Efficiency Practice Problems

Efficiency = ───────────   x

In-Class Examples

Example #1: A certain light bulb consumes 200J of electrical energy per second, but only emits 25J of light energy per second. Calculate the efficiency of this bulb.

Example #2: A certain large wind turbine is able to transform 1,500,000J of mechanical energy into 1,000,000J of electrical energy every second.
  a. How much thermal energy does this turbine 'waste' each second?

  b. Calculate the efficiency of this turbine.

Example #3: A certain engine is filled with gasoline that contains chemical energy, and when the engine is started, it begins transforming that chemical energy into mechanical energy. Over the course of a few seconds, the engine transforms 7,000J of chemical energy, but 5,000J of that energy is 'wasted' in the form of thermal energy.
  a. How much energy does the engine transform into useful mechanical energy during these few seconds?

  b. Calculate the efficiency of this engine.

Efficiency Extra Practice   Name: _____

Now try the following practice problems on your own, using the in-class example problems as a guide. Show all of your work on problems.

1a. In every energy transformation there is always some amount of _____ energy produced.

  b. Unless this type of energy (a) is what is wanted, this is considered _____ energy.

  c. For example, a battery transforms _____ energy into _____ energy, but some thermal 'waste' energy is also generated, so the battery heats up. In this example, a comparison or ratio of the electrical energy to the chemical energy is called _____.

2. A certain solar panel is capable of absorbing 750J of light energy every second, and converting 150J of that energy into electrical energy.
   a. How much energy is 'wasted' in the form of heat by the solar panel every second?

   b. What is the efficiency of this solar panel?

3. A certain fan is capable of using 4800J of electrical energy each minute, converting 4000J of it into kinetic energy of the fan. What is the efficiency of this fan?

4. A mover pushes a 90kg box up an incline, increasing the box's height by 3.1m. If the mover inputs 5,000J of energy to accomplish this, what was the efficiency of the energy transformation? (Hint: You'll need to do an energy calculation before you can calculate efficiency.)

5. 240J of electric energy flows into a certain light bulb every second, and some energy is transformed into light energy while some 'waste' thermal energy is also generated. If 200J of thermal energy is generated each second, what is the efficiency of this bulb? (Hint: Pay good attention to what energy values you've been given, before you start plugging them into the efficiency formula.)