Follow the Energy

Trace how energy changes in a remote power system.

PHS.7.1 "Using digital resources, explore forms of energy (e.g., potential, kinetic, mechanical, chemical, electrical, thermal, radiant, and nuclear)."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the named forms of energy in the passage. Then number the forms on the sunlight-to-signal-light path in the order energy changes from one form to the next.

Power for a Remote Sensor

1. A science class uses an online interactive model to plan power for a remote weather sensor. The model lets users switch between a solar panel and a small turbine in a stream, then follow the energy into a rechargeable battery and a blinking signal light. Labels name each form of energy, while arrows show where it travels. A useful trace begins with the source and ends with every output, not just the one people want. Energy is transferred from place to place or transformed from one form to another. The sensor does not create energy.

2. When the class selects a sunny afternoon, sunlight reaches the panel. Sunlight is radiant energy, carried by electromagnetic waves. The panel converts some of this energy to electrical energy that flows through wires. Inside the battery, charging stores energy through chemical changes. After sunset, those chemical changes supply electrical energy to the light, which sends out radiant energy. A temperature display also rises near the panel and the light. That rise signals thermal energy spreading into the surroundings. The model shows a smaller energy transfer on a cloudy afternoon, so the battery charges more slowly.

3. When the class selects the stream, water high on a slope has gravitational potential energy because of its position. As it moves downhill, some becomes kinetic energy of moving water. Flowing water turns the turbine, whose rotating parts carry mechanical energy; a generator converts that motion into electrical energy. Some energy also becomes thermal energy as parts rub and water swirls. In the model, closing the water gate stops the turbine even if the battery still powers the light for a while. The display helps students distinguish energy entering the system from energy already stored inside it.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why does the battery charge more slowly on a cloudy afternoon? Trace the energy from sunlight to storage.

2. Trace the stream's energy from water high on the slope to the electricity made by the generator. Name the forms in order.

3. The water gate closes, but the light keeps blinking. Trace the stored energy to the light and name two energy outputs from the light.

4. A student says the stream system creates electrical energy from nothing. Use the energy trace to explain why that claim is incorrect, and name another form the energy becomes.

3 YOUR TURN

Your own words

Use a digital diagram, simulation, or video to investigate a device or process other than those in the passage. In four or five sentences, name your source, trace at least three distinct energy forms in order, identify a less useful output, and cite one label or observation from the source.

ANSWER KEY

Follow the Energy

HIGH SCHOOL · PHS.7.1

PART 1 · READ AND MARK

Underline the named forms of energy in the passage. Then number the forms on the sunlight-to-signal-light path in the order energy changes from one form to the next. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why does the battery charge more slowly on a cloudy afternoon? Trace the energy from sunlight to storage.	**Less radiant energy reaches the panel, so it produces less electrical energy to store through chemical changes in the battery.**
2	Trace the stream's energy from water high on the slope to the electricity made by the generator. Name the forms in order.	**Gravitational potential energy, kinetic energy of moving water, mechanical energy of the rotating turbine, then electrical energy.**
3	The water gate closes, but the light keeps blinking. Trace the stored energy to the light and name two energy outputs from the light.	**Chemical energy stored in the battery supplies electrical energy to the light. The light sends out radiant energy and thermal energy.**
4	A student says the stream system creates electrical energy from nothing. Use the energy trace to explain why that claim is incorrect, and name another form the energy becomes.	**The electrical energy comes from moving water that began high on a slope, not from nothing. Some energy also becomes thermal energy.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I used the PhET Energy Forms and Changes simulation to explore a cyclist powering a lamp. Chemical energy from food becomes mechanical energy as the cyclist pedals. A generator changes that mechanical energy to electrical energy, and the lamp releases radiant energy. The lamp also releases thermal energy, which does not help light the room. The simulation's thermal-energy symbols moving away from the lamp show that output.

Accept accurate energy traces that distinguish an energy form from the device carrying or converting it. For the open task, check that the named digital source supports the cited label or observation.