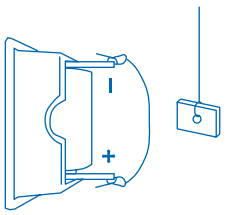
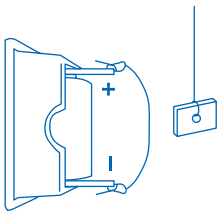
Name _____ **Activity Sheet 11, Part A**

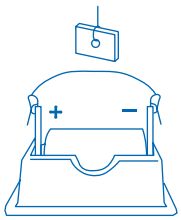
A Compass in a Circuit

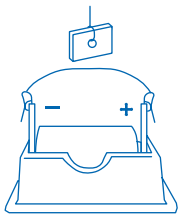
1. Tape or tie one end of the thread to a magnet. Tape the other end of the thread to a surface so that the magnet swings free. Build a circuit. Connect the short piece of wire to the electrical clips. Place the circuit so that the wire is vertical and close to the magnet. What happens to the magnet? Turn the circuit 180°. What happens?





Next, place the circuit so that the wire is horizontal. Then turn the circuit 180°. Record how these positions affect the magnet.

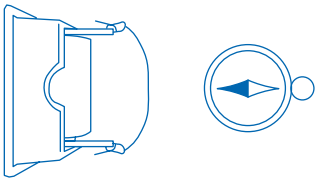




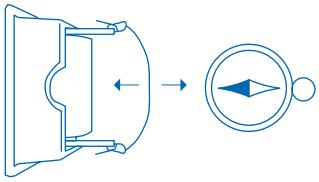
Name _____ **Activity Sheet 11, Part B**

A Compass in a Circuit

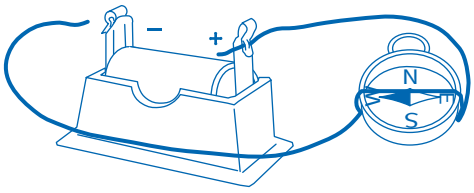
2. Hold the circuit near a compass, as shown below. What happens?



Move the wire back and forth, as shown by the arrows. What happens?



3. Disconnect the short piece of wire from the clips. Wrap the long piece of wire once around the compass so that it lines up with the compass needle. Connect one end of the wire to an electrical clip. Touch the other end of the wire to the other clip. Alternately disconnect and connect the wire. What happens to the compass needle?



4. Now make several wraps (at least four) of wire around the compass.
Repeat step 3. Describe your observations.

Name _____ **Activity Sheet 12**

Plants and Solar Energy

Session I—Activity 12

1. Draw and describe the two terrariums. Include details such as depth of soil, arrangement and number of seeds, where in the classroom each will be stored, and so on.

terrarium in sunlight **terrarium in darkness**

Session II—Activity 13

2. Draw and describe the two terrariums after 7 to 10 days of growth.

terrarium in sunlight **terrarium in darkness**

3. Based on your observations, do you think plants need solar energy to live? Explain.

Name _____ **Activity Sheet 14**

Transferring Solar Energy

Starting Time _____		**Ending Time** _____	
	Starting Temperature (°C)	Final Temperature (°C)	Change in Temperature (°C)
Uncovered Solar Tray			
Covered Solar Tray			

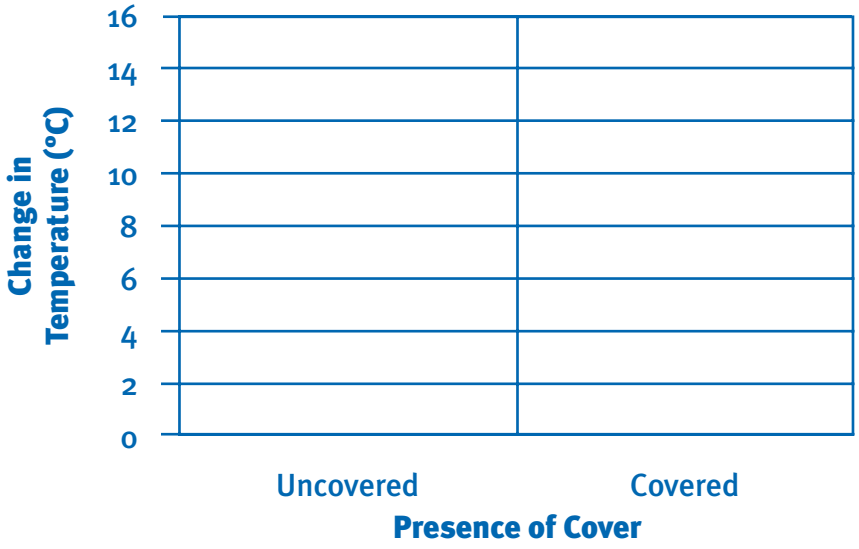
1. Record the starting temperature of the water and the starting time.
2. I predict that the water will be warmer in the _____ solar tray.
   I predict that the water temperature in that tray will be _____ °C.

