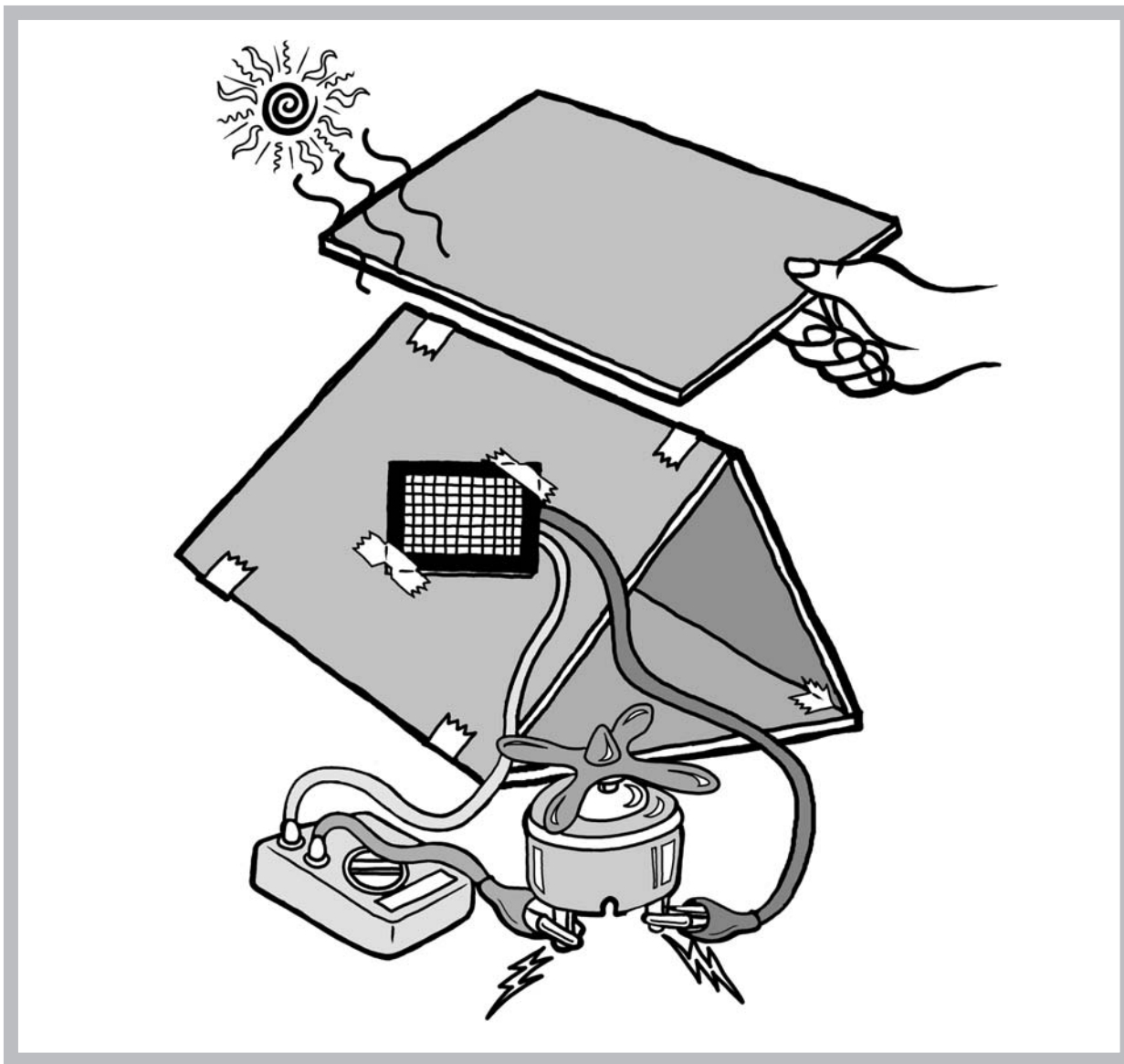


Lab Instruction Card A: *Effect of Light Intensity on PV Current*

Instructions: Please do not write on this card. Return it to the teacher when you are done.

Question:

What effect does the intensity of incoming light have on the amount of electric current (amperes) produced by a PV cell?



