**The Scientific Method**

Long ago many people, including doctors, believed that the shape of a plant indicated whether it was useful as medicine. A flower that resembled a human heart was administered to patients with heart problems. A plant with a root shaped like a human kidney was prescribed for patients with kidney ailments. Seeds that were shaped like teeth were vigorously chewed to get rid of a toothache. However, since the plants did not contain any ingredients that could actually heal or cure, the belief gave many people false hope.

The belief that certain plants could heal whatever they resembled seems silly now. It is a good illustration of mistakes that can occur when the ***scientific*** ***method***is not followed. What is the ***scientific method***? It is a way of thinking and studying about something carefully and logically. It involves a set of attitudes and procedures that can be followed to discover knowledge about the world

Although the name ***scientific method*** suggests that it is used only in a laboratory, that is far from the truth. In fact, you may have used something like the scientific method many times without realizing it. The thought process that lies behind the scientific method is very valuable and important.

**The scientific method is made up of five steps:**

1. **Observing an identifying a problem**
2. **Forming a hypothesis**
3. **Conducting an experiment**
4. **Interpreting the results**
5. **Drawing a conclusion**

Scientists follow this procedure strictly in their research. However, it may be easier to understand the five steps if their use is applied to a common consumer problem.

Take, as an example, a couple who are on a tight budget. They want to make sure to get the best value for their food dollar. Here is how they might use the scientific method.

***Observing and identifying a problem:*** The couple is trying to decide which kind of bread--diet or regular--to buy. The diet bread appeals to them because it only has half the calories of regular bread. On the other hand, the diet bread costs twice as much. They read the list of ingredients on both packages and discover that both kinds have the same ingredients. They compare the appearance of the breads. In color and texture, they seem very much the same, yet the slices of diet bread seem smaller. They decide that the problem is this: Which type of bread will provide the best value?

***Forming a hypothesis****:* The next step is to form a hypothesis, or a possible explanation, about which kind of bread is better and why. Since the slices of diet bread are smaller and a loaf actually costs *twice* as much as the regular bread, the couple feels that it is probably not as good a value. They form the hypothesis that the regular bread is the best value.

***Experimenting****:* To test their hypothesis, the couple brings a loaf of each type of bread home and weighs a slice of each on their kitchen scale. The slice of regular bread weighs two grams. The diet slice weighs only one gram.

***Interpreting the results****:* From the “experiment”, the couple discovers that the two products are the same except in weight. The diet bread weighs only half as much. In other words, the diet bread has half as many calories per slice just because there is only half as much bread per slice. Yet the diet bread costs twice as much.

***Drawing a conclusion****:* On the basis of their “experiment”, they couple conclude that their hypothesis was correct: the regular bread is the better value.

Of course, the questions investigated in scientific laboratories are far more complex than that example, and the equipment used for observations and true experiments is much more sophisticated. Yet the same five steps guide researchers as they seek the answers to scientific questions about the world. And when the same hypothesis has been proved by experiments over and over, it comes to be accepted as a general explanation called a ***theory*** can be applied to your practical decision making.

**Practice Creating an Experimental Design**

Read and respond to the following prompt.

**Prompt**

A gardener wants to understand photosynthesis and plant growth. She has read that plants do not absorb all colors of light equally. She knows that plants appear green because green light is not absorbed by chlorophyll, so she has hypothesized that plants will grow faster in either red, blue light than in green or white light.

To test her hypothesis, she wants to set up an experiment to test the different effects of red, blue, green, and white light on plant growth.

On a separate sheet of paper, design a controlled experiment that the gardener can use to test her hypothesis. Describe how the data will be collected and how the hypothesis will be tested.