3. Convert 5.00 km/h to m/s

$$= \frac{(5.00 \text{ km/h})(1\,000 \text{ m/km})}{3\,600 \text{ s/h}}$$
$$= 1.39 \text{ m/s}$$

$$W = Fd = \frac{1}{2}m\left(v_f^2 - v_0^2\right)$$
$$= \frac{1}{2}(1.10\times10^3 \text{ kg})\left((1.39 \text{ m/s})^2 - 0\right)$$
$$= 1.06\times10^3 \text{ J}$$

4.
$$Fd = \frac{1}{2}m\left(v^2 - v_0^2\right)$$
$$F(0.70 \text{ m}) = \frac{1}{2}(4.5\times10^{-3} \text{ kg})\left((1.0\times10^3 \text{ m/s})^2 - 0\right)$$
$$F = \frac{\frac{1}{2}(4.5\times10^{-3} \text{ kg})\left((1.0\times10^3 \text{ m/s})^2 - 0\right)}{0.70 \text{ m}}$$
$$= 3.2\times10^3 \text{ N}$$

5.

$$F_g = mg$$
$$= (1.0 \text{ kg})(9.81 \text{ m/s}^2)$$
$$= 9.81 \text{ N}$$

$$F_{net} = F_T - F_g$$
$$= 18 \text{ N} - 9.81 \text{ N}$$
$$= 8.19 \text{ N}$$

$$F_{net}d = \frac{1}{2}m\left(v^2 - v_0^2\right)$$
$$(8.19 \text{ N})(0.30 \text{ m}) = \frac{1}{2}(1.0 \text{ kg})(v^2 - 0)$$
$$v = \sqrt{\frac{2(8.19 \text{ N})(0.30 \text{ m})}{1.0 \text{ kg}}}$$
$$= 2.2 \text{ m/s}$$

6. Convert weight to mass:

$$F_g = mg$$
$$m = \frac{F_g}{g}$$
$$= \frac{4.0 \text{ N}}{9.81 \text{ m/s}^2}$$
$$= 0.408 \text{ kg}$$

$$Fd = \frac{1}{2}m\left(v^2 - v_0^2\right)$$
$$F(2.3\times10^{-2} \text{ m}) = \frac{1}{2}(0.408 \text{ kg})\left(0 - (2.1 \text{ m/s})^2\right)$$
$$F = \frac{\frac{1}{2}(0.408 \text{ kg})\left(0 - (2.1 \text{ m/s})^2\right)}{2.3\times10^{-2} \text{ m}}$$
$$= -39 \text{ N}$$

7.
$$Fd = \frac{1}{2}m\left(v^2 - v_0^2\right)$$
$$F(5.5 \text{ m}) = \frac{1}{2}(0.65 \text{ kg})\left(0 - (2.0 \text{ m/s})^2\right)$$
$$F = \frac{\frac{1}{2}(0.65 \text{ kg})\left(0 - (2.0 \text{ m/s})^2\right)}{5.5 \text{ m}}$$
$$= -0.24 \text{ N}$$

8.

$$F_g = mg$$
$$= (1.1 \text{ kg})(9.81 \text{ m/s}^2)$$
$$= 10.8 \text{ N}$$

$$Fd = \frac{1}{2}m\left(v^2 - v_0^2\right)$$
$$F(0.36 \text{ m}) = \frac{1}{2}(1.1 \text{ kg})\left((4.2 \text{ m/s})^2 - 0\right)$$
$$F = \frac{\frac{1}{2}(1.1 \text{ kg})\left((4.2 \text{ m/s})^2 - 0\right)}{0.36 \text{ m}}$$
$$= 26.95 \text{ N}$$

Note: This is the net force.

$$F = F_{net} = F_T - F_g$$
$$F_T = F_{net} + F_g$$
$$= 26.95 \text{ N} + 10.8 \text{ N}$$
$$= 37.8 \text{ N}$$
$$\simeq 38 \text{ N}$$

9.
$$Fd = \frac{1}{2}m\left(v^2 - v_0^2\right)$$
$$(35 \text{ N})(3.5 \text{ m}) = \frac{1}{2}(15 \text{ kg})(v^2 - 0)$$
$$v = \sqrt{\frac{2(35 \text{ N})(3.5 \text{ m})}{15 \text{ kg}}}$$
$$= 4.0 \text{ m/s}$$

10. Find net force first:

$$F_{g(1)} = m_1 g$$
$$= (6.0 \text{ kg})(9.81 \text{ m/s}^2)$$
$$= 58.9 \text{ N}$$

$$F_{g(21)} = m_2 g$$
$$= (12.0 \text{ kg})(9.81 \text{ m/s}^2)$$
$$= 117.7 \text{ N}$$