Solar Boat

Overview: Does it matter at what angle a solar panel receives incoming sunlight? If so, does it matter enough to make a difference? We'll find out today in this clever experiment.

What to Learn: Sunlight is very important for all life on earth. Without it, we would not be able to survive. Thankfully we can use its energy in all kinds of ways, like we will today!

Materials

- Solar Project Kit (Radio Shack #277-1201) or other solar cell with motor (usually sold in hobby stores)
- Foam block (about 6" long)
- Alligator clip leads (RS#278-1156)
- Propeller (if your kit doesn't come with one) – you can rip one off an old small personal fan or old toy

Lab Time

1. Attach the wires of the solar cell to the motor (one to each motor terminal).
2. Attach the propeller to your motor. If the shaft won't fit, drill out the center hole. If the hole is too large, use a tiny dab of hot glue on the shaft tip to secure the propeller into place.
3. Stand out in the sun. How do you need to hold your solar cell to make the propeller spin the fastest?
4. Position the motor on a block of foam so that the propeller hangs off the edge and is free to rotate. Hot glue the motor into place, being careful not to get any hot glue near any vents in your motor.
5. Hot glue your solar cell to the foam block. You might want to check the final position in sunlight before attaching it.

Solar Boat Observation

Draw a picture of the angle at which your solar boat performs the best. Why do you think this is?

Reading

Does it really matter what angle the solar cell makes with the incoming sunlight? If so, does it matter much? When the sun moves across the sky, solar cells on a house receive different amounts of sunlight. You're going to find out exactly how much this varies by building your own solar boat.

Many solar companies advise people on how to position their solar panels depending on where in the world they live. Of course you would want to think about this if you live in a place where the sun is blocked for part of the year. Surprisingly, some of the world's fastest growing solar power markets are in cold, northern climates like Canada and Russia!

Exercises Answer the questions below:

1. What kind of electricity comes from a battery and photovoltaic cell?
    a. Nuclear
    b. Voltaic
    c. Electrochemical
    d. Ionized
2. Electricity is another name for the free flow of:
    a. Protons
    b. Quarks
    c. Electrodes
    d. Electrons
3. True or false: Ions are attracted to the same charge.
    a. True
    b. False
4. Do solar panels work in cloudy climates?
    a. Yes
    b. No

Answers to Exercises: Solar Boat

1. What kind of electricity comes from a battery and photovoltaic cell? (electrochemical)
2. Electricity is another name for the free flow of (electrons)
3. True or false: Ions are attracted to the same charge. (false)
4. Do solar panels work in cloudy climates? (yes)