

Students please affix one of the self adhesive labels from your sheet of identification labels to this page. Make sure the edges of the label are within the boundaries of this box and that the affixed label does not obscure any other parts of this page. If you do not have a self adhesive identification label, please complete the following information.

Your Name: _____
Write your name as it appears on your name badge.

Your Participant Code:

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Write your participant code as it appears on your name badge.
Two letter state abbreviation. ↑
State code (0301, 0302, to 0350) ↑
Team member number (01, 02, 03, or 04) ↑

Students please do not write or mark within this box.

Judges, after this skill sheet has been scored and double checked, write the total score for this activity in the blank below.

Skill Activity Score: _____

Judge's Initials: _____

2013 National FFA Agricultural Mechanics Career Development Event

Energy Systems Skill Sheet

Please read and follow directions carefully! Use your time wisely!

GENERAL INFORMATION/DIRECTIONS: Read through the entire skill sheet prior to answering any questions.

Please use caution while using the multimeter. Do not cut any wires, use only the tools provided at the workstation.

For this skill activity, assume that you are the technician assigned to troubleshoot the roof mounted system that is displayed on the table for this activity. You will be referencing the specification data associated with the photovoltaic module, and comparing the specifications to the actual measurements you will perform on the module. Do not turn on the multimeter if you do not know how to operate it safely.

Troubleshooting and evaluating a photovoltaic (pv) panel by measuring the open-circuit voltage, the short-circuit current and the maximum power output.

PROCEDURES: TEST THE PV PANEL USING THE MULTIMETER

Because you are working around equipment, safety glasses must be worn at all times. Fill in the blanks or circle the best answer for the following questions:

1. What is the actual open-circuit voltage reading from your pv panel? _____
2. According to the manufacturer, what should the open-circuit voltage be? _____
3. What could explain the difference in the actual measured and the theoretical open-circuit voltage? _____
4. What is the actual short-circuit voltage reading from your pv panel? _____
5. According to the manufacturer, what should the open-circuit voltage be? _____

6. What could explain the difference in the actual measured and the theoretical open-circuit voltage?

7. If the open-circuit voltage on your panel measures 10 volts, and the operating current measures 1.1 amps, what is the power output in watts?

8. If the open-circuit voltage on your panel measures 10 volts, and the power output is 15 watts, what is the amperage of the circuit?

9. What direction should the pv panel face in the **winter** to produce the most power?
 - A. North
 - B. South
 - C. East
 - D. West
10. Raise your hand to have the judge or assistant sign here when you have read and you understand the directions before you answer any other questions.

Ohms Law $I = V/R$

Where: I=current (amperes), V=potential difference (volts), R=resistance (ohms)

Watts = Volts x Amperes

Skill Activity Score Sheet

Question Number	Possible	Score
1. Actual open-circuit voltage	3	_____
2. Theoretical open-circuit voltage	3	_____
3. Explain the difference between actual & theoretical ocv	3	_____
4. Actual closed-circuit voltage	3	_____
5. Theoretical closed-circuit voltage	3	_____
6. Explain the difference between actual & theoretical ccv	3	_____
7. Power output in watts	3	_____
8. Amperage of the circuit	3	_____
9. Direction of the pv panel	3	_____
10. Safety and work habits and follow directions	3	_____

TOTAL POINTS: (Double check point total and enter on front) 30 _____