

The Scientific Method

1. Research your topic.
2. What is the Problem?
3. What is your Hypothesis?
4. Do the Experiment.
5. What is your Conclusion?

RESEARCH is the process of collecting information. Read to find out what topic interests you. Once you have chosen a topic, you will research your topic (read some more). If you are thinking of growing crystals, you might want to learn a little about crystals to help you understand your topic. Do use many references (books, magazines, internet, etc.). Do ask people to help you (teachers, parents, media specialists, scientists, doctors, veterinarians, etc.).

What is the **PROBLEM** to be solved? What question do you want to answer? It is best to have a question that cannot be answered "Yes" or "No". For instance, "How does temperature affect the growth of crystals?" rather than "Do crystals grow in the dark?". Do limit your problem. Do choose a problem that can be solved with an experiment. For example: "What is a crystal?" can be answered without an experiment. But, "Does temperature affect crystal growth?" needs to be answered with an experiment.

A **HYPOTHESIS** is a scientific guess. You should propose a HYPETHESIS to your PROBLEM based on your RESEARCH. For instance, " It is my hypothesis that crystals will grow better in the cold because they are less soluble."

Next, it is time to test your HYPOTHESIS and do the **EXPERIMENT**. Before you do the experiment, you have to plan it carefully. You have to think about all the variables in the experiment. For instance, you can grow crystals in the kitchen where it is warm or in the refrigerator where it is cold. These are independent variables. The crystals might grow longer in the kitchen and shorter in the refrigerator. What are you going to measure? How long the crystals are? Or how fast they grow? Or both? What kind of crystals will you grow? You need to think through the experiment before you do it....plan carefully. Get advice from the Science

Fair Committee (Nov 6, 7, 14, 15 in the Media Center from 8:45-9:15). Then do the experiment!

- Do ask your parents or a Science Fair Committee member for help
- Do have only one independent variable (the thing you are changing- like temperature or light)
- Do repeat the experiment more than once to verify your results
- Do have a control
- Do organize your data

Now that you have done your EXPERIMENT, what is your **CONCLUSION**? The CONCLUSION is a summary of the results of the experiment. It is a statement of how the results match your HYPOTHESIS.

If the results do not match your hypothesis, try to give a possible reason why. You can suggest further testing in your conclusion.

- Do not change your hypothesis
- Do not leave out experimental results that do not support your hypothesis
- Do give possible reasons for the difference in your hypothesis and the results of the experiment
- Do give ways that you can experiment further.

If the results of your experiment support your hypothesis, you might say "As stated in the hypothesis, I believe that temperature affects the growth of crystals. My experiment supports this hypothesis because....".

