



Name:  
Company:  
Period:

4 Phase Engineering Design Process



# Solar Energy

## Phase III: Design Optimization

### (Round 3 – Temperature)

#### Independent Variable:

IV: Temperature (degrees Celcius)

How will you measure the IV? Infrared Thermometer pointed at different places on cell

To make the cell colder we can:

To make the cell hot we can:

#### Dependent Variable (aka Criteria):

DV aka Criteria: Voltage of solar cell

How will you will you measure the DV? Multimeter.

#### Control Variables:

What must be held constant in this experiment?

- 
- 





## Data Collection:

Collect data to drive your design decisions

**Reminder: to measure VOLTAGE...**

1. Leads are plugged into COM and VΩmA
2. Dial set to DCV 20

### RAW DATA TABLE:

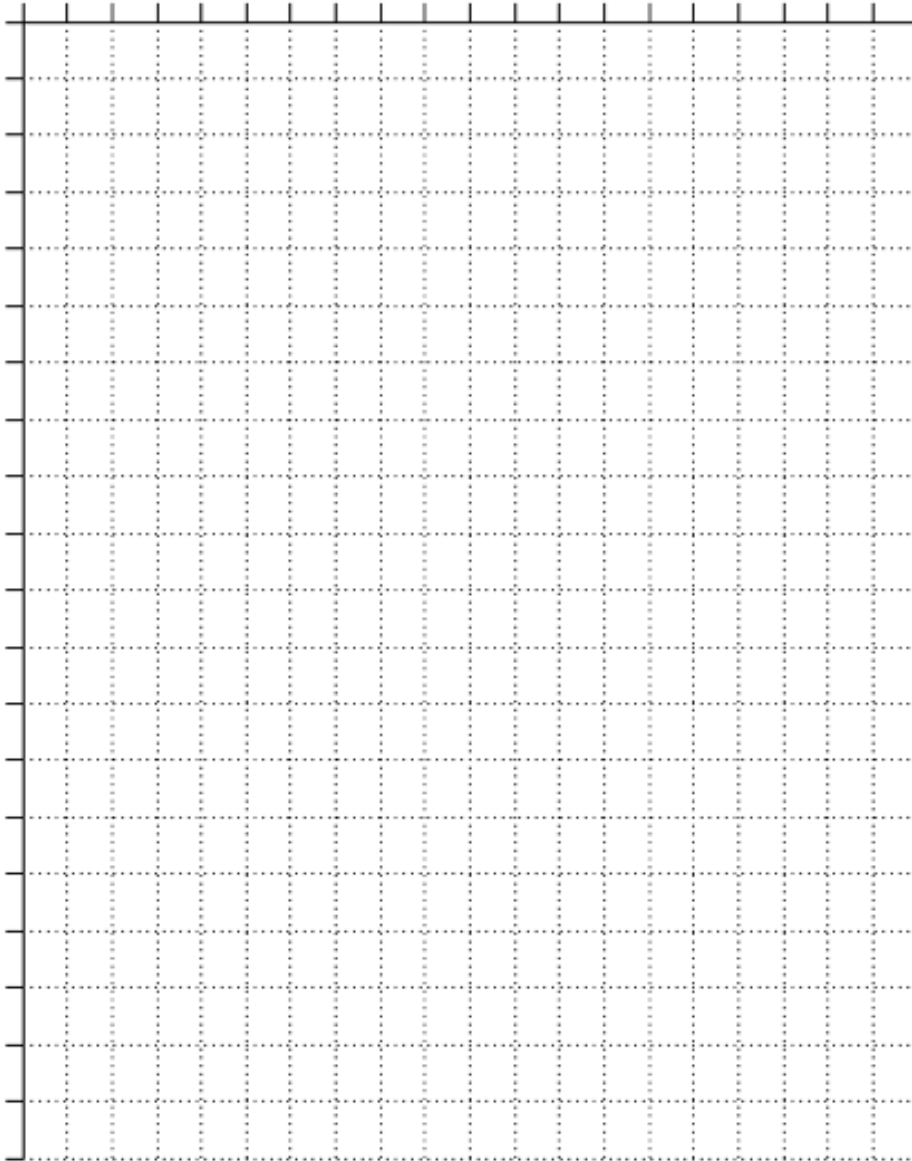
IV: Temperature (°C)	DV:			
	Voltage (V)			Voltage (V)
	Trial 1	Trial 2	Trial 3	Average





Average Voltage (V)

Temperature (°C)



**GRAPH:**

Title





## Optimal Level:

Look at your graph. What is the optimal temperature to maximize voltage?

Power is calculated with the  $P=IV$  equation. So when voltage increases, power \_\_\_\_\_

Extrapolate this pattern to even higher and lower temperatures to complete the sentence:

The power is maximum when the solar panels are hot or cold.

Look up the “Temperature Coefficient.” Define it.

### Extension:

The slope of this type of graph is called the “Temperature Coefficient”, calculate your Temperature Coefficient: *(show all work and don't forget units on your answer)*

## Design:

When writing your instructions manual, you will need to recommend a temperature that maximizes power for your stakeholder. What will your recommendation be? (full sentence)

