**Activity 7: Solar Circuits**

*source: Solar Schoolhouse*

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**Project #12: Series and Parallel Circuits**

Wire solar cells to a small DC motor. Watch what happens with series and parallel circuits. Find out how to make the motor turn faster, and which circuit works better on a cloudy day.

**Materials**
- Solar cells
- Direct current hobby motor
- Plastic wheel (optional)
- Jumpers with alligator clip ends

**Simple Circuit to Motor**
1. Use jumpers to connect wires from the solar cell to the terminals on the motor. Notice which way the motor spins. The plastic wheel makes it easier to see which way the motor is turning.
2. Reverse polarity by switching the jumpers on the motor terminals, and observe. What happens when you reverse polarity?

**Series Circuit to Motor**
1. Use a jumper to connect the black (-) wire of one cell to the red (+) wire of another cell.
2. Use jumpers to connect the remaining wire from each cell to the terminals on the motor. What happens?
3. Connect more cells in series, and notice motor speed.

**Parallel Circuit to Motor**
1. Use one end of a jumper to clamp the red wires from two solar cells together, and clip the other end to a terminal on the motor.
2. Use a jumper to clamp the black wires from the two solar cells together, and clip the other end to the other terminal on the motor.

**NOTE:** Parallel circuits are useful for powering loads when there is less sunlight, like on a cloudy day. There are two paths for the current to follow between the cells. What happens when you shade one cell? Why do you think this happens in a parallel circuit?

**Each solar cell produces .5 volts and .4 Amps, or 400 milliamps (mA) in maximum sun.**

**Series wiring (+ to -) adds the voltage. The PV amps stay the same.**

**Parallel wiring (- to - and + to +) adds the amperage and the voltage stays the same.**

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Imagine the power is out at your house and you want to listen to the radio. You’re in luck! You have six solar cells, and it’s a sunny day. All you need to do is figure out how to connect them to the radio.

You know the following information:

1. Each solar cell produces 0.5 volts and 0.4 amps in full sun.
2. The radio needs 3 volts and 0.3 amps.

Draw the wires between the solar cells, and connect them to the radio wires.

**Remember:**
Wiring cells in series (+ to -, + to -) adds volts, PV amps stay the same.
Wiring cells in parallel (+ to +, - to -) adds amps, volts stay the same.

**Final output of solar cells:**

______ volts
______ amps

What kind of wiring method did you use? ______________________

How much power (in watts) does the radio use? _______________

Power formula: watts = volts x amps