

Math& 107

Activity for Homework #2

Just how much energy do “everyday things” use? Here is a problem that will look at this.

1) Suppose Mr. Wildman has four 100 watt light bulbs in his garage. His wife insists that he leave these on overnight from Nov. 1 to March 1. You can assume there are on average 10 hours of night for each day during this time period and you can also assume that this is not a leap year .

a) How many Joules of energy are used by these light bulbs during this time period?

b) How many Kwh are used by these light bulbs during this time period?

c) If the electric company charges \$0.07545 per Kwh, how much does this cost him?

d) If he replaces the 100 watt bulbs with 13 watt CFL bulbs how much money will he save?

2) Suppose you are interested in purchasing a new car. You are concerned about gas usage and cost and so you decide you would like to compare a Nissan Juke (crossover gasoline power car) and Nissan Leaf (complete electric car).

a) You are going to drive your car primarily in the city. Look up the city miles per gallon of the Nissan Juke. Suppose you drive your car about 12,000 miles per year. If the average price of gasoline is \$2.75, what will you spend on gasoline in the next year for the Juke

b) Now consider the Nissan Leaf. This is an entirely electric car which has an average of 107 miles per battery charge. It takes 20 Kwh to completely recharge a battery and costs roughly \$0.07545 per Kilowatt hour. If you drive the leaf 12000 miles per year how much will spend on energy to charge the car.

c) New comparable models of the Juke and Leaf are priced differently. A 2016 basic Juke will cost \$20260 and requires no modifications to your garage. The cost of a 2016 basic Leaf is \$29210 and you will also be required update your garage for a charging station which costs on average \$700. How many years will you have to drive the Leaf for it to be “cheaper” than the Juke (if you wish you can do this calculation in miles). Use the values in part a and b to help you answer this question and note there are multiple ways to do this problem

d) What is “missing” in your calculations in part c? What assumptions are you making about the cars that might affect your answer?