

Investigation of the factors affecting the output from a solar panel

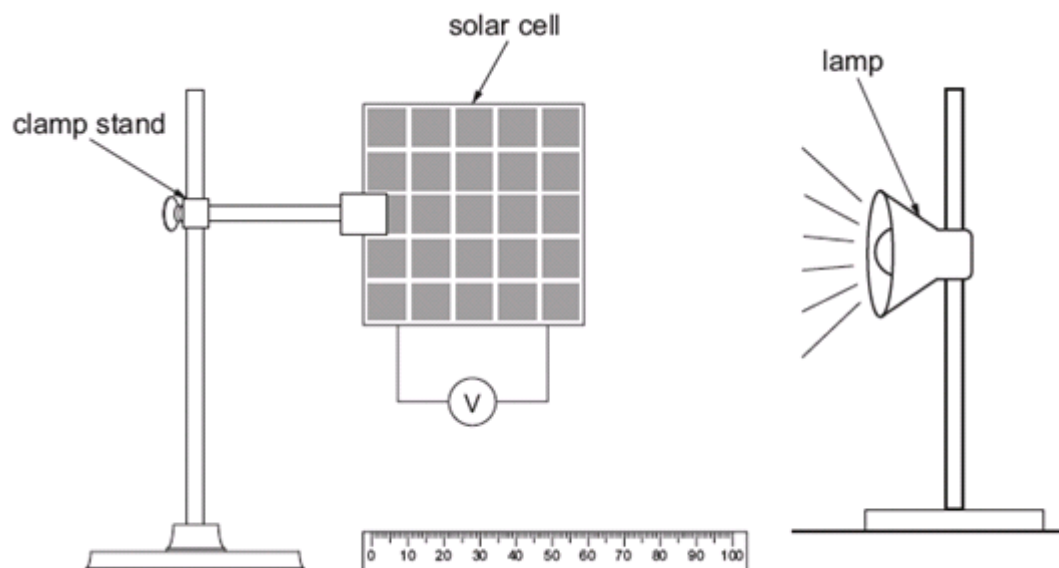
Introduction

Solar photovoltaic cells convert energy received from the sun into electricity. The output from a solar panel varies depending on the intensity of the radiation falling on it. In the UK in winter, the Earth's axis is tilted, reducing the intensity of the radiation reaching us. You can model this effect by moving a light source further away from a solar panel and measuring the voltage produced.

Apparatus

solar panel
 voltmeter $\pm 0.01 \text{ V}$
 metre ruler $\pm 1 \text{ mm}$
 12V lamp and holder
 12V d.c. power supply
 connecting leads
 clamp stand, boss and clamp

Diagram of Apparatus



Method

1. Carefully clamp the solar panel in the boss.
2. Connect the solar panel to the voltmeter.
3. Place the lamp 20cm from the solar panel.
4. Record the output voltage.
5. Repeat steps 3 to 4 increasing the distance by 20cm each time, up to 100cm.
6. Repeat the experiment twice more.

Analysis

1. Calculate the mean voltage for each distance.
2. Plot a graph of mean voltage against distance.

Risk Assessment

Hazard	Risk	Control measure
Hot lamps can burn	If the lamp is touched when moving it can cause burns to the skin	Do not move lamp until cool

Teacher / Technician notes

Solar panels are available to buy very cheaply from Rapid Electronics e.g. TruOpto OPL30A10101 Solar Module 3V 100 mA 0.3W order code 56-0124.

This task could be useful in developing planning skills as students could plan to investigate the effect of increasing cloud cover, by covering the solar panel with different thicknesses of tracing paper.

Working scientifically skills covered

1. Development of scientific thinking

Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.

Explain every day and technological applications of science; evaluate associated personal, social, economic and environmental implications and make decisions based on the evaluation of evidence and arguments.

2. Experimental skills and strategies

Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena.

Apply a knowledge of a range of techniques, instruments, apparatus and materials to select those appropriate to the experiment.