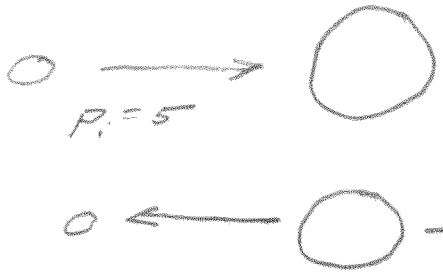
10.



$P_i = P_f$

$P_{PP_i} + P_{BE_i} = P_{PP_f} + P_{BE_f}$

$5 + \phi = (\quad) + (>0)$

(>-5) $\quad > 5$

$\therefore P_{BE_f} > 5$

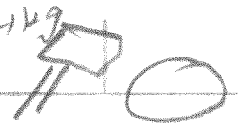
27. 7 million J/day.

Rate of energy consumption in Watts?

$$\text{Power} = \frac{\text{Energy}}{\text{time}}$$

$$\frac{7 * 10^6 \text{ J}}{1 \text{ day}} \cdot \frac{1 \text{ day}}{24 \text{ hrs}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ s}} = 81 \frac{\text{J}}{\text{s}}$$

POWER = 81 W



30. 4.0 m/s → 0 m/s in .01 m

$F = ma$

$a = \frac{\Delta v}{t}$

$F = ma$

$at = \Delta v$

$F \cdot t = \Delta m v$

$= m \Delta v$

$F = \frac{m \Delta v}{t}$

FIND t

$x = \frac{1}{2} a t^2$

$x = \frac{1}{2} \frac{\Delta v}{t} \cdot t^2$

$x = \frac{1}{2} \Delta v \cdot t$

$.01m = (.5)(4.0 m/s) \cdot t$

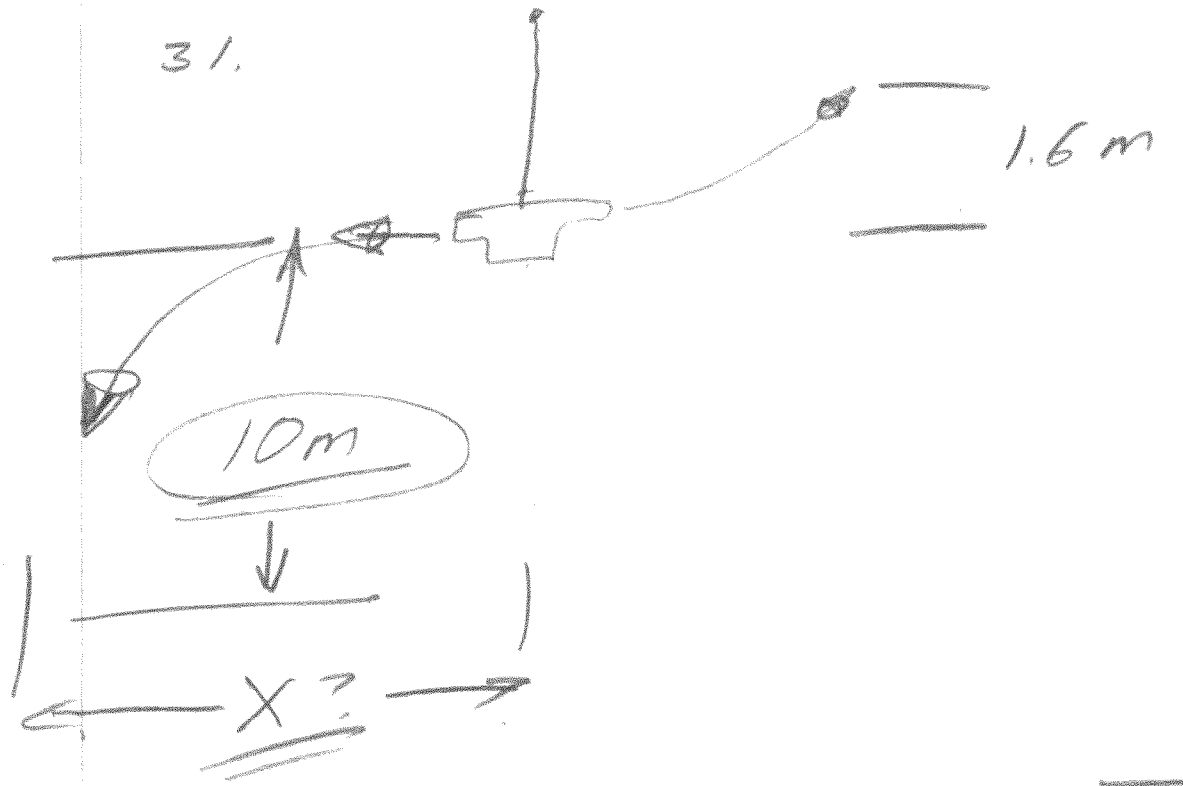
$\frac{.01 m}{.5(4.0 m/s)} = t$

$t = .005 s$

$F = \frac{4kg \cdot 4 m/s}{.005 s}$

$F = 3200 N$

31.



NEED: $t_{flight} \rightarrow t = \sqrt{\frac{2d_f}{g}}$

$\checkmark V_i \rightarrow$ Use Conserv of Energy

$PE = KE$

$mgh = \frac{1}{2}mv_i^2$

$gh = \frac{1}{2}v^2$

