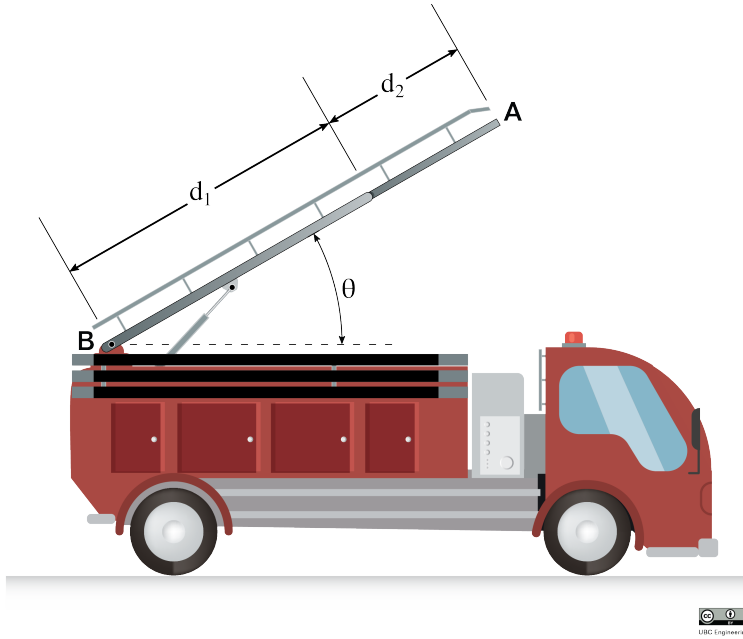


22-R-KM-TW-2



A fire truck is rescuing a person from a burning building. It needs to deploy the ladder to a height of $h = 10 \text{ m}$ above the ground. The height of the fire truck (from the ground to point B) is 4 m . The ladder starts initially from rest with $\theta = 0$ and accelerates with angular acceleration $\alpha = 0.01 \text{ rad/s}^2$. If the combined length of d_1 and d_2 is 8 m , how long will it take for the ladder to reach the person at height h ?

Solution:

$$\sin \theta = \frac{h - h_{truck}}{L}$$

$$\theta = \arcsin \left(\frac{h - h_{truck}}{L} \right) = \arcsin \left(\frac{10 - 4}{8} \right) \approx 0.848 \text{ rad}$$

$$\theta = \theta_0 + \omega_0 t + \frac{1}{2} \alpha t^2$$

$$\theta_0 = \omega_0 = 0$$

$$\Rightarrow \theta = \frac{1}{2} \alpha t^2$$

$$t = \sqrt{\frac{2\theta}{\alpha}} = \sqrt{\frac{2(0.848)}{0.01}} = 13.0 \text{ s}$$