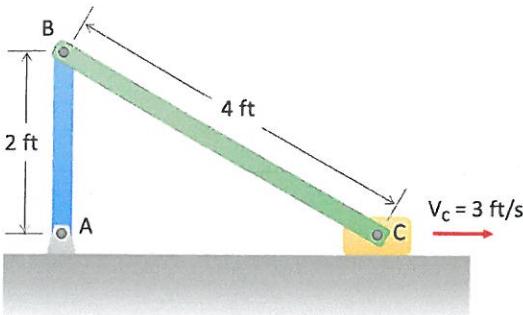


Work Energy I - Problem 3

The mechanism consists of two rods, AB and BC , which weigh 10 lb and 20 lb, respectively, and a 4-lb block at C . Determine the kinetic energy of the system at the instant shown, when the block is moving at 3 ft/s.



LINK \underline{AB} (RAFA)

$$T_{AB} = \frac{1}{2} m V^2 + \frac{1}{2} I_G \omega^2 = \frac{1}{2} \left(\underbrace{\frac{1}{3} \left(\frac{10}{32.2} \right) (2)}_{I_G} \right) (1.5)^2$$

$$\underline{T_{AB} = 0.466 \text{ Ft-lbs}}$$

LINK \underline{BC} (NO ICZV) ∴ NO ROTATION

$$T_{BC} = \frac{1}{2} m V^2 + \frac{1}{2} I_G \cancel{\omega^2} = \frac{1}{2} \left(\frac{20}{32.2} \right) (3)^2$$

$$V_C = V_B \\ = V_{CG \text{ OF}} \\ BC$$

$$\underline{T_{BC} = 2.80 \text{ Ft-lbs}}$$

BLOCK C TRANSLATION

$$T_C = \frac{1}{2} m V^2 + \frac{1}{2} I_G \cancel{\omega^2} = \frac{1}{2} \left(\frac{4}{32.2} \right) (3)^2$$

$$\underline{T_C = 0.559 \text{ Ft-lbs}}$$

$$T_{TOTAL} = T_{AB} + T_{BC} + T_C = 0.466 + 2.80 + 0.559$$

$$\boxed{T_{TOTAL} = 3.83 \text{ Ft-lbs}}$$