Harnessing Electrical Energy

A. Fill in the Blanks

Complete each sentence with the correct word from the word bank.

1. A material that allows electricity to flow through it easily is called a _____.

2. In a power plant, steam or moving water spins a _____, which is connected to a generator.

3. A _____ is a device that converts mechanical energy into electrical energy.

4. Wind energy is considered a _____ resource because it will not run out.

5. A complete, unbroken path through which electricity can flow is called a closed _____.

B. Match the Following;

Match the term in Column A with its correct description or example in Column B.

Column A	Column B
1. Load	A. A source of energy that will eventually run out (e.g., coal, oil).
2. Insulator	B. A device that uses electrical energy, such as a motor or light bulb.
3. Power Source	C. A material that prevents the flow of electricity, such as plastic
4. Non-renewable	D. The sun, wind, or moving water
5. Renewable	E. A device that provides electrical energy, such as a battery or outlet.

C. Practice Problems

Answer the following questions in more detail.

1. Describe the main difference between a renewable and a non-renewable energy source. Give one example of each.
2. Draw a simple closed circuit diagram that includes a battery, a switch, and a light bulb. Label all three parts.(Draw in the space below)

3. Explain the energy transformation that occurs in a hydroelectric power plant, starting from the water in the dam.

4. Why are the electrical wires in your home coated with plastic or rubber?

5. What happens to the other light bulbs in a series circuit if one bulb burns out? Why?

6. What happens to the other light bulbs in a parallel circuit if one bulb burns out? Why?

7. What is the function of a generator?

8. List two advantages of using solar power.

9. List two disadvantages of using fossil fuels (like coal) to generate electricity.

10. What are the two main things that electrical energy transforms into when you use a toaster?

D. Warm-up Questions

Answer the following basic questions.

1. What is the main purpose of a switch in an electrical circuit?

2. Name one source of energy that is considered "renewable."

3. Is copper metal a good conductor or a good insulator of electricity?

4. What is the name of the device in a power plant that spins to generate electricity?

5. Give one example of electrical energy being transformed into light energy.

E. Challenge Questions

These questions require critical thinking and detailed explanations.

1. A city wants to build a new power plant. They are deciding between a coal-fired power plant and a large wind farm. Argue in favor of the wind farm, explaining at least three key benefits over the coal plant.

2. Explain why a parallel circuit is a much more practical and safe way to wire a house compared to a series circuit.

3. Trace the path of energy from the sun all the way to you listening to music on a battery-powered speaker that was charged using a solar panel. List at least four energy transformations.

4. Besides the source of energy (e.g., coal, water, wind), what two components are almost always found in large-scale power plants to generate electricity? Explain the role of each.

5. Design a simple experiment to test whether saltwater is a better conductor of electricity than pure (distilled) water. List your materials and steps.

F. Word Problems & Application

Apply your knowledge to these real-world scenarios.

1. During a thunderstorm, a tree falls and breaks a power line leading to your neighborhood. What safety rule is most important to follow if you see the downed power line? Why?
2. Your family's electricity bill is very high. Suggest three specific actions your family can take to conserve electrical energy and lower the bill.
3. An inventor wants to create a portable reading light for camping. What would be a better power source: a long extension cord or a battery? Explain your choice.
4. A new school is being built in a very sunny desert area. What type of renewable energy source would be the most logical and efficient to install at the school? Why?
5. You plug in an old lamp and the lights in the entire room go out, but the lights in the rest of the house stay on. This is likely because a safety device called a circuit breaker was tripped. What is the purpose of a circuit breaker?

G. True or False

1. In a power plant, a generator's job is to burn fuel. _____
2. An open circuit is one that is complete and allows electricity to flow. _____
3. Rubber and glass are good insulators of electricity. _____
4. All forms of electricity generation have zero impact on the environment. _____
5. A battery converts electrical energy into chemical energy. _____