   I predict that the water will not be as warm in the _____ solar tray.
   I predict that the water temperature in that tray will be _____ °C.

   I predict this will happen because _____

   _____

   _____
3. After 40 minutes, record the final temperatures of the water and the ending time. Calculate and record the change in temperature for each tray.
4. Make a bar graph to show the change in temperature in each solar tray.



5. What can you conclude about the importance of a cover on a solar collector?

   _____

   _____

Name _____ **Activity Sheet 15**

Solar Energy and Tray Color

Starting Time _____		**Ending Time** _____	
	Starting Temperature (°C)	Final Temperature (°C)	Change in Temperature (°C)
Black Solar Tray			
White Solar Tray			

1. Record the starting temperature of the water and the starting time.

2. I predict that the water will be warmer in the _____ solar tray.
   I predict that the water temperature in that tray will be _____ °C.

   I predict that the water will not be as warm in the _____ solar tray.
   I predict that the water temperature in that tray will be _____ °C.

   I predict this will happen because

   _____

   _____

3. After 40 minutes, record the final temperatures of the water and the ending time. Calculate and record the change in temperature for each tray.

4. Make a bar graph to show the change in temperature in each solar tray.

5. What can you conclude about the importance of a color of a solar collector?

   _____

   _____

Name _____ **Activity Sheet 16**

Solar Energy and Water Volume

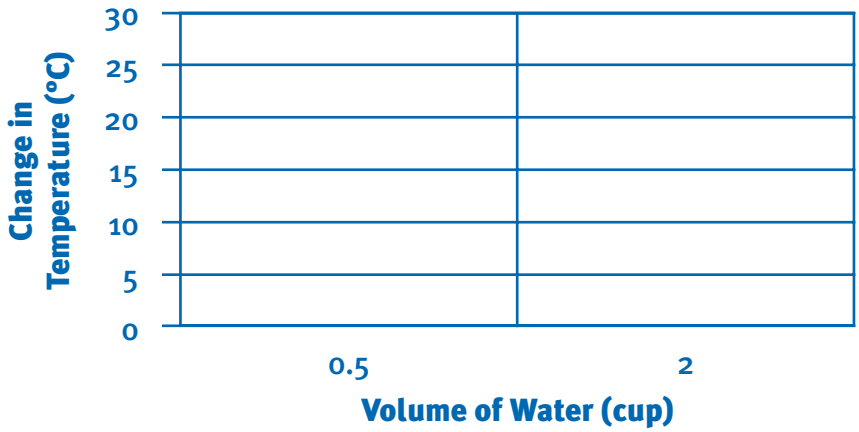
Starting Time _____			**Ending Time** _____	
Tray No.	Volume of Water (cup)	Starting Temperature (°C)	Final Temperature (°C)	Change in Temperature (°C)
1	0.5			
2	2.0			

1. Record the starting temperature of the water and the starting time.
2. I predict that the water temperature in the solar trays will be highest in tray _____ because

_____

_____

3. After 40 minutes, record the final temperatures of the water and the ending time. Calculate and record the change in temperature for each tray.
4. Make a bar graph to show the change in temperature in each solar tray.



5. The water in tray _____ got the warmest. Explain why.

_____

_____

_____

_____

_____

Name _____ **Activity Sheet 17**

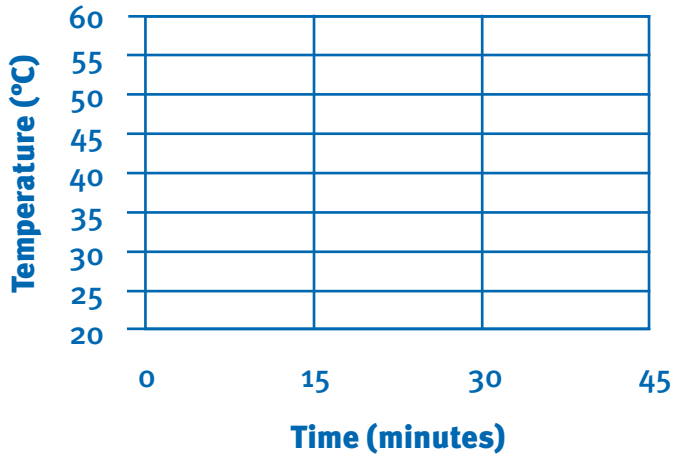
Solar Energy and Exposure Time

Exposure Time (minutes)	Temperature (°C)
0 (setup)	
15	
30	
45	

1. Measure the temperature of the water during the setup (at 0 minutes) and record it in the table above.
2. I predict that over the next 45 minutes, the temperature of the water will

_____

3. Measure the water temperature at each 15-minute interval and record it in the table above.
4. Make a line graph to show the change in water temperature over the course of 45 minutes.



