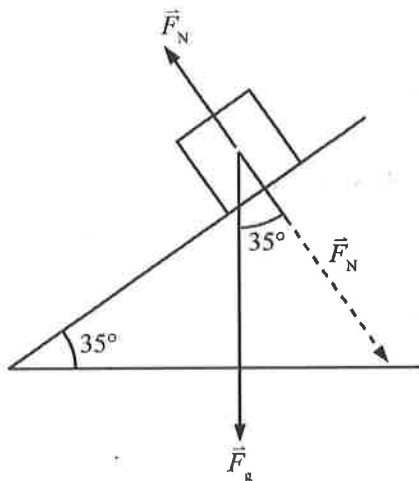


5.



$$\begin{aligned}
 F_N &= F_g \cos 35.0^\circ \\
 &= (15.0 \text{ N})(\cos 35.0^\circ) \\
 &= 12.3 \text{ N} \\
 F_{fr} &= \mu F_N \\
 &= (0.300)(12.3 \text{ N}) \\
 &= 3.69 \text{ N}
 \end{aligned}$$

Lesson 5—Applied Force or Tension

PRACTICE EXERCISES ANSWERS AND SOLUTIONS

For the following sets of solution, magnitudes of the forces are considered.

1.



$$\begin{aligned}
 F_{net} &= F_{app} - F_g \\
 &= 145 \text{ N} - mg \\
 &= 145 \text{ N} - (11.0 \text{ kg})(9.81 \text{ m/s}^2) \\
 &= 37.1 \text{ N} \\
 F_{net} &= ma \\
 a &= \frac{F_{net}}{m} \\
 &= \frac{37.1 \text{ N}}{11.0 \text{ kg}} \\
 &= 3.37 \text{ m/s}^2
 \end{aligned}$$

2.



$$\begin{aligned}
 F_{net} &= F_{app} - F_{fr} \\
 &= 6.0 \text{ N} - 2.0 \text{ N} \\
 &= 4.0 \text{ N} \\
 \vec{F}_{net} &= 4.0 \text{ N in east direction} \\
 \vec{F}_{net} &= m\vec{a} \\
 \vec{a} &= \frac{\vec{F}_{net}}{m} \\
 &= \frac{4.0 \text{ N east}}{12.0 \text{ kg}} \\
 &= 0.33 \text{ m/s}^2 \text{ east}
 \end{aligned}$$

3.



$$\begin{aligned}
 F_g &= mg \\
 &= (15.0 \text{ kg})(9.81 \text{ m/s}^2) \\
 &= 147 \text{ N} \\
 F_{net} &= ma \\
 &= (15.0 \text{ kg})(8.80 \text{ m/s}^2) \\
 &= 132 \text{ N} \\
 F_{net} &= F_{app} - F_g \\
 F_{app} &= F_{net} + F_g \\
 &= 132 \text{ N} + 147 \text{ N} \\
 &= 279 \text{ N}
 \end{aligned}$$

4.



$$\begin{aligned}
 F_{net} &= ma \\
 &= (20.0 \text{ kg})(0.80 \text{ m/s}^2) \\
 &= 16 \text{ N} \\
 F_{net} &= F_{app} - F_{fr} \\
 F_{fr} &= F_{app} - F_{net} \\
 &= 27.0 \text{ N} - 16 \text{ N} \\
 &= 11 \text{ N}
 \end{aligned}$$

5.

$$\begin{aligned}
 v^2 &= v_0^2 + 2ad \\
 (4.0 \text{ ms})^2 &= 2(a)(5.0 \text{ m}) \\
 a &= 1.6 \text{ m/s}^2
 \end{aligned}$$

$$\begin{aligned}
 \vec{F}_{net} &= m\vec{a} \\
 m &= \frac{F_{net}}{a} \\
 &= \frac{12.0 \text{ N}}{1.6 \text{ m/s}^2} \\
 &= 7.5 \text{ kg}
 \end{aligned}$$