1. What is the work required to move a 10000 kg train car a distance of 200 m assuming a force of 2000N is applied to move a car?

$$W = F \cdot S$$

$$W = (2000\,N)(200\,m)$$

$$\boxed{W = 400000\,J}$$

2. How far must a 650 N student fall before the force of gravity has done 7000 J of work?

$$W = Fs$$

$$s = \frac{W}{F} = \frac{7000}{650} = 10.77 \Rightarrow \boxed{11\ m}$$

3. With how much force must Bad Bart exert in order to do 1000 J of work while moving his cart of laundry 50 m from one side of the prison laundry room to the other?

$$W = Fs$$

$$F = \frac{W}{s} = \frac{1000\,J}{50\,m} = \boxed{20\,N}$$

4. If the force of friction between the floor and a desk is 400 N and 3 bears apply a total of 1000 N in order to slide the desk 20 m across the room, what is the work done by the bears? What is the work done by friction? What is the net work done?

$W_B = F_B s = 1000\,N(20\,m) = 20000\,J$

$W_F = F_F s = 400\,N(20\,m) = 8000\,J$

$W_{net} = 12000\,J$

#5 was worked in class

6. How much work is done by gravity in settling a 25000 kg house by 3.0 cm?

$W = Fs$

$s = 3.0\,cm$

$\div 100\,cm/m$

$0.03\,m$

$W = (25000\,kg)(9.81\,m/s^2)(0.03\,m)$

$F = mg$

$W = 7357.5\,J$

$\boxed{W = 7400\,J}$

7. How much work is done on a sturdy concrete wall by a man who pushes with a force of 450 N for 24 hours on the wall?

$W = F s \qquad s = 0$

$\boxed{W = 0\ \text{J}}$

8. If a 25 kg object accelerates at 2.0 m/s^2 along a surface (mu=0.3) for a distance of 4.5 m, what is the work done by friction? What is the net work done? What is the work done by the monkey pushing the object?

$W_f = F_f s = (0.3)(25\,kg)(9.81\,m/s^2)(4.5\,m) = 330\,J$

$F_f = \mu m g$

$W_{net} = F_{net} s = (25\,kg)(2.0\,m/s^2)(4.5\,m) = 225\,J$

$F_{net} = ma$

$W_{monkey} = W_f + W_{net} = 555\,J$

9. 2000 J of work are done by a person pulling an object at a constant velocity with a spring. If the object is pulled a distance of 10 m, how much would the spring have been stretched during the trip (k=500 N/m)?

$$W = F_S = kxs$$

$$F = kx$$

$$x = \frac{W}{kS} = \frac{2000\ \text{J}}{(500\ \text{N/m})(10\ \text{m})} = \boxed{0.4\ \text{m}}$$

(J = N·m)

10. How much work is done on one gram of blood which is pumped from your heart to the top of your head?

$W = Fs$ $\quad s \approx 0.5\,m$

$F = mg$

$W = mgs = (0.001\,kg)(9.81\,m/s^2)(0.5\,m)$

$\boxed{W = 4.9 \times 10^{-3}\,J}$