Equipment and Supplies:

- PV cell
- small buzzer, fan, or other device
- two wire leads (not needed for some types of PV cells)
- ammeter or multi-meter
- one piece of window screen
- two pieces of aluminum foil
- two sheets of cardboard
- tape (several inches)

A

Lab Instruction Card A: *Effect of Light Intensity on PV Current*

Instructions:

1. Read this entire instruction card and study the illustration.
2. Discuss the experiment with your team to be sure you all understand.
3. With your group, frame a hypothesis about the effect of light intensity on PV current and write it on your lab sheet.
4. Prepare for the experiment:
 - Build an electric circuit with the PV cell, wire leads, and electric device. Check that it functions.
 - Set the ammeter to register currents between 0 and 200 milliamps or up to .2 amps.
 - Place the ammeter in the electric circuit. Check that the circuit and ammeter function.
 - Devise a method to keep the PV cell at a right angle (90°) to the incoming sunlight. If the sun is directly overhead, simply place the PV cell on a table or level ground. If the sun is not directly overhead, fold and tape a piece of cardboard into a triangular shape so that one side is at a right angle to the sun's rays while another side is on the table or ground. Then tape the PV cell to the folded cardboard.
 - With your team, decide who will hold the cardboard and the PV cell, read the ammeter, and record the data.
5. Conduct the experiment—checking the current (amperes) produced by the PV cell under different light conditions—and record your data. Tips:
 - Remember that during a controlled experiment, your goal is to keep constant all variables other than the one you are studying—in this case light intensity.
 - Throughout the experiment, take care that you do not accidentally shade the PV cell.
 - Even when you hold the PV cell steady, the ammeter reading may fluctuate. Watch the readings for a moment and record the median.
6. Use your data to create a bar graph.
7. Discuss the results with your team. Do the results support your hypothesis or refute it? Explain this on your lab sheet.
8. Discuss the real-world applications question and complete the lab sheet.

