

Work Energy II - Problem 3

The two crates are released from rest. Their masses are  $m_A = 40 \text{ kg}$  and  $m_B = 30 \text{ kg}$ , and the kinetic coefficient of friction between crate A and the inclined surface is  $\mu_k = 0.15$ . What is the magnitude of the velocity of the crates when they have moved 400 mm?

CLASSIFY MOTION

BOTH CRATES TRANS

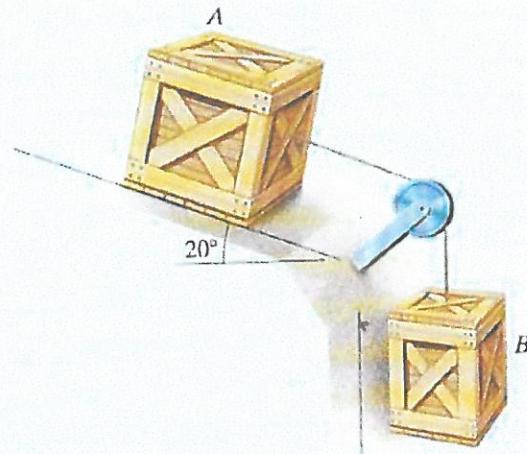
PROPERTIES

$$m_A = 40 \text{ kg}$$

$$W_A = 392 \text{ N}$$

$$m_B = 30 \text{ kg}$$

$$W_B = 294 \text{ N}$$



WHAT DOES WORK?

WEIGHT OF BOTH CRATES

FRICITION ON CRATE A

$$U_{WA} = W_A * \Delta y = 392 (0.4 \sin 20) = 53.6 \text{ J}$$

$$U_{WB} = W_B * \Delta y = 294 (0.4) = 117.6 \text{ J}$$

$$U_{FR} = -M_k N d = -0.15 (392 \cos 20) (0.4) = -22.1 \text{ J}$$

$$U_{1-2} = 53.6 + 117.6 - 22.1 = 149.1 \text{ J}$$

WORK-ENERGY  $(@ REST, \therefore T_1 = 0)$

$$T_1 + U_{1-2} = T_2$$

$$149.1 = \frac{1}{2} (40) V_A^2 + \frac{1}{2} (30) V_B^2 \quad \text{BUT } V_A = V_B = V$$

$$V = 2.07 \text{ mps}$$