

Using Your Thinking Toolbox

Opposing Viewpoints

- *Primary or secondary source?* – When studying history, a primary source is someone who was *there* and saw what happened. A secondary source is someone who was not there but heard about it. Primary sources are more desirable than secondary sources. An eyewitness account of the gunfight at the OK Corral would be a primary source. A history book chronicling the gunfight at the OK Corral would be a secondary source.
- *Reason to lie?* – Someone has a reason to lie when they say things that make them look good or help their interests. When someone has a reason to lie, we need to verify what they say.
- *Opposing viewpoints chart* – Draw two columns on a piece of paper and list an opposing point of view in each column. List arguments for each side in each column. Try to be objective and show respect for both sides.

Fallacies

- *“Avoiding Opposing Viewpoints” fallacy* – This is where a person does not honestly look at both sides of an issue.
- *“Possibility” fallacy* – Some people have trouble seeing the difference between something that is “possibly” true, and something that is “probably” true. If we think of this as a balance scale, the side that is probably true is heavier than the side that is only possibly true. We should think about how strong the evidence is on each side. We must choose the side with the best evidence.



Christian Logic
PO Box 46
Muscatine, Iowa 52761-0001
(309) 537-3464
info@christianlogic.com
www.christianlogic.com

Tools for Thinking Scientifically

Hypothesis

- A hypothesis is a tentative answer to a question. It could be the first-try at explaining a problem – an idea.
- When competing in a science fair, do not create a complex hypothesis. Limit yourself to a simple issue, not several problems at once.
- In your hypothesis, predict the results of your experiment.

Experiment

- Design an experiment that gives you a clear “yes” or “no” to your question.
- Create an experimental control. This is another bean plant, model rocket, etc. – just like the one in your experiment – that you do not experiment with. When the experiment is finished, you can compare the two.
- A variable is the thing you are changing in the experiment to see what will happen. If you have too many variables, then it is hard to tell which variable is affecting the experiment.
 - Repeat your experiment several times to make your results more reliable.

Observation

- Keep a journal and take photos of what you do in

your project.

- Learn to use measuring instruments. This will make your results more accurate.
- ### Analyzing Data
- Make graphs of your data to help you understand what happened.
 - Be aware of the assumptions you are making in your experiment.
 - Ask yourself, “Did my experiment verify my hypothesis?”
 - Explain how your project could be used to help people.

Getting Advice

- Before doing an experiment, research the subject at a university or college library. Keep photocopies of journal articles, etc. in your notebook.
- Talk to a scientist in your field at a university or college.
- Ask your friends for suggestions.

Contests and Fairs

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