$\sqrt{2gh} = \sqrt{v_i^2}$

$v_i = \sqrt{2gh}$

$v_i = \sqrt{2(10\,m/s^2)(1.6\,m)}$

$v_i = 5.66\,m/s$

$t_f = \sqrt{\frac{2d_f}{g}}$

$= \sqrt{\frac{2(10\,m)}{10\,m/s^2}}$

$t_f = 1.41\,s$

$X = v_i \cdot t_f$

$= 5.66\,m/s \cdot 1.41\,s$

$X = 7.98\,m$

$\boxed{X = 8\,m}$

40.

find h

$$d_f = \frac{1}{2} g t^2$$

$$v = at$$

$$\frac{v}{a} = t$$

$$\frac{13 m/s}{10 m/s^2} = t$$

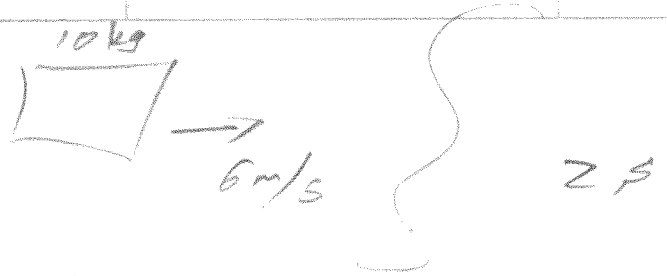
$$t = 1.3 s$$

$$d_f = \frac{1}{2} g t^2$$

$$= (.5)(10 m/s^2)(1.3 s)^2$$

$$\boxed{h = 8.45 m}$$

43.



$$Ft = \Delta m v$$

$$F = \frac{m \Delta v}{t}$$

$$= \frac{(10\,kg)(6\,m/s)}{2\,s}$$

$$= 30\ kgm/s^2$$

$$\boxed{F = 30\,N}$$

44. 5 kg @ 4 m/s

$$p_i = p_f$$

$$m_1 v_1 + m_2 v_2 = (m_1 + m_2) v_f$$

$$(5\text{kg})(4\text{m/s}) + (4\text{kg})(-2\text{m/s}) = (5\text{kg} + 4\text{kg}) v_f$$

$$20\ \text{kg m/s} + -8\ \text{kg m/s} = 9\text{kg} \cdot v_f$$

$$\frac{12\ \text{kg m/s}}{9\text{kg}} = v_f$$

$$\boxed{v_f = 1.3\ \text{m/s}}$$

45.

CHANGE OF MOMENTUM ?

$$p_i = m_1 v_i$$

$$p_f = m v_f$$

$$\Delta p = p_f - p_i$$

$$= (10\text{kg})(+4\text{m/s}) - (10\text{kg})(-4\text{m/s})$$

$$\boxed{\Delta p = 80\ \text{kg m/s}}$$

49.

