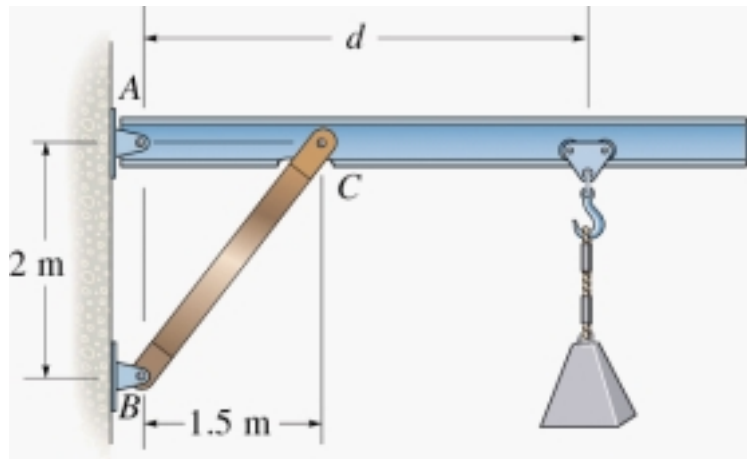


Problem 1:

The mass of 700 kg is suspended from a trolley which moves along the crane rail from $d = 1.7$ m to $d = 3.5$ m. Determine the force along the pin-connected knee strut BC and the magnitude of force at pin A as a function of position d .



Solution:

The free body diagrams for the rail and the 2-force member are shown below:

Equations of Equilibrium :

$$\left(\sum M_A = 0\right)$$

$$F_{BC} \left(\frac{4}{5}\right) (1.5) - 6867(d) = 0$$

$$\Rightarrow F_{BC} = 5722.5d$$

$$\rightarrow \sum F_x = 0$$

$$-A_x + (5722.5d) \left(\frac{3}{5}\right) = 0$$

$$\Rightarrow A_x = 3433.5d$$

$$F_{BC} = 5722.5d$$

$$A_x = 3433.5d$$

$$+\uparrow \sum F_y = 0$$

$$-A_y + (5722.5d) \left(\frac{4}{5}\right) - 6867 = 0$$

$$\Rightarrow A_y = 4578d - 6867$$

$$\Rightarrow F_A = \sqrt{(3433.5d)^2 + (4578d - 6867)^2}$$

