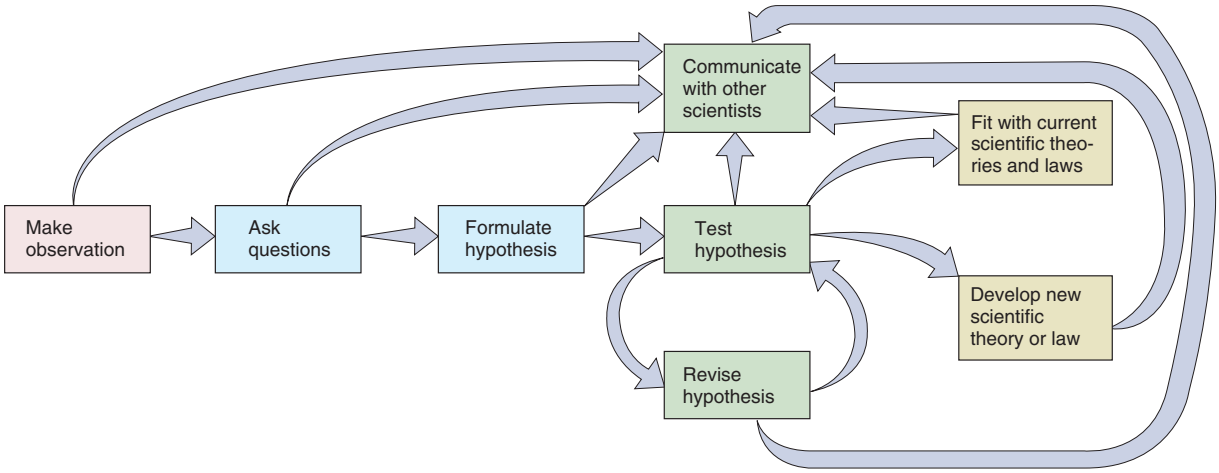

Figure 1.2

The Scientific Method
The scientific method is a way of thinking that involves making hypotheses about observations and testing the validity of the hypotheses. When hypotheses are disproved, they can be revised and tested in their new form. Throughout the scientific process, people communicate about their ideas. Theories and laws develop as a result of people recognizing broad areas of agreement about how the world works. Current laws and theories help people formulate their approaches to scientific questions.

scientific method to gain further information about the event and explain it.

Questioning and Exploration

As scientists gain more empirical evidence about an event they begin to develop *questions* about it. How does this happen? What causes it to occur? When will it take place again? Can I control the event to my benefit? The formation of the questions is not as simple as it might seem because the way the questions are asked will determine how you go about answering them. A question that is too broad or too complex may be impossible to answer; therefore a great deal of effort is put into asking the question in the right way. In some situations, this can be the most time-consuming part of the scientific method; asking the right question is critical to how you look for answers.

Let's say, for example, that you observed a cat catch, kill, and eat a mouse. You could ask several kinds of questions:

1a. Does the cat like the taste of the mouse?
1b. If given a choice between mice and canned cat food, which would a cat choose?
2a. What motivates a cat to hunt?
2b. Do cats hunt only when they are hungry?

Obviously, 1b and 2b are much easier to answer than 1a and 2a even though the two sets of questions are attempting to obtain similar information.

Once a decision has been made about what question to ask, scientists *explore other sources of knowledge* to gain more information. Perhaps the question has already been answered by someone else or several possible answers have already been rejected. Knowing what others have already done allows one to save time and energy. This process usually involves reading appropriate science publications, exploring information on the Internet, or contacting fellow scientists interested in the same field of study. Even if the particular question has not been answered already, scientific literature and other scientists can provide insights that may lead toward a solution. After exploring the appropriate literature, a decision is made about whether to continue to explore the question. If the scientist is still intrigued by the question, a formal hypothesis is constructed and the process of inquiry continues at a different level.

Constructing Hypotheses

A **hypothesis** is a statement that provides a possible answer to a question or an explanation for an observation that can be tested. A good hypothesis must be logical, account for all the relevant information currently available, allow one to predict future events relating to the question being asked, and be testable. Furthermore, if one has the choice of several competing hypotheses one should use the simplest hypothesis with the fewest assumptions. Just as deciding which questions to ask is often difficult, the formation of a hypothesis requires much critical thought and mental exploration. If the hypothesis does not account for all the observed facts in the situation, doubt will be cast on the work and may eventually cast doubt on the validity of the scientist's work. If a hypothesis is not