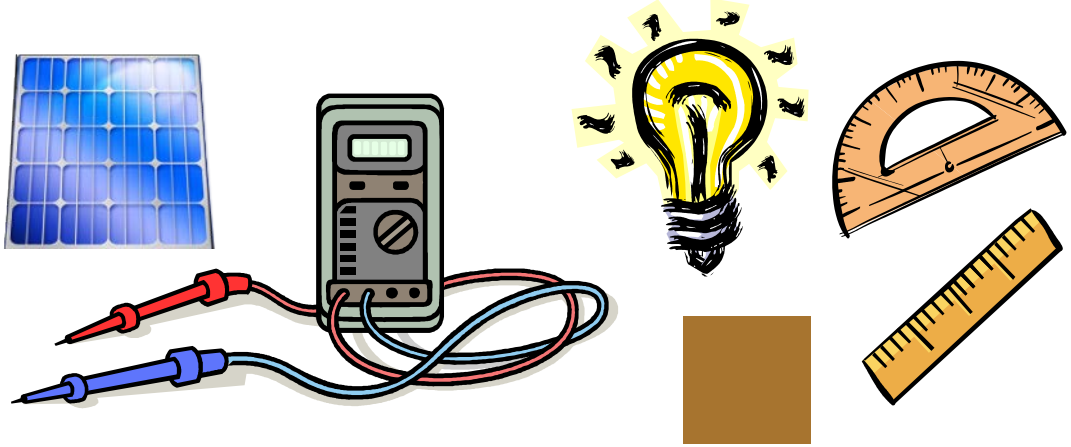
Solar Panel Experiments

MATERIALS
Solar panel connected in series or parallel
Multi-meter
Incandescent light
Yard stick
Protractor
6”x6” cardboard



PROCEDURE
Using the equipment provided, connect the solar panel to the multimeter

Distance from the light source – seasonal variation

1. Start with the solar panel positioned parallel to the light source at 10cm from the source
2. Read the voltage
3. Slowly move the solar panel away from the light source while keeping an eye on the voltage.
4. What happens to the voltage as you move further from the light source?
5. Do you think these results will differ depending on if the panel is wired in series or parallel?

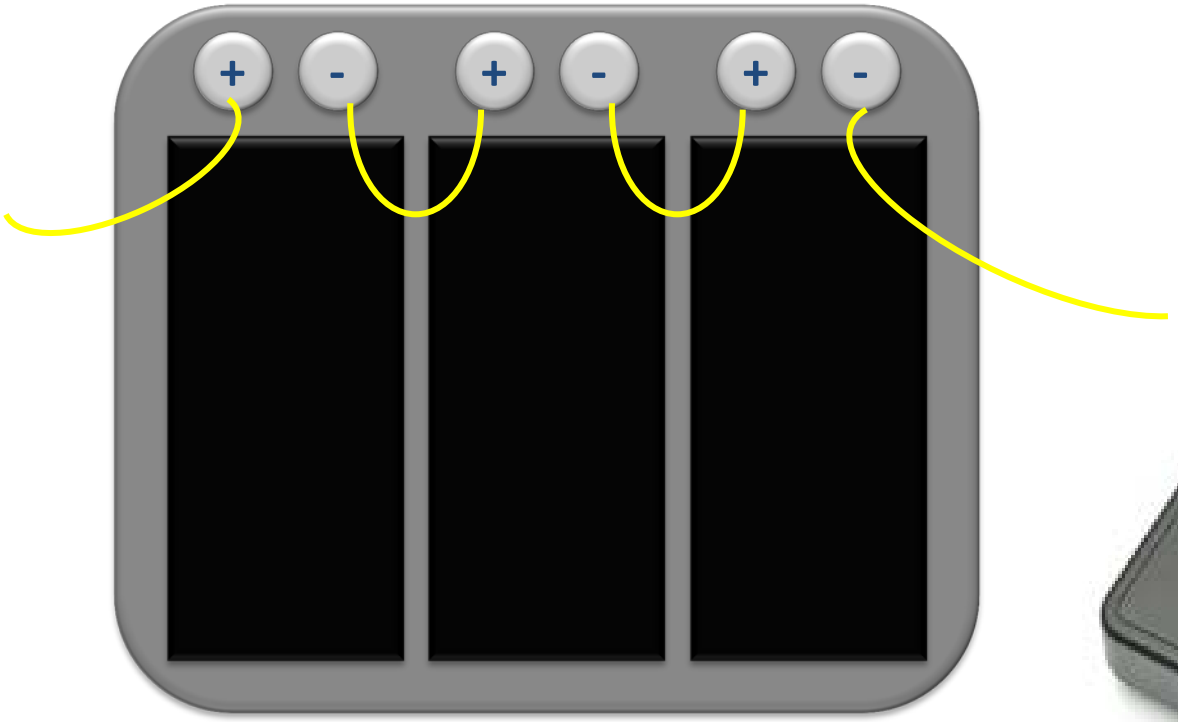
Angle of the panel – geographic variation

