

Power for Plants

Trace how technology transfers and transforms energy in a solar water pump.

5.9.c “advances in technology improve the ability to transfer and transform energy.”

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each sentence that tells how a technology transfers or transforms energy, and circle the names of the energy forms to trace where the energy goes.

A Garden Pump That Uses Sunlight

- ① At a community garden, a solar-powered pump moves water from a storage tank to raised beds. Solar cells in the panel transform light energy from the Sun into electrical energy. Wires transfer the electrical energy to the pump's motor. Inside the motor, electrical energy changes into mechanical energy, turning an impeller that pushes water through a hose.
- ② Older solar pumps often stopped whenever a cloud briefly covered the Sun. New controllers check the panel's output many times each second. They adjust the motor's speed so it uses available electricity instead of shutting off. This technology helps transfer electrical energy to the motor more steadily. Efficient motors also waste less energy as unwanted thermal energy, so more electrical energy becomes useful mechanical energy.
- ③ A rechargeable battery can keep the pump working after sunset. While charging, it transforms electrical energy from the solar panel into stored chemical energy. During discharge, it transforms chemical energy back into electrical energy, which travels through wires to the controller and motor. Better battery materials can store more energy and last through more charging cycles. Together, these advances make energy available when and where gardeners need it.

2 ANSWER WITH EVIDENCE Use the passage

1 What energy transformation happens in the solar panel?

2 How does electrical energy get from the solar panel to the pump's motor?

3 How does a new controller improve the pump's use of energy when clouds cover the Sun?

4 Describe the energy changes that happen when the rechargeable battery charges and then discharges.

3 YOUR TURN Your own words

Invent a device that solves a school problem, such as lighting a path or cooling a lunch box. In 2 or 3 sentences, name its energy source, describe an energy transfer or transformation, and explain how one technology would reduce waste or make energy available at a useful time.

PART 1 • READ AND MARK

Underline each sentence that tells how a technology transfers or transforms energy, and circle the names of the energy forms to trace where the energy goes. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What energy transformation happens in the solar panel?	The solar panel transforms light energy from the Sun into electrical energy.
2	How does electrical energy get from the solar panel to the pump's motor?	Wires transfer electrical energy from the solar panel to the motor.
3	How does a new controller improve the pump's use of energy when clouds cover the Sun?	It checks the panel's output and adjusts the motor's speed, so the motor uses available electricity instead of shutting off.
4	Describe the energy changes that happen when the rechargeable battery charges and then discharges.	During charging, electrical energy changes into chemical energy. During discharge, chemical energy changes back into electrical energy.

PART 3 • YOUR TURN (SAMPLE ANSWER)

A backpack light uses a solar panel to transform sunlight into electrical energy, which travels by wires to charge a battery. The battery changes chemical energy into electrical energy after dark, and an LED gives light while wasting little energy as heat.

Accept equivalent descriptions of energy transfers and transformations that match the passage. For the open response, accept any realistic device with a stated energy source, a correct transfer or transformation, and a reasonable technological improvement.