Unit 8 Review (worksheet)

1. $m = 1200\ kg$
   $V_i = 50\ km/hr = 13.\bar{8}\ m/s$
   $V_f = 0$
   $F = -1550\ N$

   a) $E_k = \frac{1}{2}(1200)(13.\bar{8})^2 = 115{,}740.7\ J = 1.16 \times 10^5\ J$

   b) $W = Fd = (-1550)(25) = -38750\ J = -3.9 \times 10^4\ J$

2. $m = ?$ $E_k = 4000\ J$ $V = 20\ m/s$

   $4000 = \frac{1}{2}m(20)^2$

   $\frac{4000}{200} = \frac{200m}{200}$ $m = 20\ kg$

3. $E_H = mc\Delta t = (1.5)(4180)(90-10) = 501{,}600\ J = 5.02 \times 10^5\ J$

4. $\frac{50{,}000}{770} = \frac{(2.0)(385)(t_f - 23)}{770}$

   $64.935 = t_f - 23$

   $t_f = 87.94 = 88°C$

5. $\frac{2.4 \times 10^5}{90} = \frac{(6.0)\,c\,(15)}{90}$ $c = 2666.\bar{6} = 2.7 \times 10^3\ \frac{J}{kg \cdot °C}$

6. a) $W = \Delta E_k = \frac{1}{2}(0.015)[0 - (400)^2] = -1200\ J$

   b) $F = ?$ $W = Fd$ $F = \frac{-1200}{0.20} = -6000\ N$

7. $W = \Delta E_k = 0 - \frac{1}{2}(1000)(27.7)^2 = -385{,}802\ J = -3.86 \times 10^5\ J$

8. $E_{pi}^{\,0} + E_{ki} = E_{pf} + E_{kf}^{\,0}$

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

   $\frac{\frac{1}{2}(8.0)^2}{9.8} = \frac{(9.8)h_f}{9.8}$ $h_f = 3.265\ m = 3.3\ m$

9. $\frac{mgh}{mgh_.} = \frac{3.5}{5.0} = 0.70$ 30% loss

10. $E_{pi} + \cancel{E_{ki}}^{0} = \cancel{E_{pf}}^{0} + E_{kf}$

$(V_i = 0) \quad (h_f = 0)$

$mgh_i = \frac{1}{2}mv_f^2 \qquad (9.8)(20) = \frac{1}{2}v_f^2 \qquad v_f = \sqrt{392} = 19.8 \text{ m/s}$

11. 

$W = F \cdot d$

$= (mg)d_y = (50)(9.8)(7 \cdot \sin 25°) = 1449.6 \text{ J} = 1450 \text{ J}$

12. $P = \frac{W}{t} = \frac{Fd}{t} = \frac{(1.50 \times 10^3)(9.8)(15)}{30} = 7350 \text{ W}$

13. $P = \frac{W}{t} = \frac{F\cancel{d}}{t} = F \cdot \text{velocity} = (1.00 \times 10^3)(9.8)(4.0) = 3.92 \times 10^4 \text{ W}$

14. $E_{pi} + E_{ki} = E_{pf} + E_{kf}$

$\cancel{m}gh_i + \frac{1}{2}\cancel{m}v_i^2 = \cancel{m}gh_f + \frac{1}{2}\cancel{m}v_f^2$

$(9.8)(15) + \frac{1}{2}(3.0)^2 = (9.8)(7.0) + \frac{1}{2}v_f^2$

$147 + 4.5 = 68.6 + \frac{1}{2}v_f^2$

$82.9 = 0.5v_f^2 \qquad v_f = \sqrt{165.8} = 12.9 \text{ m/s}$