

1. $m = .430 \text{ kg}$
 $v_i = 0 \text{ m/s}$
 $v_f = 23.0 \text{ m/s}$
 $\Delta t = .0090 \text{ s}$

$$a = \frac{v_f - v_i}{\Delta t}$$

$$= \frac{23.0 - 0}{.0090}$$

$$= 2600 \text{ m/s}^2$$

$$\Sigma F = ma$$

$$= (.430)(2600)$$

$$= \boxed{1100 \text{ N}}$$

2. $m_1 = 2250. \text{ kg}$

$$\Sigma F = m_1 a_1$$

$$= (2250.)(1.50)$$

$$= 3380 \text{ N}$$

$$m_2 = 2250. + 1200.$$

$$= 3450. \text{ kg}$$

$$a_z = \frac{\Sigma F}{m_2} = \frac{3380}{3450.} = \boxed{1.980 \text{ m/s}^2}$$

3. $m = .065 \text{ kg}$
 $v_i = 35.0 \text{ m/s}$
 $v_f = 0 \text{ m/s}$
 $\Delta t = .455 \text{ s}$

$$a = \frac{v_f - v_i}{\Delta t}$$

$$\Sigma F = m \left(\frac{v_f - v_i}{\Delta t} \right)$$

$$= (.065) \left(\frac{-40.0 - 35.0}{.455} \right) = \boxed{-11 \text{ N}}$$

4. $m = 75.0 \text{ kg}$
 $\Delta d = 15.0 \text{ m}$
 $\Delta t = .95 \text{ s}$
 $v_i = 0 \text{ m/s}$

$$\Delta d = v_i \Delta t + \frac{1}{2} a \Delta t^2$$

$$a = \frac{2 \Delta d}{\Delta t^2}$$

$$\Sigma F = ma$$

$$= m \left(\frac{2 \Delta d}{\Delta t^2} \right)$$

$$= 75.0 \left(\frac{2(15.0)}{(.95)^2} \right)$$

$$= \boxed{2500 \text{ N}}$$

5. $m = 12500. \text{ kg}$

$$v_i = 0 \text{ m/s}$$

$$v_f = 195 \text{ km/hr} = 54.2 \text{ m/s}$$

$$\Delta d = 80.0 \text{ m}$$

a) $a = \frac{v_f^2 - v_i^2}{2 \Delta d}$

$$= \frac{54.2^2 - 0}{2(80)}$$

$$= 18.4 \text{ m/s}^2$$

$$= 18.4 / 9.80$$

$$= \boxed{1.88 \text{ g}}$$

b) $\Sigma F = ma$

$$= (12500.)(18.4)$$

$$= \boxed{2.30 \times 10^5 \text{ N}}$$

6. $v_i = 6.50 \text{ m/s}$
 $m = 4.20 \text{ kg}$
 $\Delta d = .005 \text{ m}$
 $v_f = 0 \text{ m/s}$

$$a = \frac{v_f^2 - v_i^2}{2 \Delta d}$$

$$\Sigma F = ma$$

$$= m \left(\frac{v_f^2 - v_i^2}{2 \Delta d} \right)$$

$$= 4.20 \left(\frac{0 - 6.50^2}{2(.005)} \right)$$

$$= \boxed{1.77 \times 10^4 \text{ N}}$$

7. $v_i = 22.3 \text{ m/s}$
 $\Delta d = .229 \text{ m}$
 $v_f = 0$
 $m = 80.0 \text{ kg}$

a) $a = \frac{v_f^2 - v_i^2}{2\Delta d}$

$\Sigma F = ma$

$$= (80.0) \left(\frac{0^2 - 22.3^2}{2(.229)} \right)$$

$$\boxed{= -8.69 \times 10^4 \text{ N}}$$

b) $\Sigma F = (80.0) \left(\frac{0^2 - 22.3^2}{2(1.0)} \right)$

$$\boxed{= -1.99 \times 10^4 \text{ N}}$$