

The Scientific Method

The following is a review of the Scientific Method with some key questions and directions on how to design and conduct an experiment.

Problem/Purpose

- What is your goal?
- What idea are you trying to test?
- What is the scientific question you are trying to answer?

Hypothesis

- Explain how you think your project can demonstrate your purpose.
- Make a prediction regarding the outcome of your experiment.
- State the results you are predicting in measurable terms.

Procedure

- Give a detailed explanation of how you will conduct the experiment to test your hypothesis.
- Be clear about the variables (elements of the experiment that change to test your hypothesis) versus your controls (elements of the experiment that do not change).
- Be very specific about how you will measure results to prove or disprove your hypothesis. You should include a regular timetable for measuring results or observing the projects (for example, every hour, every day, every week).
- Your procedure should be like a recipe - Another person should be able to perform your experiment following your procedure. Test this with a friend or parent to be sure you have not forgotten anything.

Materials

- List all materials and equipment that were used.
- Your list of materials should include all of the ingredients of the procedure recipe.

Observations/Data/Results

- Keep a detailed journal of observations, data, and results. Your journal should contain data measurements and written notes about what you are sensing (hearing, seeing, or touching) about your experiment.
- If appropriate, photograph your project results or phases of the project to help your analysis and possibly to demonstrate your experiment on your exhibit board.

Analysis

- Explain your observations, data, and results. This is a summary of what your data has shown you.
- List the main points that you have learned.
- Why did the results occur? What did your experiment prove?
- Was your hypothesis correct? Did your experiment prove or disprove your hypothesis? This should be explained thoroughly.

Conclusion

- Answer your problem/purpose statement.
- What does it all add up to? What is the value of your project?
- What further study do you recommend given the results of your experiment? What would be the next question to ask?
- If you repeated this project, what would you change?

