Energy Forms & Changes Simulation

Name _____

http://phet.colorado.edu/en/simulation/energy-forms-and-changes

Google "Phet energy forms". Click the first link which will load the University of Colorado's PHET page. Click the white triangular "play" button.

In this simulation, you will be able to "see" several different forms of energy and the changes (transfers) that can occur between them. You are also able to work with a system where you can manipulate the energy input, observe the process of electrical energy generation and manipulate the output. **Click on the "Energy Systems" tab**. We will do all of our work here. Be sure to **click the "Energy Symbols**" box so the different types of energy will be visible throughout the process.

Getting Familiar With The Options

Please experiment with the different source, generation and output options – there are many combinations to play with – then complete the questions below.

1. Which **energy sources (input)** can cause the turbine (wooden wheel) to spin and generate electrical energy? _____
2. Which **energy sources (input)** cause the solar panels to generate electrical energy? _____
3. Which **energy output** objects work with the turbine? _____
4. Which **energy output** objects work with the solar panels? _____
5. What happens to the amount of electrical energy that is generated when the:

   Specify "a little" or "a lot"

   a. Faucet is on high? _____
   b. Faucet is on low? _____
   c. There are no clouds? _____
   d. There are lots of clouds? _____
   e. Low heat on the kettle? _____
   f. High Heat on the kettle? _____
   g. The girl pedals slowly? _____
   h. The girl pedals quickly? _____

6. Why must the cyclist be fed in order to continue to pedal?

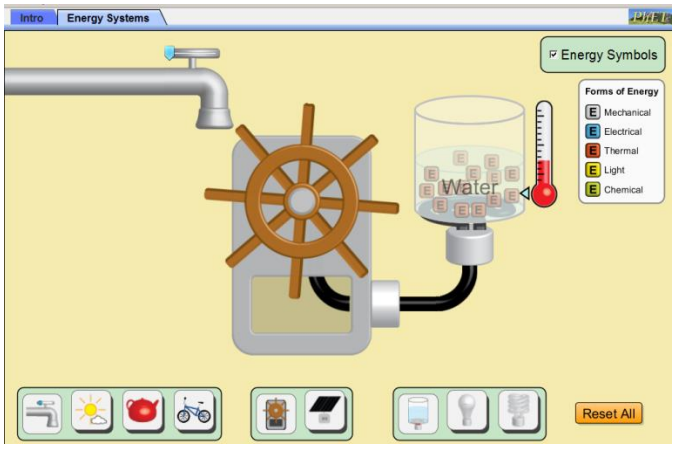
   _____
7. How frequently is chemical energy needed if the cyclist pedals slower? _____
8. If the cyclist pedals faster? _____
9. The Law of Conservation of Energy states that _____

   _____.

Exploring Energy Transfer

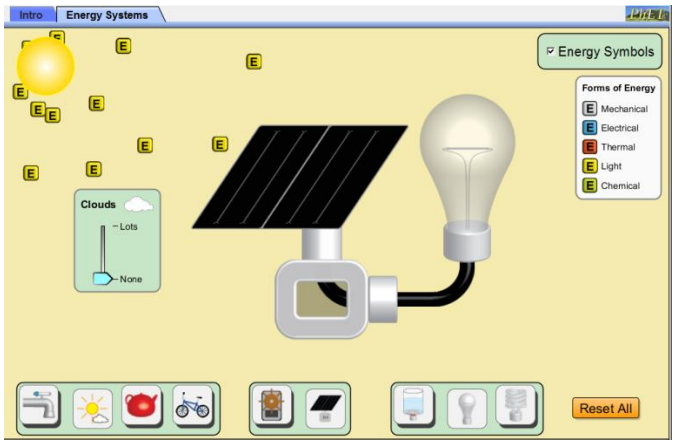
Set up your system as shown in the picture. Let it run for a while and then complete the sentences using the energy symbols to help you "see" the flow of the energy within each system.

10. Turbine Moved by Medium Water Flow from Faucet With A Water Heater System



In this system, _____**kinetic**_____ energy from the moving water of the faucet turns the turbine. The _____ energy of the spinning turbine generates _____ energy in the wires. The electricity transforms into _____ energy in the stove that causes the temperature of the water to increase. The water then becomes steam and gives off more _____ energy into the atmosphere.