1. Start with the solar panel positioned parallel to the light source at 10cm from the source
2. Read the voltage
3. Slowly tilt the solar panel away from the light source while keeping an eye on the voltage.
4. Repeat step 3 but tilt the panel toward the light source.
5. What happens to the voltage as you tilt the panel? Is the result different when you tilt it away versus toward?
6. Do you think these results will differ depending on if the panel is wired in series or parallel?

Covering the panel – shading

1. Start with the solar panel positioned parallel to the light source at 10cm from the source
2. Read the voltage
3. Using the cardboard, cover the left half of the panel while keeping an eye on the voltage.
4. Repeat step 3 but cover the right half, top half, bottom half and any other combinations you would like to try.
5. What happens to the voltage as you cover the light source? Is it different if you cover different parts of the panel?
6. Do you think these results will differ depending on if the panel is wired in series or parallel?

Solar Panel Assembly



Multimeter

PROCEDURE

1. Assemble the solar panel in series according to the diagram above
2. Connect the panel to the multi-meter
3. Read the Volts – turn the dial to V (20 scale is best)
4. Read the Amps – turn the dial to A (200m scale is best)
5. Multiply Volts and Amps to get Watts – this is the amount of energy that this panel can generate and be used to power an appliance
6. Can you think of an appliance that uses this many Watts? A TV? Light bulb?

Series vs. Parallel

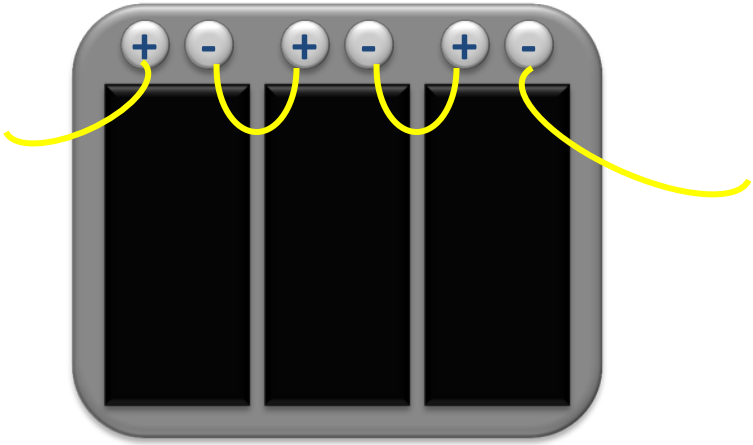
PROCEDURE

1. Using the light meter, record the strength of your light source
2. Using the equipment provided, connect the solar panel to the multimeter in series
3. Record the Voltage (DCV, 20) and the Current (DCA, 20m)
4. Calculate the Watts (VxA=W)
5. Disassemble the panel and reassemble it in parallel
6. Repeat steps 3 & 4
7. Which configuration gives you more power?
8. Record your findings on the computer to share with the class

Light source strength: _____foot-candles

Configuration	V	A	W
Series			
Parallel			

Angle of Panel



Multimeter

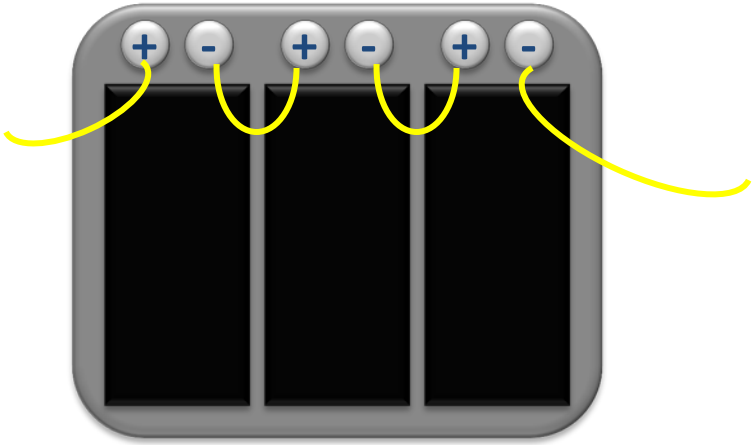
Light source strength: _____foot-candles

