mass moment of inertia of the body about the velocity center of the body times the square of the angular speed of the body. ①

2.

$$T_1 + V_1 = T_2 + V_2$$

(*a*) $$0 + 25(2) = \frac{1}{2}\left[\frac{1}{12}\left(\frac{25}{32.2}\right)(4)^2 + \frac{25}{32.2}(2)^2\right]\left(\frac{v_B}{4\cos 30°}\right)^2 + 25(2\cos 30°)$$ ③

$$v_B = 6.231 \qquad \mathbf{v}_B = 6.23 \text{ ft/s} \rightarrow$$ ①

(*b*) $$0 + 25(2) = \frac{1}{2}\left[\frac{1}{12}\left(\frac{25}{32.2}\right)(4)^2 + \frac{25}{32.2}(2)^2\right]\left(\frac{v_B}{4\cos 70°}\right)^2 + 25(2\cos 70°)$$

$$+ \frac{1}{2}(70)(4\sin 70° - 3)^2$$ ③

$$v_B = 3.3948 \qquad \mathbf{v}_B = 3.39 \text{ ft/s} \rightarrow$$ ①