

Here Comes the Sun

Student Worksheet:

Dissect a Solar Powered Calculator

Step One: As a team, observe whether the calculator operates when you completely block the solar power panel. What happens if you partially block the solar panel? Write your observations, and explanations of what you found below.

Step Two: Suggest five other products you can think of that are either completely or partially powered by solar panels.

Step Three: As a team, disassemble either a new (inexpensive) or old unusable solar powered calculator, using the materials provided to you. Be sure that you remove all the small screws that hold the top and bottom together, some are often hidden under pads or rubber strips. You will need to use a very small screwdriver, such as the type commonly found in eyeglass repair kits. And, you will need to unscrew the circuit board from the front panel of the calculator too -- there are many screws.

Safety Note: Be careful touching the solar panel and the LCD (liquid crystal display) as the glass edges may be sharp.

Step Four: As a team, observe the solar panel and see how it is connected to the other parts of the calculator. Examine all the other parts of the calculator, and discuss what you find. Then answer questions below.

Questions:

1. How many individual parts did you find? Describe them.
2. What surprised you the most about the interior parts of the calculator?
3. How was the solar panel connected to the circuit board?

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Student Worksheet: Dissect a Calculator (continued)

4. If there was a battery back up for this calculator, how was it connected to the circuit board?

5. Some calculators will still operate in the disassembled state, as long as the wires from the solar panel and battery are still connected to the circuit board. Does your calculator still operate? If you reconnect the wires with scotch tape, does it still work?

6. Why do you think there was a rubber or plastic sheet separating the circuit board from the buttons you press?

7. What type of material do you think is embedded under the plastic or rubber sheet and the circuit board? Why do you think engineers included this sheet in their design?

8. Assuming you could repower your calculator, if you reconstructed your calculator with all the buttons in different positions, would it still work properly? Why, why not?

9. Is there anything you would recommend, as part of an engineering team, to improve the functionality of the calculator you disassembled? Attach a drawing or sketch of your proposed component part or improvement, and answer the questions below:

What new materials will you need (if any)	What materials or parts will you eliminate (if any)	How will this new product improve the functionality of a calculator?	How do you think your new design will impact the cost of this calculator? Why?

5. Present your ideas to class.