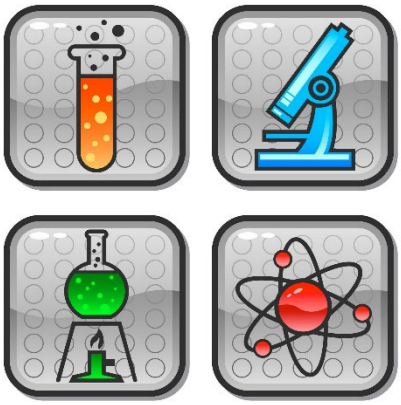
Part 1

The Scientific Method



Reasoning in Science

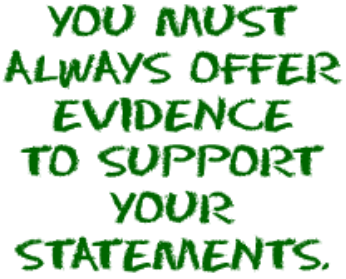
Learning about the **scientific method** is almost like saying that you are learning how to learn. The scientific method is a process used by scientists to study the world around them. It can also be used to test whether any statement is correct. You can use the scientific method to study a leaf, a dog, an ocean, or the entire Universe.

We all have questions about the world. The scientific method is there to test if your answer was correct. You could ask, "Why do dogs and cats have hair?" One answer might be that it keeps them warm. A good scientist would then come up with an experiment to test whether the statement was accurate. BOOM! It's the scientific method in action. (OK, settle down)

Questions and Answers

Just about everything starts with a question. Usually, scientists come up with questions by looking at the world around them. "What is that?" See that squiggly thing at the end of the sentence? A question has been born.

When scientists see something they don't understand they have some huge urge to answer questions and discover new things. The trick is that you have to be able to offer some **evidence** that confirms every answer you give. If you can't test your own answer, other scientists can't test it to see if you were right or not.



As more questions are asked, scientists build a foundation of answers. Once you have a lot of individual answers, it’s time to organize. One of the cool things about science is that other scientists can learn things from what has already been done. They don't have to go out and test everything again and again. Science is special because it builds on what has been learned before.

The whole process allows the world to advance, evolve, and grow. All of today's advancements are based on the achievements of scientists who already did great work.

Experimental Evidence

Experimental **evidence** is used to confirm the answers in science. Results are **validated** (found truthful) when other scientists repeat experiments and come up with the same results.

A history of evidence and validations show that the original statements were correct and accurate. It is a simple idea and the basis of all science. Statements must be confirmed with loads of evidence.

Scientists start with general observations and then make a **hypothesis**. A hypothesis is somewhere between a statement and a guess. It is a proposed explanation for something that was observed.

Once you have a scientific hypothesis, the fun can begin. You need to test the hypothesis with an **experiment** this will lead to observations and **data**. The data is the evidence you can use to determine if the hypothesis was correct

The Scientific Method

The Scientific Method helps scientists create credible investigations that feature well supported evidence. Check out the following steps that will help you understand the scientific method.

Steps of the Scientific Method

1. The Question- Science always start with a question. The question needs to be about something that can be measured and will typically start with words such as what, when, where, how or why.

2. Background Research- Gathering information on the topic you might have a question about. This can be done in a variety of ways including, looking online, in a book or in a handout which a teacher has provided.

3. Hypothesis - Using your background research and current knowledge, make an educated guess that answers your question. Your hypothesis should be a simple statement that expresses what you think will happen.

4. Experiment- Create a step by step procedure and follow those steps to conduct an experiment that tests your hypothesis. In a well thought out experiment only one thing (a variable) changes that way you know what may cause differences. You should be able to repeat the experiment a number of times to ensure you're the results weren't an accident.

5. Data- Collect data (information) and record the progress of your experiment. Write down your results with detailed measurements, descriptions and observations in the form of notes, journal entries, photos, charts and graphs.

6. **Observations**- Describe the observations you made during your experiment. Include information that could have affected your results such as errors, environmental factors and unexpected surprises.

7. **Conclusion**- Analyze the data you collected and summarize your results in written form. Use your analysis to answer your original question, do the results of your experiment support or oppose your hypothesis?

8. **Communication**-Present your findings in an appropriate form, whether it's a final report for a scientific journal, a poster for school or a display board for a science fair competition.