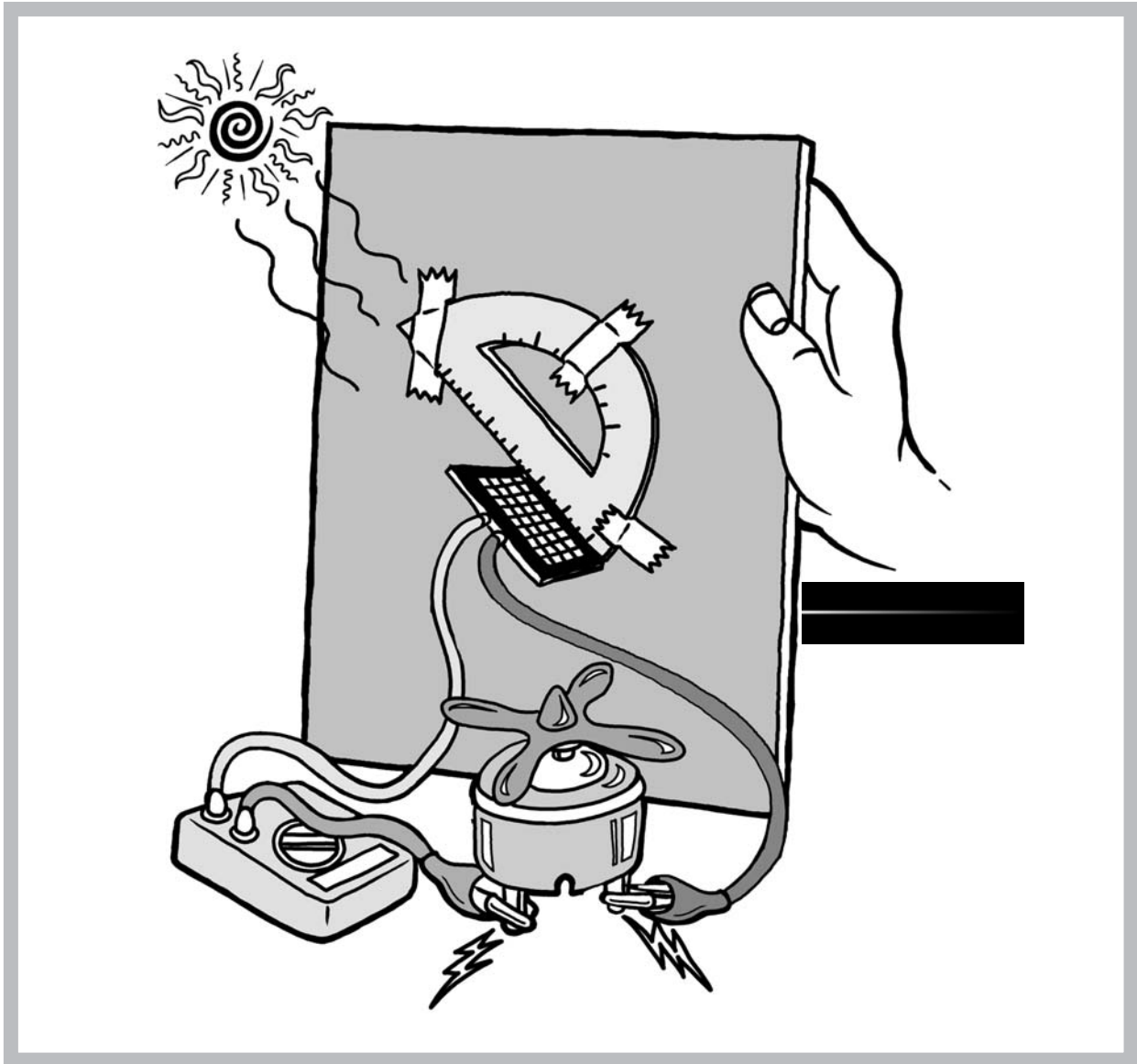
B

Lab Instruction Card B: *Effect of Light Angle on PV Current*

Instructions: Please do not write on this card. Return it to the teacher when you are done.

Question:

What effect does the angle of incoming light have on the amount of electric current (amperes) produced by a PV cell?



Equipment and Supplies:

- PV cell
- small buzzer, fan, or other device
- two wire leads (not needed for some types of PV cells)
- ammeter or multi-meter
- protractor
- sheet of cardboard
- tape (several inches)

B

Lab Instruction Card B: *Effect of Light Angle on PV Current*

Instructions:

1. Read this entire instruction card and study the illustration.
2. Discuss the experiment with your team to be sure you all understand.
3. With your group, frame a hypothesis about the effect of light angle on PV current and write it on your lab sheet. Consider the graphs from Lesson 2.
4. Prepare for the experiment:
 - Build an electric circuit with the PV cell, wire leads, and electric device. Check that it functions.
 - Set the ammeter to register currents between 0 and 200 milliamps or up to .2 amps.
 - Place the ammeter in the electric circuit. Check that the circuit and ammeter function.
 - Hold the cardboard upright, with one end against the table and one edge toward the sun. (Never look directly at the sun.)
 - Tape the protractor to the cardboard so that the bottom of the protractor is tilted at the angle of the incoming sunlight.
 - With your team, decide who will hold the cardboard and the PV cell, read the ammeter, and record the data.
5. Conduct the experiment—checking the current (amperes) produced when the PV cell is at different angles—and record your data. Tips:
 - Remember that during a controlled experiment, your goal is to keep constant all variables other than the one you are studying, in this case light angle.
 - Throughout the experiment, take care that neither your bodies nor the cardboard shade the PV cell.
 - Even when you hold the PV cell steady, the ammeter reading may fluctuate. Watch the readings for a moment and record the median.
6. Use your data to create a line graph.
7. Discuss the results with your team. Do the results support your hypothesis or refute it? Explain this on your lab sheet.
8. Discuss the applications question and complete the lab sheet.



Lab Sheet A: *Effect of Light Intensity on PV Current*

Team name: _____ Class / Period: _____

Student name(s): _____

Instructions: Use the Lab Instruction Card for guidance in completing this sheet.

