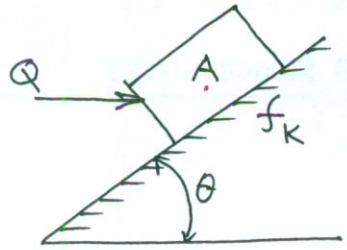
1114/P. 326



$W_A = 50$ lb
$\theta = 30^\circ$
$f_K = 0.1$
$Q = 40$ lb

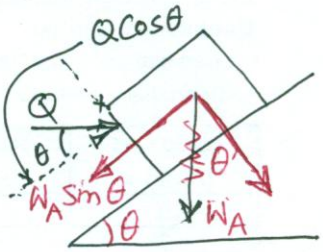
$v_0 = 0$
$v_f = ?$ after $t = 4$ s.

Note: Direction of motion is not stated. But we need it to apply Newton's 2nd law. We can assume a direction and then interpret the results (from sign). In this problem we can find it beforehand.

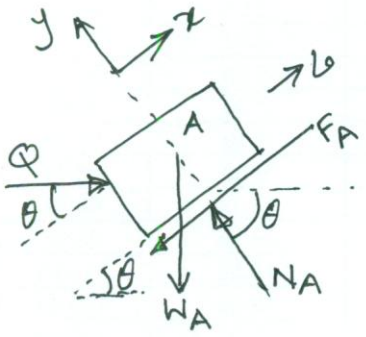
Sol^n

$Q\cos\theta = 40\cos 30^\circ = 34.64$ lb

$W_A \sin\theta = 50 \sin 30^\circ = 25$ lb



Since $Q\cos\theta > W_A \sin\theta$, the body moves upward



From the freebody diagram of A

Taking $\Sigma F_y = 0$ ↑ +ve

$$-Q\sin\theta - W_A\cos\theta + N_A = 0$$

$$\Rightarrow -40\sin 30^\circ - 50\cos 30^\circ + N_A = 0$$

$$\therefore N_A = 63.30 \text{ lb}$$

$$\therefore F_A = N_A \cdot f_k = 63.3 \times 0.1 = 6.33 \text{ lb}$$

Now applying $\Sigma F_x = ma$, +ve x direct^n +ve

$$Q\cos\theta - W_A\sin\theta - F_A = \frac{W_A}{g}\cdot a$$

$$\Rightarrow 40\cos 30^\circ - 50\sin 30^\circ - 6.33 = \frac{50}{32.2} \times a$$

$$\therefore a = 2.132 \text{ fps}^2$$

$$v_f = v_0 + at = 0 + 2.132 \times 4 = \boxed{8.53 \text{ fps}}$$ Ans.