PROCEDURE

1. Using the light meter, record the strength of your light source
2. Using the equipment provided, connect the solar panel to the multimeter in series
3. Position the panel 20cm from the light source
4. Position the panel at 90° to the light source
5. Record the Voltage (DCV, 20) and the Current (DCA, 20m)
6. Calculate the Watts (VxA=W)
7. Repeat steps 4,5 & 6 for 75°, 60°, 45°, and 30° (use protractor provided)
8. Which configuration gives you the most power?
9. Record your findings on the computer to share with the class

Configuration	V	A	W
90°			
75°			
60°			
45°			
30°			

Distance from Source



Multimeter

Light source strength: _____foot-candles

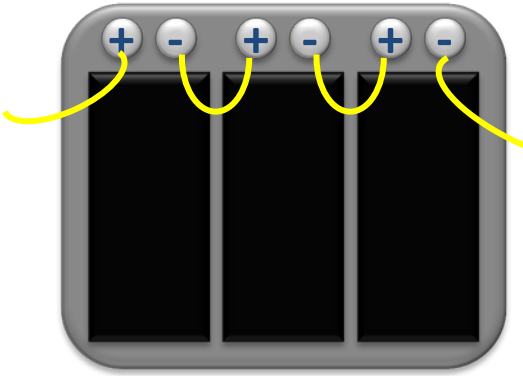
PROCEDURE

1. Using the light meter, record the strength of your light source
2. Using the equipment provided, connect the solar panel to the multimeter in series
3. Position the panel parallel to the light source
4. Position the panel 10cm from the light source
5. Record the Voltage (DCV, 20) and the Current (DCA, 20m)
6. Calculate the Watts (VxA=W)
7. Repeat steps 4,5 & 6 for 25, 50, 75 & 100cm
8. Which configuration gives you the most power?
9. Record your findings on the computer to share with the class

Configuration	V	A	W
10cm			
25cm			
50cm			
75cm			
100cm			

Percent Coverage

Light source strength: _____foot-candles



Multimeter

PROCEDURE

1. Using the light meter, record the strength of your light source
2. Using the equipment provided, connect the solar panel to the multimeter in series
3. Position the panel parallel to the light source and 10cm from the light source
4. Record the Voltage (DCV, 20) and the Current (DCA, 20m)
5. Calculate the Watts (VxA=W)
6. Using the cardboard provided, cover half of the panel horizontally
7. Repeat steps 4 & 5 – record 2 trials
8. Using the cardboard provided, cover half of the panel vertically
9. Repeat steps 4 & 5 – record 2 trials
10. Which configuration gives you the most power?
11. Record your findings on the computer to share with the class

Configuration	V	A	W
0%			
50% vertical 1			
50% vertical 2			
50% horizontal 1			
50% horizontal 2			

Solar Energy Demo - Outline

- Passive Solar Heating
  - Show experimental set up
  - Ask which they think will be hotter (hypothesis)
  - Have someone read the temp (observation)
  - Discuss results – was it what they thought? Why or why not? (results)
  - Give real world application
- Solar Concentrating
  - Show experimental set up
  - Ask which they think will be hotter (hypothesis)
  - Have someone read the temp (observation)
  - Discuss results – was it what they thought? Why or why not? (results)
  - Give real world application
- Solar Thermal – Hot Water
  - Show experimental set up
  - Ask which they think will be hotter (hypothesis)
  - Have someone read the temp (observation)
  - Discuss results – was it what they thought? Why or why not? (results)
  - Give real world application
- Solar Cooking
  - Show experimental set up
  - Ask them to explain how it works
  - Show them how it works and what they can cook in it
  - Give real world application