Hypothesis: _____

Record your data on light intensity and PV current and then graph the data:

Light Conditions	Current (milliamps)
shade (with cardboard)	
partial shade (with screen)	
full sunlight	
full sunlight with reflector	



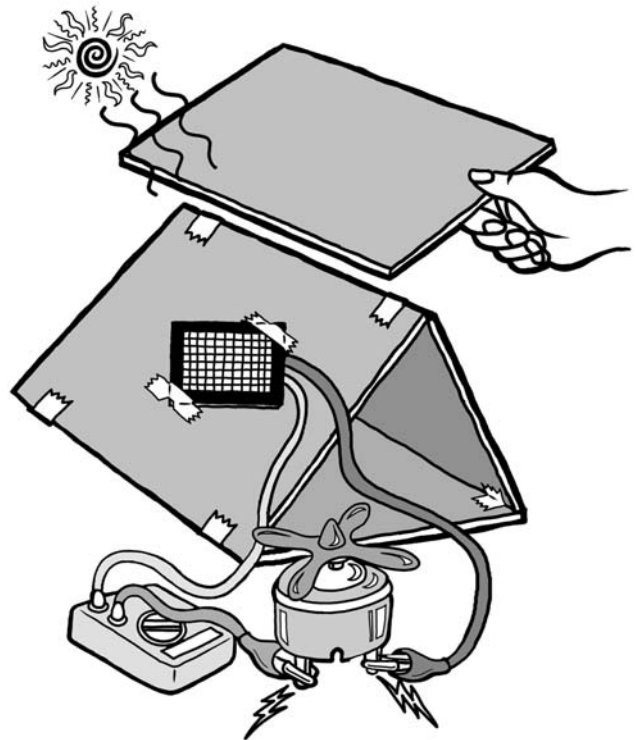
A

Lab Sheet A: *Effect of Light Intensity on PV Current*

continued

Results: Summarize your experimental results and explain whether they support or refute your hypothesis:

Real-world application: What are some factors you would want to consider when choosing a site for a PV system either in the country or the city?



B

Lab Sheet B: *Effect of Light Angle on PV Current*

Team name: _____ Class / Period: _____

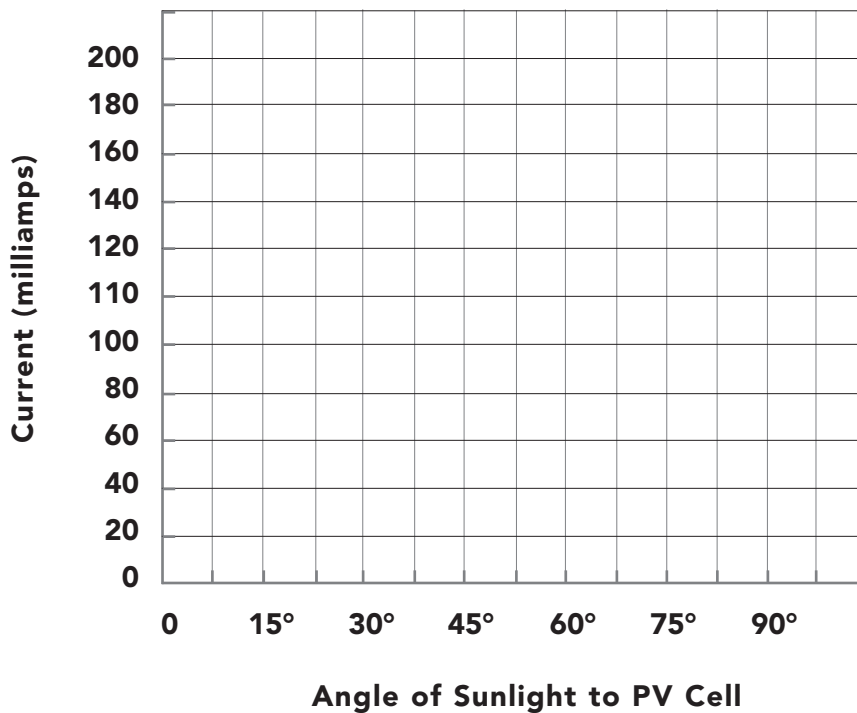
Student name(s): _____

Instructions: Use the Lab Instruction Card for guidance in completing this sheet.

Hypothesis: _____

Record your data on light angle and PV current and then graph the data:

Angle of Incoming Light	Current (milliamps)
0°	
15°	
30°	
45°	
60°	
75°	
90°	



B Lab Sheet B: *Effect of Light Angle on PV Current*

continued

Results: Summarize your experimental results and explain whether they support or refute your hypothesis:

Real-world application 1: In the Northern Hemisphere, where incoming sunlight usually comes from an angle south of directly overhead, what might be done to increase the amount of electric power produced by a PV array?

Real-world application 2: What might be done to increase the amount of electric power produced by a PV array throughout the day, while the angle of the sun is constantly changing?

