Solar and geothermal resources: different pathways

Student activity • observation and reasoning

YEAR 10 / LESSON 31 / PHYSICS ONLY

The question

Why is a solar water heater different from a photovoltaic panel?

Compare resource diagrams and observe a small photovoltaic panel powering a suitable low-power load.

Equipment

- Small photovoltaic panel, matched low-power motor or meter, connecting leads
- Opaque card, process diagrams and booklet

Use the small panel and its matched load only. Keep it stable and dry; do not connect to mains or batteries. Do not look at the Sun, use focusing lenses or lean out of windows.

Course coverage: Physics only: 4.18P, 4.19P. Solar and geothermal resources.

Plan, model or apparatus sketch

Draw a labelled setup or force diagram; include the measured quantities.

Method and reasoning

Read the whole sequence before starting

YEAR 10 / LESSON 31 / PHYSICS ONLY

1. Draw three pathways: sunlight heating water, sunlight producing electrical output from a photovoltaic cell, and geothermal heating used to drive a turbine and generator.

2. Observe a staff-checked small photovoltaic panel connected to a matched low-power motor or meter near a window. Keep the panel supported.

3. Cover the panel with an opaque card, then uncover it. Record the visible change without claiming a measured efficiency.

4. Explain why solar heating alone supplies thermal energy rather than electrical output. Distinguish a photovoltaic cell from a steam turbine system.

5. Compare sunlight variability, geothermal site dependence, fuel requirements and environmental impacts. Avoid describing every renewable resource as available everywhere.

6. Choose one of the three technologies for an invented use case and explain the match between its output and the need.

Cleanup

- Disconnect and store the small panel and return diagram cards.

Record your evidence

Blank spaces are for your own work

YEAR 10 / LESSON 31 / PHYSICS ONLY

Reference and task data

No numerical generation data are supplied. A small classroom panel demonstrates a pathway, not the performance or cost of a full installation. Geothermal electricity generation depends on suitable geological conditions; domestic ground-source heat pumps are a different system.

System / condition	Observation or output	Energy pathway
Panel uncovered		
Panel covered		
Solar water heating		
Geothermal electricity		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

YEAR 10 / LESSON 31 / PHYSICS ONLY

1. What output does a solar water heater supply?

2. Does a photovoltaic cell need a turbine?

3. What drives a geothermal turbine?

4. What happens when the classroom panel is covered?

5. Why is geothermal generation site-dependent?

6. Does renewable mean impact-free?