Scientific Method Module
Student Guide.

"God is subtle but he is not malicious."
-- Einstein

The *Scientific Method* is a set of techniques and assumptions used to try to discover the organizing principles of the physical universe. In this Module, we will explore the method using a "universe" of a set of playing cards.

Here your Instructor will present cards from a deck to you; your task will be to figure out what 'law', if any, controls the pattern by testing hypotheses (i.e. through conjecture and refutation). By "pattern" we mean the order in which the cards are placed in the deck. For example, one pattern is that the cards alternate between red and black.

The basis of the Scientific Method is that one must be prepared to "dare to be wrong." If we are not prepared to be wrong, then we are not able to increase our understanding.

A. List five different patterns that might be true for the cards in the deck. These should be possible general patterns, not predictions of what the next card might be. For each pattern, list what cards would support the hypothesis and what cards would falsify the hypothesis.

B. It is likely that in Part A you made one or more assumptions about that nature of the "universe" of the deck of cards. These could be:
- The deck contains four suits: clubs, diamonds, hearts and spades.
- The deck contains aces, cards numbered between 2 and 10, plus jacks, queens and kings.
- There are 52 different cards in the deck.
- Etc.

Identify as many of those assumptions that you have made as possible.

C. Your Instructor will show you the first three cards of the deck. For the patterns of Part A:
- Which have been proven to be correct?
- Which have been proven to be incorrect?
- Which have not been proven to be either correct or incorrect?

Have any of your patterns been proven to be correct? What would be necessary for a pattern to be proven to be correct? If all of your patterns have been proven to be incorrect, try to choose two or more patterns that might be true for the cards of the deck based on the three cards that you can see.

D. Your Instructor will show you the next three cards of the deck. For the patterns not proven to be incorrect in Part C:
- Which have now been proven to be correct?
- Which have now been proven to be incorrect?
- Which have not been proven to be either correct or incorrect?

E. Can you now say what the pattern of the cards in the deck is? What would be necessary for you to be 100% sure that you know what the pattern is?

This Student Guide was written by David M. Harrison, Dept, of Physics, Univ. of Toronto, in August 2008.

It is based on materials developed by Allen Journet, Dept. of Biology, Southeast Missouri State University, http://cstl-csm.semo.edu/journet/BS107/LabManual/BS107-LAB3%20F2008.pdf.

Last revision: November 30, 2008.