Homework Discussion, Week 6

Physics 1301 Dr. Andersen

Chapter 7

41.) a) Solve $P = \frac{W}{t}$ for W with $P = 0.30\ hp$ and $t = 169\ min.$ b) Convert your answer from Joules to Calories.

Chapter 8

21.) a) Use conservation of energy

$$\frac{1}{2}mv_i^2 + mgy_i = \frac{1}{2}mv_f^2 + mgy_f.$$

In this case we want to solve for v_i, and we know that $v_f = 29\ m/s$ and $y_i = y_f + 32\ m$. Just plug and chug with these values. b) Start with the same energy conservation equation, but now we want to find the y coordinate where $v_f = 0$. Setting $y_i = 32\ m$ (this way, the value we find for y_f will be the height above the base of the cliff), and v_i to the value from part (a), we again plug and chug.

26.) a) A couple of things to notice: 1) because the masses are hooked together by a rope, their speeds will be equal, and 2) if they both start out at a y-coordinate of y_i, then m_1 will end up at $y_f = y_i + h$ and m_2 will end up at $y_f = y_i - h$. Putting all this into an energy conservation equation gives (notice initial kinetic energy is zero for both)

$$m_1gy_i + m_2gy_i = \frac{1}{2}m_1v_f^2 + \frac{1}{2}m_2v_f^2 + m_1g(y_i + h) + m_2g(y_i - h).$$

Solving for v gives

$$v = \sqrt{\frac{2(m_2 - m_1)gh}{m_1 + m_2}}$$

b) Plugging in gives $v = 1.1\ m/s$.

Chapter 9

9.) $F = \frac{\Delta p}{\delta t}$, so since the initial speed of the ball is zero, $F = (0.045\ kg)(67\ m/s)/(0.001\ s) = 3015\ N \approx 3000\ N$.