$$P_i = P_f$$

$$m_a v_{a,i} + m_c v_{c,i} = m_a v_{af} + m_a v_{af}$$

$$0 \quad 0 = (70\text{ kg})\, v_{af} + (0.10\text{ kg})(30\text{ m/s})$$

$$0 = 70\text{ kg}\, v_{af} + 3.0\text{ kg m/s}$$

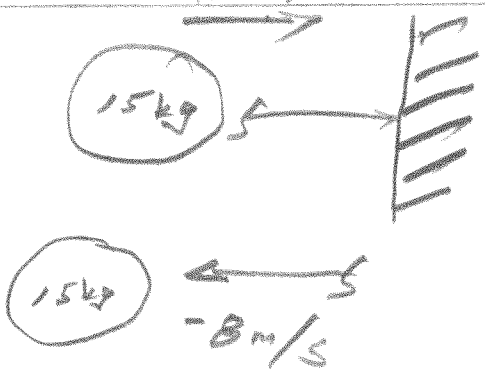
$$-3.0\text{ kg m/s} = 70\text{ kg}\, v_{af}$$

$$\frac{-3.0\text{ kg m/s}}{70\text{ kg}} = v_{af}$$

$$-.042\text{ m/s} = v_{af}$$

Speed = .042 m/s

50.



Impulse on wall?

Impulse = $F \cdot t$

Impulse = $\Delta m v$ or $\underline{m \Delta v}$

$m \Delta v = (15\,kg)(8\,m/s + 8\,m/s)$

$= 240\,kg\,m/s$

57. $1.0\,N \rightarrow$ [4.0 kg]

4 s

Find x

$x = \frac{1}{2} a t^2$

$F = ma$

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

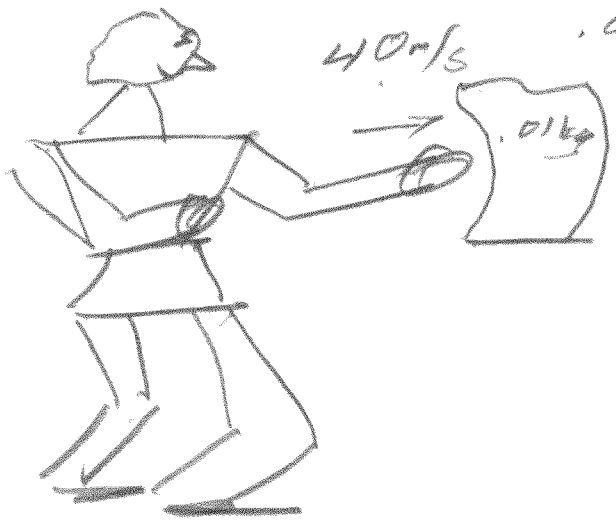
$a = \frac{1.0\,N}{4.0\,kg}$

$a = .25\,m/s^2$

$x = (.5)(.25\,m/s^2)(4s)^2$

$\boxed{x = 2m}$

64.

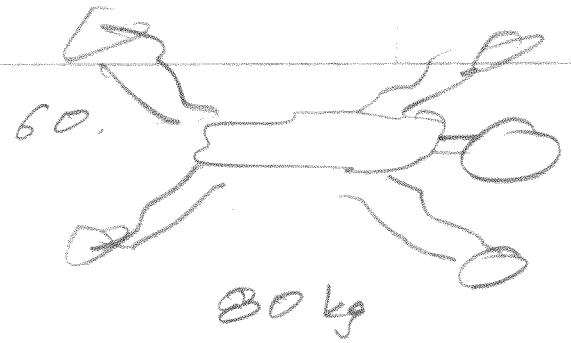


$$F \cdot t = \Delta m v$$

$$F = \frac{\Delta m v}{t}$$

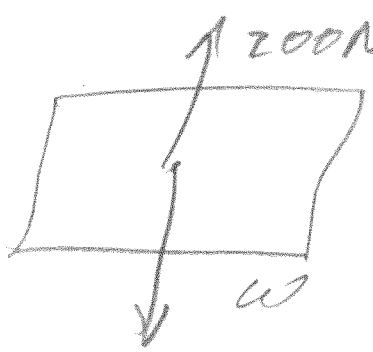
$$= \frac{(.01\,kg)(40\,m/s)}{.08\,s}$$

$$\boxed{F = 5\,N}$$



80 kg

200 N



$W = mg$

$= 80\,kg \cdot 10\,m/s^2$

$= 800\,N$

$F_{NET} = 800N - 200N$

$F_{NET} = 600N$ ↓

$F = ma$

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

$\frac{600N}{80kg} = a$

$a = 7.5\,m/s^2$