Name _____ Period _____ Date _____

Energy Forms & Changes Simulation

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

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.

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

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. Explain why the cyclist must be fed in order to continue to pedal?

   _____

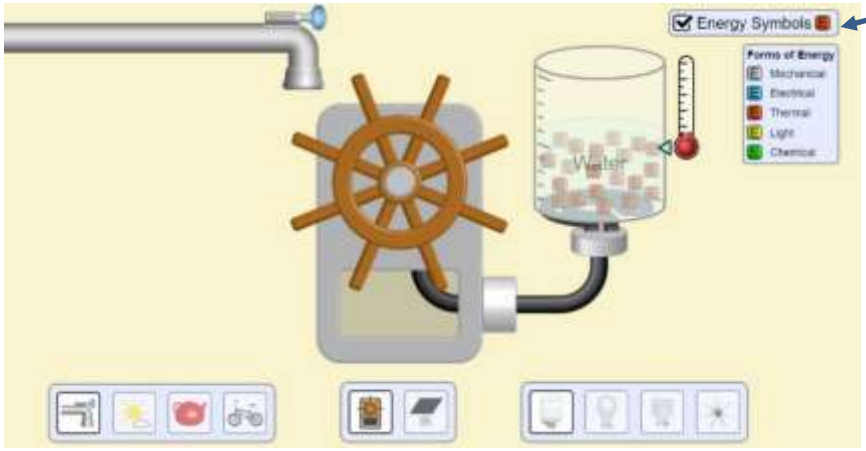
7. The Law of Conservation of Energy states that _____

   _____.

Exploring Energy Transfer

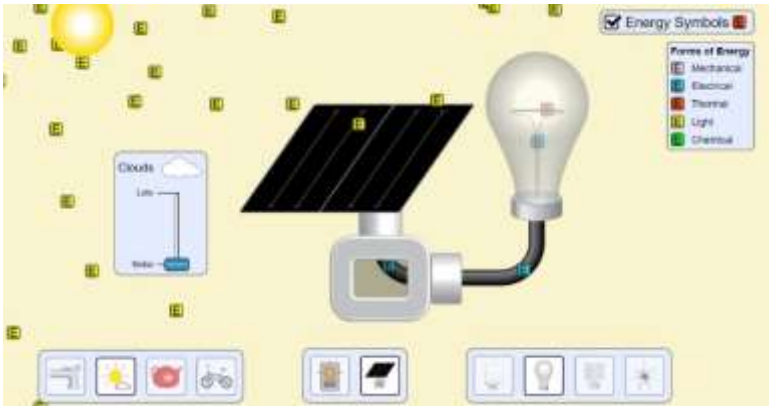
Set up your system as shown in the picture. Let it run for a while and then complete the sentences using the energy symbols to help you "see" the flow of the energy within each system. HINT: **Make sure to check the Energy Symbols box**. Use the color of the "E" boxes to know what form the energy is.

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



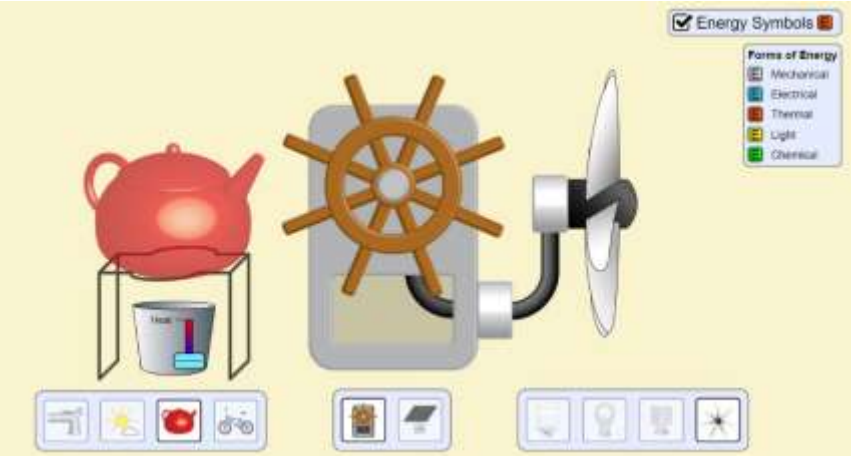
In this system, _____**kinetic**_____ energy from the moving water of the faucet turns the turbine. The _____ energy of the spinning turbine generates _____ energy which is transformed into _____ energy that causes the temperature of the water to increase. The water then becomes steam and gives off more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

9. **Solar Panel in No Cloud Cover With An Incandescent Light Bulb System**



In this system, _____ energy from the sunlight causes the solar panel to create _____ energy which flows into the incandescent light bulb. In the light bulb, the _____ energy is transformed into two different types of energy: _____ energy and _____ energy.

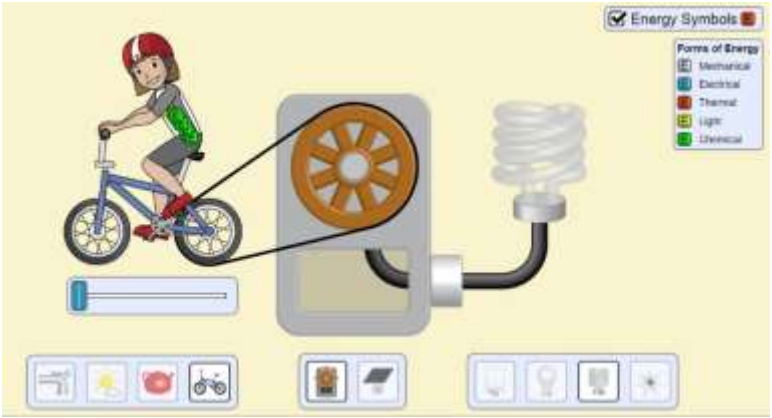
10. <u>Turbine Moved by Steam from Medium Heat Kettle With A Fan</u>



In this system, _____ energy from the flames of the fire transfer energy to the kettle causing the liquid to become steam. The thermal energy of the steam spins the turbine (_____ energy) which generates _____ energy that is used to operate the fan. The moving electric motor and the spinning fan blades are a form of _____ energy. After running for a while, the fan becomes hot to the touch, and ever so often releases _____ energy into the air.

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

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



In this system, _____ energy from the cyclist is converted to a lot of _____ energy and a little bit of _____ energy. The _____ energy from the turning bicycle wheel spins the turbine which generates _____ energy. The fluorescent light bulb converts this energy into two new forms: a lot of _____ energy and very little _____ energy.

12. 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?

_____

In your opinion, which light bulb is more efficient? _____

Explain how you know this. _____

13. What common form of energy (not including kinetic or potential) is not included in the "Energy Symbols" key that would normally be present in these examples?

_____

14. 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".

_____

_____

15. 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.*

_____

_____

_____

_____

_____

_____

_____

16. Application question: In Lancaster county, Pennsylvania, it is common for members of the Amish community to use wind mills to pump water from underground to fill a tank for drinking water. The wind causes the turbine blades to spin, rotating a shaft, which is transferred through some gears to operate a pump, which pumps water up from deep below the ground to fill an above ground tank. Identify the energy conversions happening at each step below.

A. Wind blows (_____ energy)

B. causing the turbine to turn, rotating shaft works pump(_____ energy)

C. Motion of water moving up from well (_____ energy)

D. Water in tank which is positioned 5 feet above the ground level (_____ potential energy)