

4.  $p = mv$

$$m = \frac{p}{v}$$

$$= \frac{29 \text{ kg}\cdot\text{m/s}}{2.0 \text{ m/s}}$$

$$= 14.5 \text{ kg}$$

$$F_g = mg$$

$$= (14.5 \text{ kg})(9.80 \text{ m/s}^2)$$

$$= 1.4 \times 10^2 \text{ N}$$

5.  $F_g = mg$

$$m = \frac{F_g}{g}$$

$$= \frac{6.6 \text{ N}}{9.80 \text{ m/s}^2}$$

$$= 0.673 \text{ kg}$$

$$p = mv$$

$$= (0.673 \text{ kg})(3.0 \text{ m/s})$$

$$= 2.0 \text{ kg}\cdot\text{m/s north}$$

6.  $v = \frac{d}{t}$

$$= \frac{2.6 \text{ m}}{1.1 \text{ s}}$$

$$= 2.36 \text{ m/s}$$

$$p = mv$$

$$= (7.0 \text{ kg})(2.36 \text{ m/s})$$

$$= 17 \text{ kg}\cdot\text{m/s west}$$

7.  $a = \frac{v_f - v_0}{t}$

$$-9.80 \text{ m/s}^2 = \frac{v_f - 0}{0.25 \text{ s}}$$

$$v_f = -2.45 \text{ m/s}^2$$

$$p = mv$$

$$= (5.0 \text{ kg})(-2.45 \text{ m/s}^2)$$

$$= -12 \text{ kg}\cdot\text{m/s or } 12 \text{ kg}\cdot\text{m/s down}$$

8.  $p_1 = mv$

$$= (1.0 \text{ kg})(-2.0 \text{ m/s})$$

$$= -2.0 \text{ kg}\cdot\text{m/s}$$

$$p_2 = mv$$

$$= (1.0 \text{ kg})(1.6 \text{ m/s})$$

$$= 1.6 \text{ m/s}$$

$$\Delta p = p_2 - p_1$$

$$= 1.6 \text{ kg}\cdot\text{m/s} - (-2.0 \text{ kg}\cdot\text{m/s})$$

$$= 3.6 \text{ kg}\cdot\text{m/s up}$$

9.  $F = ma$

$$a = \frac{F}{m}$$

$$= \frac{1.5 \times 10^5 \text{ N}}{9.5 \times 10^3 \text{ kg}}$$

$$= 15.8 \text{ m/s}^2$$

$$a = \frac{v_f - v_0}{t}$$

$$15.8 \text{ m/s}^2 = \frac{v_f - 0}{15 \text{ s}}$$

$$v_f = 2.4 \times 10^2 \text{ m/s}$$

OR

$$Ft = m\Delta v$$

$$(1.5 \times 10^5 \text{ N})(15 \text{ s}) = (9.5 \times 10^3 \text{ kg})v$$

$$v = 2.4 \times 10^2 \text{ m/s up}$$

10.  $Ft = m\Delta v$

$$F(2.60 \text{ s}) = (26.3 \text{ kg})(-21.0 \text{ m/s})$$

$$F = -212 \text{ N or } 212 \text{ N south}$$

11.  $\Delta p = m\Delta v$

$$= (15.0 \text{ kg})(10.0 \text{ m/s} - 0)$$

$$= 150 \text{ kg}\cdot\text{m/s}$$

$$= 1.50 \times 10^2 \text{ kg}\cdot\text{m/s south}$$

12.  $Ft = m\Delta v$

$$(25.0 \text{ N})(7.20 \times 10^{-1} \text{ s}) = 18.0 \text{ N}\cdot\text{s north}$$

13. Impulse =  $m\Delta v$

$$= (5.00 \text{ kg})(15.0 \text{ m/s})$$

$$= 75.0 \text{ kg}\cdot\text{m/s east}$$

14.  $v_{\text{average}} = \frac{d}{t}$

$$= \frac{26.3 \text{ m}}{3.2 \text{ s}}$$

$$= 8.22 \text{ m/s}$$

$$v_{\text{average}} = \frac{v_f + v_0}{2}$$

$$8.22 \text{ m/s} = \frac{v_f + 0}{2}$$

$$v_f = 16.44 \text{ m/s}$$

$$\Delta p = m\Delta v$$

$$= (11.0 \text{ kg})(16.44 \text{ m/s})$$

$$= 181 \text{ kg}\cdot\text{m/s west}$$