The Scientific Method: Adding Up to a Lot of Good

Step 1: The scientific method is a process where new knowledge is obtained based

on physical evidence. You can think of the scientific method as a cycle that begins with the very natural human act of making observations and generating questions about those observations. Next, a hypothesis (a testable explanation of those observations) is created and then test through an experiment. Depending on how well an experiment is designed the experiment may or may not provide answers or insight into the hypothesis or process being studied. This is why scientists conduct many previous experiments; other modify an experiment slightly, but when combined the individual experiments come together to create a body of knowledge on a specific topic.

In your science classes you have probably done lab activities or experiments where you followed a set of instructions (a “protocol”), recorded the data, obtained a result, and then wrote the procedure, data, and interpretation of the results in a lab notebook. These actions are all very real and valuable parts of the scientific method, but there is more! Science depends on researchers sharing their work with other people in the field. This is called publishing. When scientific work is published it contributes to the greater knowledge, The process of publishing includes peer review, where other scientists in the field read the study and provide critiques, highlighting the strengths and the weaknesses of the experiment. These critiques make the scientific process stronger and more reliable. Critiques also drive new experiments based on the previous results. The scientific method is a never-ending cycle (Figure 1).

**Figure 1:** The Scientific Method

Observation

Refine Hypothesis or Make a New One

Hypothesis

Experiment

Peer Review & Publish

Step 2: Read the article :Adding up to No Good?” Then answer the following questions.

1. The following questions relate to the food additive study that was originally published in the March 2006 issue of *Toxicological Sciences* and briefly described in the article “Adding Up to No Good?”.

What question did the study try to answer?

What were the results? Discuss when effects were seen and when they were not seen. Also, using general terms, describe the amounts of the chemicals used in the study (i.e., according to the authors, did they reflect “real life” exposures?).

Where are these results potentially meaningful?

Now, think about the news article, “Adding up to No Good?” The article highlights one critism of the study. Using your own words, describe the criticism.

List questions related to this study that are still unanswered and need further research.