11. Solar Panel in Medium Cloud Cover With A Regular Light Bulb System

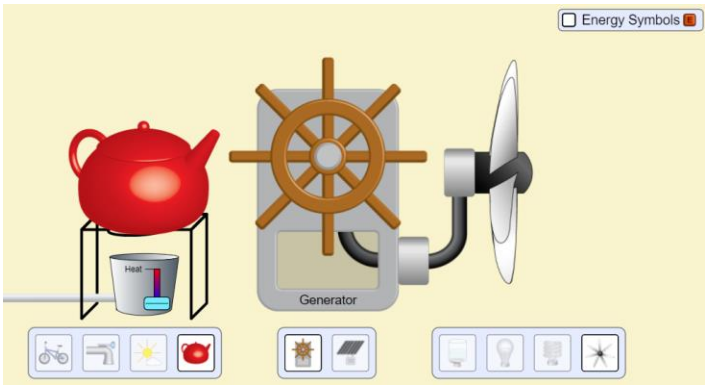


In this system, _____ energy from the sunlight causes the solar panel to create _____ energy in the wires. This energy then flows into the incandescent light bulb. In the

light bulb, the _____ energy is transformed into two different types of energy:

_____ energy that you can feel and _____ energy that you can see.

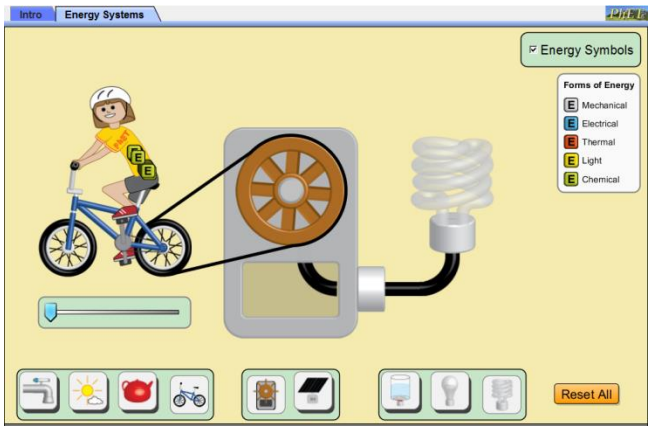
12. <u>Turbine Moved by Steam from Medium Heat Kettle With A Fan blade</u>



In this system, _____ energy from the flames of the fire transfer energy to the kettle causing the liquid to become steam. The _____ energy of the moving steam spins the turbine which generates _____ energy in the wire. The electricity changes to _____ energy in the fanblade.

Note Another form of energy is released from the kettle. What is it? _____

13. <u>Turbine Moved by Cyclist Pedaling at Medium Speed With A Fluorescent Light Bulb System</u>



In this system, _____ energy that the cyclist ate turns into _____ energy in the cyclist's feet. This energy in the legs is converted to a lot of _____ energy that goes to the wooden wheel, and a little bit of _____ energy that goes out into the atmosphere. The _____ energy from the turning bicycle wheel spins the

turbine which generates _____ energy in the wires. The fluorescent light bulb converts this energy into two new forms: a lot of _____ energy and very little _____ energy.

14. Switch out the fluorescent bulb (curly one) with the incandescent bulb (rounded) and observe the energy output. What do you notice about the difference in the energy and output of these two bulbs?

_____

15. In your opinion, which light bulb is more efficient? Efficient means you are getting the exact type of energy you want without "wasting" energy in forms that you do NOT want. _____

16. What kinetic form of energy is not included in the "Energy Symbols" key that would normally be present in these examples? (Look at your energy types chart for help)
_____

17. Look carefully at each of the four systems shown above. Knowing what we have discussed about energy conversions, identify (list) at least three different places where this form of energy (sound) should be "produced".
_____

_____

_____

18. In the space below, explain why this simulation is a good way to illustrate the Law of Conservation of Energy. *Use a specific example to support your answer.*

_____

_____

_____

19. In our county we have windmills that generate electricity for us to use in our homes. First the wind blows onto the blades to make them spin. The blades are attached to a generator that has a magnet near a coil of wire. The spinning of the magnet makes electricity that is sent out through wires to your house. You turn on the TV and are entertained.

A. Wind blows (_____ energy)
B. Blades spin (_____ energy)
C. Magnets spin by wire coils and make (_____ energy)
D. Your TV is showing a bright screen (_____ energy)
E. Your TV is making noises (_____ energy)