Name:_____ Date: _____

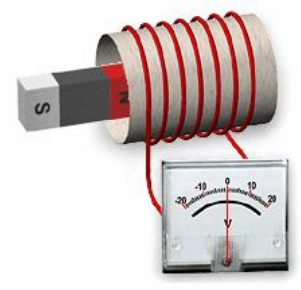
Period:_____

Generators – Let's Get Charged!

The Big Question:

_____

Fill In the Blanks:



1. The movement of a magnet through coiled wire causes charged particles in the wire to move, resulting in _____.
2. An electric generator is a device that converts _____ energy to_____ energy.
3. A generator consists of _____ and coiled wire.
4. Kinetic energy moves the magnets (or the coil of wire) and this causes charges in the coiled wire to _____.
5. A water pump (or even a pump for soap) is similar to a generator because it causes the water to flow but _____.

Generator I. Transfer of energy: KE→electrical energy

Directions:

A. Collect the pieces needed to assemble a generator. You will need:

- CD with magnets
- Rod with small gear
- Gear crank
- Large gear
- CD with coils of wire
- White board
- Washer

B. First, slide the rod with the small gear through the top hole on the white board. Then slide the CD with coils of wire onto the plastic rod so that the coils are facing the white board.

C. Next, slide a washer onto the rod.

D. Then, slide the CD with magnets onto the rod so that the magnets are facing away from the white board. Lastly, insert the large gear onto the gear crank and insert them into the other hole so that it is on the side opposite the CDs.

E. Using the alligator clips at the end of the wires connected to the voltmeter, connect the voltmeter and the LED to the wires coming off the generator. Set the voltmeter to "DC V 2000m". Experiment with the generator by cranking the handle at different speeds and observing whether the LED lights and what voltage the voltmeter is reading.

1. Where is kinetic energy present in your generator? _____
2. Where is electrical energy present in your generator? _____
3. Is the amount of KE related to the amount of electrical energy in your generator? Justify your answer._____

   _____

   _____

F. **Generator II. Transfer of energy: PE→KE→Electrical Energy**

G. Disconnect the voltmeter clips and remove everything from the white board. Push the plastic rod with the spool of string on it halfway through the top hole in the white board. Slide the CD with the coils of wire onto the plastic rod and attach the Velcro pieces so that the coils do not spin. Insert the washer and the CDs with the magnets so that the magnets are facing away from the wooden board. Attach the alligator clips of the voltmeter to wires on each side of the LED light.

H. One group member should hold the board on the edge of the table with the pulley facing off the table. Another member should connect a 500 g weight to the end of the string and wind the string around the spool until the weight is raised 20 cm off the ground. Release the weight and record the maximum voltage that is measured from the generator. Put this number in the chart below.

I. Repeat this procedure for the heights shown in the table below. Complete 2 measurements for each height and record your data in the table below.

	TRIAL 1	**TRIAL 2**
Height off the ground	Maximum Voltage Observed	Maximum Voltage Observed
20 cm		
40 cm		
60 cm		
80 cm		

4. Where is potential energy present in this experiment? _____
5. Where is kinetic energy present in this experiment? _____
6. Where is electrical energy present in this experiment? _____
7. Is the amount of PE related to the amount of electrical energy in your experiment? Justify your answer. _____

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