5. What is the relationship between exposure time and amount of solar energy absorbed?

_____

_____

_____

_____

Name _____ **Activity Sheet 18, Part A**

Solar Energy and Tray Angle

Starting Time _____		**Ending Time** _____	
	Starting Temperature (°C)	Final Temperature (°C)	Change in Temperature (°C)
Control Solar Tray (level)			
Experimental Solar Tray (elevated)			

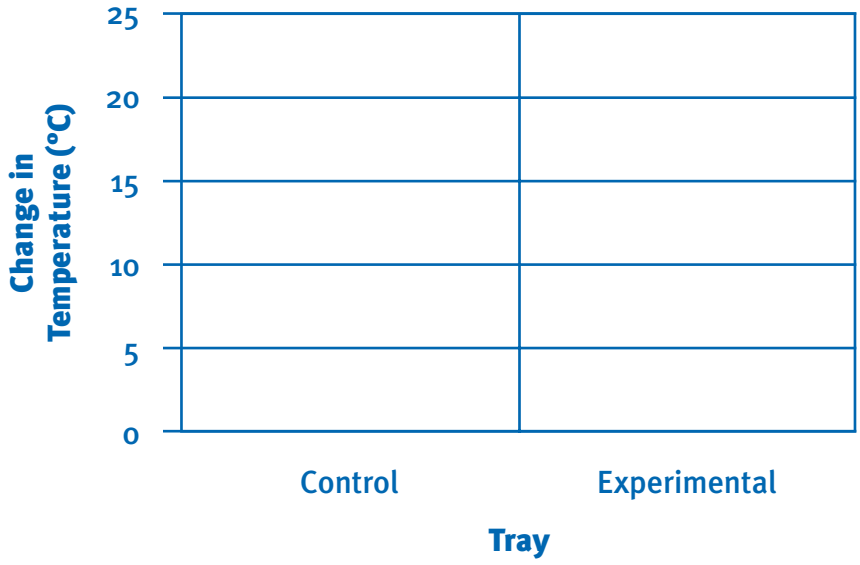
1. Record the starting temperature of the water and the starting time.
2. Draw and describe your solar trays. Include information such as the position and elevation of each tray, the position of the sun, and the time of day and time of year.

Name _____ **Activity Sheet 18, Part B**

Solar Energy and Tray Angle

3. After 40 minutes, record the final temperatures and the ending time. Calculate and record the change in temperature for each tray.

4. Make a bar graph showing the temperature change in each tray.



5. The final temperature of the elevated tray was _____ than the final temperature of the level tray by _____ °C.

6. What is the relationship between the angle at which the Sun's rays hit a tray and the temperature of the water in that tray?

_____

_____

_____

_____

_____

_____

_____

Name _____ **Activity Sheet 19, Part A**

Designing a Solar Collector

Starting Time _____		**Ending Time** _____
Starting Temperature (°C)	Final Temperature (°C)	Change in Temperature (°C)

1. Record the starting temperature of the liquid and the starting time.
2. Draw and describe the solar collector that you and your teammate designed. Include details such as the angle or tilt of the tray, the amount of liquid used, and so on.

Name _____ **Activity Sheet 19, Part B**

Designing a Solar Collector

3. After 30 minutes, record the final temperature of the liquid and the ending time. Calculate and record the change in temperature for each tray.

4. How did the efficiency of your collector compare with that of other teams' collectors?

5. Draw and describe the winning design (if another team's). Point out how their design was different from yours and why you think those differences may have made their collector more efficient.

Name _____ **Activity Sheet 20**

Solar Cells

1. **a.** Predict what will happen if half the solar cell is covered.

b. Predict what will happen if the entire solar cell is covered.

c. Predict what will happen if the lamp is turned off.

2. Observe as your teacher demonstrates what happens when the amount of light that reaches the solar cell decreases. Based on your observations, what can you conclude about how solar cells work?

3. Describe the energy transformations that took place during the demonstration.

4. Why is solar energy a good alternative to using fossil fuels?

5. How could you design an experiment to test how solar energy can be used to heat water in homes?