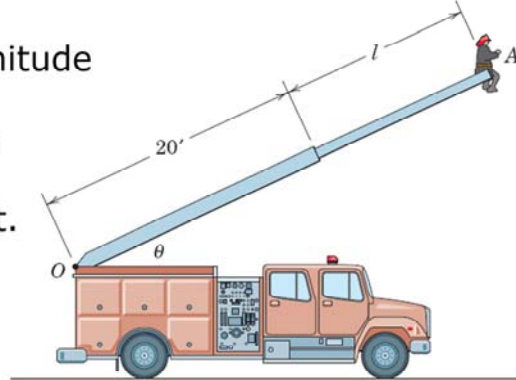


Acceleration: Exercise

A fire truck ladder extends at a constant rate of 6 in/s and elevates at a constant rate of 2 °/s.

Determine the magnitude of **velocity** and **acceleration** of the fireman at *A* when $\theta = 50^\circ$ and $l = 15$ ft.



ME 231: Dynamics

$$2/136 \quad v_r = \dot{r} = 0.5 \text{ ft/sec}$$

$$v_\theta = r\dot{\theta} = 35 \left(2 \frac{\pi}{180} \right) = 1.222 \text{ ft/sec}$$

$$v = \sqrt{0.5^2 + 1.222^2} = \underline{1.320 \text{ ft/sec}}$$

$$a_r = \ddot{r} - r\dot{\theta}^2 = 0 - 35 \left(2 \frac{\pi}{180} \right)^2$$

$$= -0.0426 \text{ ft/sec}^2$$

$$a_\theta = r\ddot{\theta} + 2\dot{r}\dot{\theta} = 0 + 2(0.5) \left(2 \frac{\pi}{180} \right) = 0.0349 \frac{\text{ft}}{\text{sec}^2}$$

$$a = \sqrt{0.0426^2 + 0.0349^2} = \underline{0.0551 \text{ ft/sec}^2}$$

