Date _____

APES Energy Problems: Take 2

1. Refrigeration is costly in terms of energy usage. A single-door, manual defrost refrigerator uses 600 kWh/yr.
   A large, 20 cu.ft. two-door automatic defrost refrigerator uses 1880 kWh/yr.
   How many kcal/yr does each type of refrigerator use? (1kWh = 860kcal)

2. Assume you use an air conditioner for a total of 137 days, 24 hours per day, at a rate of 7.25 kWh per hour.
   Assume the cost per kWh is the New York rate of $0.21/kWh and 1 kWh = 3400 BTUs.

   a.) Calculate the total number of kWh used per year.

   b.) Determine the cost of air conditioning for one year.

   c.) How many kcal are used per year?

   d.) How many BTUs are used in one year?

3. Transportation energy is costly.

   a.) Calculate the gallons of gas use just for going to the supermarket in one year if you take 5 trips to the store
       per week, traveling 7.5 miles roundtrip, and your car gets 22 miles per gallon.

   b.) Convert the gallons to kcal/year if there are 32000 kcal per gallon.

.4. Estimate the potential reduction in petroleum consumption (in gallons of gasoline per year) that could be achieved in the United States by introducing electric vehicles under the following assumptions:
1. The mileage rate for the average car is 25 miles per gallon of gasoline.
2. The average car is driven 15,000 miles per year.
3. The United States has 250 million cars.
4. 10 percent of United States cars could be replaced with electric vehicles.

5. Suppose your electric lights use 400 watts of power and average four hours per day, every day for one year. Assume the cost per kWh is the New York rate of $0.21/kWh.

Remember … last time we did this…
you were given the fact that 1 Watt = 1J/s **and** that 1kWh = 3.6 x10^6 J

a.) How many kWh per year does this represent?

b) If replacing the lights with a fluorescent bulb would save 60 watts of power, what savings in kWh does this represent in one year?

c) If the fluorescent bulb costs $18 but lasts for 10 years, would you consider it a wise investment over incandescent bulbs? Explain your answer.