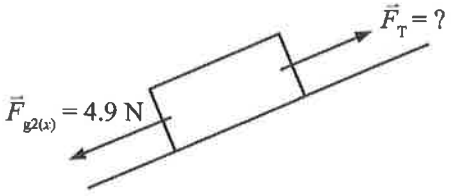
$$F_{net} = ma$$
$$a = \frac{F_{net}}{m}$$
$$= \frac{14.7\text{ N}}{3.0\text{ kg}}$$
$$= 4.9\text{ m/s}^2$$

b) F_{net} on 1.0 kg mass

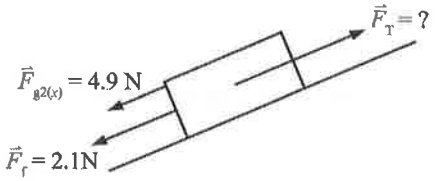
$$F_{net} = m_2 a$$
$$= (1.0\text{ kg})(4.9\text{ m/s}^2)$$
$$= 4.9\text{ N}$$



$$F_{net} = F_T - F_{g2(x)}$$
$$F_T = F_{net} + F_{g2(x)}$$
$$= 4.9\text{ N} + 4.9\text{ N}$$
$$= 9.8\text{ N}$$

7. a)
$$F_{fr} = \mu F_N = \mu F_g \cos\theta$$
$$= \mu mg\cos\theta$$
$$= (0.25)(1.0\text{ kg})(9.81\text{ m/s}^2)(\cos 30.0°)$$
$$= 2.12\text{ N}$$
$$F_{net} = F_{g1} - F_{g2(x)} - F_{fr}$$
$$= 19.6\text{ N} - 4.9\text{ N} - 2.1\text{ N}$$
$$= 12.6\text{ N}$$
$$F_{net} = ma$$
$$a = \frac{F_{net}}{m}$$
$$= \frac{12.6\text{ N}}{3.0\text{ kg}}$$
$$= 4.2\text{ m/s}^2$$

b)



F_{net} on 1.0 kg mass

$$F_{net} = m_2 a$$
$$= (1.0\text{ kg})(4.2\text{ m/s}^2)$$
$$= 4.2\text{ N}$$

$$F_{net} = F_T - F_{g2(x)} - F_{fr}$$
$$F_T = F_{net} + F_{g2(x)} + F_{fr}$$
$$= 4.2\text{ N} + 4.9\text{ N} + 2.1\text{ N}$$
$$= 11.2\text{ N} = 11\text{ N}$$

Lesson 7—Newton's Third Law of Motion

PRACTICE EXERCISES ANSWERS AND SOLUTIONS

1. Considering east direction as positive for this case

$$\vec{F}_1 = -\vec{F}_2$$
$$m_1\vec{a}_1 = -m_2\vec{a}_2$$
$$(38\text{ kg})(0.60\text{ m/s}^2) = -m_2(-0.75\text{ m/s}^2)$$
$$m_2 = 30.4\text{ kg}$$
$$\approx 30\text{ kg}$$

2.
$$F_{net} = ma$$
$$a = \frac{F_{net}}{m}$$
$$= \frac{125\text{ N}}{50.0\text{ kg}}$$
$$= 2.50\text{ m/s}^2$$
$$a = \frac{v - v_0}{t}$$
$$2.50\text{ m/s}^2 = \frac{v - 0}{0.110\text{ s}}$$
$$v = 0.275\text{ m/s}$$

According to Newton's third law
$\vec{v} = 0.275$ m/s west

3.
$$a = \frac{v - v_0}{t}$$
$$= \frac{22\text{ m/s} - 11\text{ m/s}}{0.75\text{ s}}$$
$$= 14.6\text{ m/s}^2$$
$$F_{net} = ma$$
$$= (9.8\times10^3\text{ kg})(14.6\text{ m/s}^2)$$
$$= 1.4\times10^5\text{ N}$$

According to Newton's third law
$\vec{F}_{net} = 1.4\times10^5$ N west

