

### Solution 1.16

A rock is thrown upward with a specified force. The acceleration of the rock is to be determined.

**Analysis** The weight of the rock is

$$W = mg = (3 \text{ kg})(9.79 \text{ m/s}^2) \left( \frac{1 \text{ N}}{1 \text{ kg} \cdot \text{m/s}^2} \right) = 29.37 \text{ N}$$

Then the net force that acts on the rock is

$$F_{\text{net}} = F_{\text{up}} - F_{\text{down}} = 200 - 29.37 = 170.6 \text{ N}$$

From the Newton's second law, the acceleration of the rock becomes

$$a = \frac{F}{m} = \frac{170.6 \text{ N}}{3 \text{ kg}} \left( \frac{1 \text{ kg} \cdot \text{m/s}^2}{1 \text{ N}} \right) = \mathbf{56.9 \text{ m/s}^2}$$

