QUESTION: Is there any chance you have a scientific method activity you would willing to share?

ANSWER: Yes, I do. But first let me summarize.

The OLD Scientific Method is taught by most teachers in the United States and elsewhere today. However, it is thought to have some problems. Most scientists don’t follow the order of the most-often-taught Scientific Method. They skip steps, start in the middle and work out to either end, repeat steps, etc. They also use imagination and intuition in the discovery of scientific truth or invention.

Scientists differ greatly in what phenomena they study and how they go about their work. Although there is no fixed set of steps that all scientists follow, scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence... (from Benchmarks for Science Literacy by the American Assoc. for the Advancement of (AAAS, 1993).) (Bold facing is mine.)
How to Teach the Scientific Method

I would hope that middle school science teachers would strive to stretch their understanding about “The Scientific Method” and work to teach this enlightened approach to their students. In fact, the state of Missouri requires its teachers to teach a more circular approach to the scientific method now.

Acknowledge there is no fixed procedure called “the scientific method,” but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations. (Missouri State GLE: 7.1.A.f. 9-12)

I recently came across an interesting research project conducted by William Harwood, a professor of Science Education at the Indiana University, Bloomington. Prof. Harwood has interviewed and observed scientists at work and listened to what they have to say about the scientific method. He’s discovered that the traditional linear approach is actually much more circuitous. His model is wheel-like with elements of, say, the rock cycle, where a scientist can backtrack and go over the steps in a new or different order, whatever it takes to answer the original research question.

The main component to the new model: Asking Questions, is where it always starts, but the many secondary steps can start anywhere around the wheel and be repeated many times in an attempt to answer the question: such as observing, defining the problem (or question), re-forming a question, investigating the known (which is our standard research), articulating the expectation, carrying out the study, examining the results, reflecting on the findings, and communicating with others.

I had a nice email “chat” with Bill Harwood and learned some useful things. First of all, “One thing I want teachers to get across to their students is that they are not doing science only when they are making a measurement. Rather, they are doing science when they are looking things up, when they are talking about data or ideas for designs, and so forth.”

These aren’t activities to "get ready" to do science, they ARE the activities of science! This means that if you are asking your students to observe a collection of strange things, such as a mouse skull, a snake skin, a carrot with three roots instead of one, etc. you are DOING SCIENCE!

When you are doing a simple review of statistics (mean, mode, median) you are DOING SCIENCE!

When you are teaching the elements of Experimental Design, you are DOING an important part of Science.

Prof. Harwood puts it this way: “…it is perfectly reasonable to focus a lesson on a single activity. For example, how to look up information (investigating the known) or how to determine if data are valid. Teachers need not always do a full inquiry investigation with their students to be teaching them important ideas, skills, and necessary habits of mind that are required to do science.”
This makes me feel good about breaking such a complicated topic down into manageable portions that can be taught in any order, whatever seems right for the day.

So, how can we teach this newer concept of the SCIENTIFIC METHOD? Here is a mini-lesson plan with some ideas on how to introduce this topic at the beginning of the school year:

Step 1: Teach your "standard" Scientific Method lesson. This could include lots of different activities. (BTW, this would NOT include teaching Experimental Design, which should be done in a different series of lessons and be ongoing throughout the school year.)

You could include (1) a Presentation of some sort as a review, such as the Online Tutorial I mention in the sidebar. Have your students make a fun (2) Foldable® that reviews the terms found in the tutorial. You could also assign Pairs Teams to work on a Scientific Method (3) Worksheet, Puzzle or Word Search, any of which would review the vocabulary.

Step 2: Teach a "NEW" Scientific Method lesson. This basically expands on the idea of the regular Scientific Method, emphasizing that scientists go back and forth, that it's more circular than linear.

Give them the New Scientific Method Worksheet.

Run off several pages of the triangles in different colors of the brightly colored paper by Staples I've recommended before. Cut them in strips so each student gets one complete set of the triangles in one color. They are then free to trade around their triangles so they still have a complete set but of different colors. They should be allowed to start gluing their triangles anywhere they wish. I like this worksheet because the words used are slightly different from the "standard" terms so they do have to do a bit of thinking.

Remember, there is a logical order to the triangles, so encourage them to be logical. You can't have Communicate with Others next to Run the Experiment!

The logical procession can start anywhere around the outside.

Give them time to paste the triangles and work out the questions in pairs or small groups, then have a quick discussion on the main concept, which is the more circular nature of science!