Name:_____ Date:_____

Power, Energy and Efficiency

Remember to show ALL your work! This includes: writing down the formula you used, how you manipulate it, the unit conversions you make, and your final answer with units.

$V = I \times R$ $P = I \times V$ $E = P \times t$ % Efficiency = Output / Input x 100

1.) What is the difference between power and energy?

2.) You bake a potato in a 1200W toaster oven for 25 minutes. How many joules of electricity did the toaster oven use? How many kilowatt hours did it use?

3.) A TV draws 1.5A when connected to a 120V outlet. What is the power rating of the TV set?

4.) A toy car produces 47.5J of output energy from 125J of input energy. What is the car's efficiency?

5.) An engine is only 20% efficient. What happened to the other 80%?

6.) What is the advantage of driving car that is 20% efficient instead of one that is 10% efficient? Be specific.

7.) A small engine is 12% efficient. How many joules of input energy will it need to produce 1000J of output energy?

8.) How long would it take for a blow dryer with a power rating of 1500W to receive 20,000J of energy when plugged in to a 120V outlet?

9.) If a 120V circuit creates 15Ω of resistance in an electric heater, how much energy would the heater receive in a 5 hour time period?

10.) A 1500W electric fry pan produces 50,000J in a 45 minute time period, how efficient is the fry pan?

Extension:
A microwave has a power requirement of 1250W. A frozen dinner requires 4.0 minutes to heat on full power.

a) How much electrical energy is used?

b) If the cost of electricity is 12 cents per kWh, how much does it cost to heat the dinner?