THE SCIENTIFIC METHOD

The basic **scientific method** includes the steps scientists use and follow when trying to solve a problem or prove or disprove a theory. The methods are used by scientists all over the world. This is done so scientists can work together to solve some of the same problems.

There are usually four to six steps which are a part of the scientific method. The steps can occur in any order, but the first step is usually **observation**. An observation is the use of one or more of the five senses, which include seeing, hearing, feeling, smelling, and tasting. The five senses are used to learn about or identify an event or object the scientist wants to study. For example, while observing a spider a scientist may observe the pattern or size of the spider's web.

The second step of the scientific method is the question being researched. The answer to that question is the **hypothesis**. It is the question that is turned into a statement about an event or object the scientist would like to research. A good hypothesis includes three things: The explanation for the observations, it is able to be tested by other scientists, and it will usually predict new outcomes or conclusions. The hypothesis should be in an in-then statement. The scientist observing the spider building the web may have a question about the strength of the web. An example of the hypothesis might be: **If** a spider is larger, **then** the web will be stronger. This hypothesis includes the explanation for the observation, it can be tested, and new conclusions may be reached.

The third step of the scientific method is the **experiment.** This step includes the materials needed as well as the steps that will be used. An experiment is a test which will either challenge or support the hypothesis. The hypothesis will then be supported or not supported. Using the spider hypothesis, a scientist may experiment by measuring spider webs in relation to a spider's size. Often, even when a hypothesis is not supported much can still be learned during the experiment. For example, while measuring the strength of spider webs the scientist may discover something new about them.

As the experiment is conducted, scientists need to collect data in an organized fashion. Scientists may choose to create a graph, table or chart to gather the information. After all results are collected scientist will analyze all the information to see if the data supports the hypothesis.

The final step in the scientific method is the **conclusion**. The conclusion will either clearly support the hypothesis or it will not. If the results support the hypothesis a conclusion can be written stating that information. If the data does not support the hypothesis, the scientist may choose to change the hypothesis or write a new one based on what was learned during the experiment. In the example, if the scientist proves that larger spiders build stronger webs, then that is the conclusion. If it was not proven, the scientist may change the hypothesis to: The size of a spider has no bearing on the strength of its web.

The scientific method is used for simple experiments students may do in the classroom or very complex or difficult experiments being done all over the world. The spider experiment may be done by any scientist in the world.

In summary, the **scientific method** includes the steps scientists use to solve a problem or to prove or disprove a theory. There are four basic steps involved with the scientific method. The usual steps include **observation, hypothesis, experiment,** and **conclusion.** The steps may not always be completed in the same order. Following the four steps, the results of the experiment will either support the hypothesis or will not support the hypothesis. Scientists are always free to change or write a new hypothesis and start the four steps all over again. The scientific method is used for simple experiments or for more difficult experiments.