

# Procedures

## Directions/Procedure

The procedure is like a recipe. Other scientists who read your procedure will be able to duplicate your investigation and get the same results. The procedure is a numbered, step-by-step set of directions for conducting the experiment. The steps are sequential, easy to follow, and detailed. Only include the steps that are actually part of the experimental design. Do not use paragraphs.

### *The procedure includes the following:*

- Begin each sentence with a verb. Do not use personal pronouns.
- Number each step.
- Independent/Dependent/Constant variable(s)
- Operational Definition
- Tools used to measure the results
- How many times the experiment is being repeated (minimum of 3) or the number of human subjects in the experiment (minimum 50)
- Materials that are listed
- Safety considerations
- Additions/revisions as needed while doing the experiment
- Include detailed photographs/drawings of self-designed equipment

**Create the graphic organizer in your journal to help plan your procedure:**

<u>Steps</u> (What needs to be done)	<u>Details</u> (Materials, how much, how often, when, time, temperature, etc.)
1.	
2.	
3.	

*Your final procedure is NOT in chart form. The chart is only used to help organize and plan.*

### **Example - Procedure**

1. Set the distance between the heat source and solar cell.
  - The heat source must maintain the distance of 1-meter away from solar cell.
2. Set the angle of the heat source.
  - The sun's angle must be maintained at a 45-degree angle during all trials.
  - Aim the sun directly toward the solar cell maintaining the 1-meter distance.
3. Set the angle of the solar cell.
  - The initial angle of the solar cell will start at 0 degrees.
4. Turn on the heat lamp and start timer.
  - Measure the voltage at one (1) minute.
5. Record measurement in journal.
6. Repeat steps 4-5 four more times.
7. Repeat steps 3-6, using each of the four other angles.
  - 22.5 degrees
  - 45 degrees
  - 67.5 degrees
  - 90 degrees

Safety Concerns

- The heat source is hot. Do not touch.
- When using electricity, follow proper procedure for plugging in equipment. Do not touch prongs. Do not pull cord from the outlet.

**Science Fair Rubric Checklist – Directions**

<i>Expectations-Directions</i>	<b>Points</b>
<ul style="list-style-type: none"><li>▪ Typed/Font 12/Times New Roman/Double-Spaced</li><li>▪ Heading (5 lines) – left of page<ul style="list-style-type: none"><li>○ Title “SF Directions”</li></ul></li><li>▪ Four or less spelling/grammatical errors</li><li>▪ No contractions; no personal pronouns</li><li>▪ Design of experiment – well constructed test of hypothesis</li><li>▪ Steps detailed; concise</li><li>▪ Steps sequential</li><li>▪ Format followed (numbered, sentence begins with a verb)</li><li>▪ Steps complete</li><li>▪ Experiment easily repeated using directions</li><li>▪ All safety considerations addressed; ensures little or no risk to student</li><li>▪ Rubric stapled on front (left corner)</li><li>▪ Rough draft with revisions stapled on back of final draft (left corner)</li><li>▪ Parent signature on typed assignment</li></ul>	<b>30</b>
<b><i>SCORE</i></b>	

**Perform Experiment**

When performing the experiment, read the directions and follow the steps as outlined in the procedure. Make revisions/additions as needed while doing the experiment.

**Scientific Journaling (see previous notes)**

Journal everything! In any experiment, a scientist must make observations and record ALL relevant data pertaining to the experiment. Good notes show consistency and thoroughness!