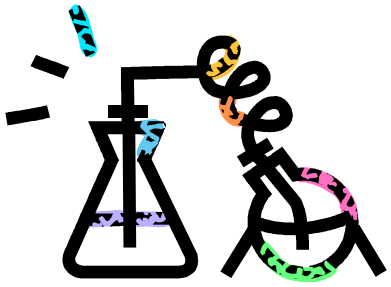
Doing Experiments
Ch. 1. 5



What is Scientific Inquiry?
How are Experiments Designed and Conducted?
What are some Other Types of Scientific Investigations?

Vocabulary 1.5

Scientific Inquiry-

Hypothesis-

Variables-

Independent Variable-

Dependent Variable-

Controlled Experiment-

Data-

Observation Research-

Opinion-based Research-

Doing Experiments pg. 34

Thinking and **questioning** is the start of a scientific inquiry process.

Scientific inquiry refers to the diverse (different) ways in which scientists study the natural world and propose (suggest) explanations based on the evidence they gather.

Scientific inquiry often begins with a 1.)**question** about an observation. In trying to answer a question, you are developing a 2.) **hypothesis.**

A **hypothesis** is a possible answer to a scientific question.

Fig. 1

Doing Experiments pg. 36

Developing a Hypothesis

A hypothesis is an educated guess about how things work. *Most of the time a hypothesis is written like this: "If _____[I do this] _____, then _____[this]_____ will happen." (Fill in the blanks with the appropriate information from your own experiment.)*

What are the two hypotheses that might answer this question: *Why does it take the school bus longer to get to school on a Monday compared to a Friday?*

Hypothesis A	Hypothesis B

Assess your Understanding

How are Experiments Designed and Conducted? Pg. 37

After developing a hypothesis, you are ready **to test it by designing an experiment.**

An experiment must follow sound scientific principles for its result to be valid.

Variables are factors that can change in an experiment.

The one variable that is purposely changed to test a hypothesis is the **manipulated variable, or independent variable.**

The factor that may change in response to the manipulated variable is the **responding variable, or dependent variable**. All other variables must be the kept the same.

An experiment in which only one variable is manipulated at a time is called a **controlled experiment**. In any experiment there is a risk of introducing bias.

Collecting and Interpreting Data pg. 39

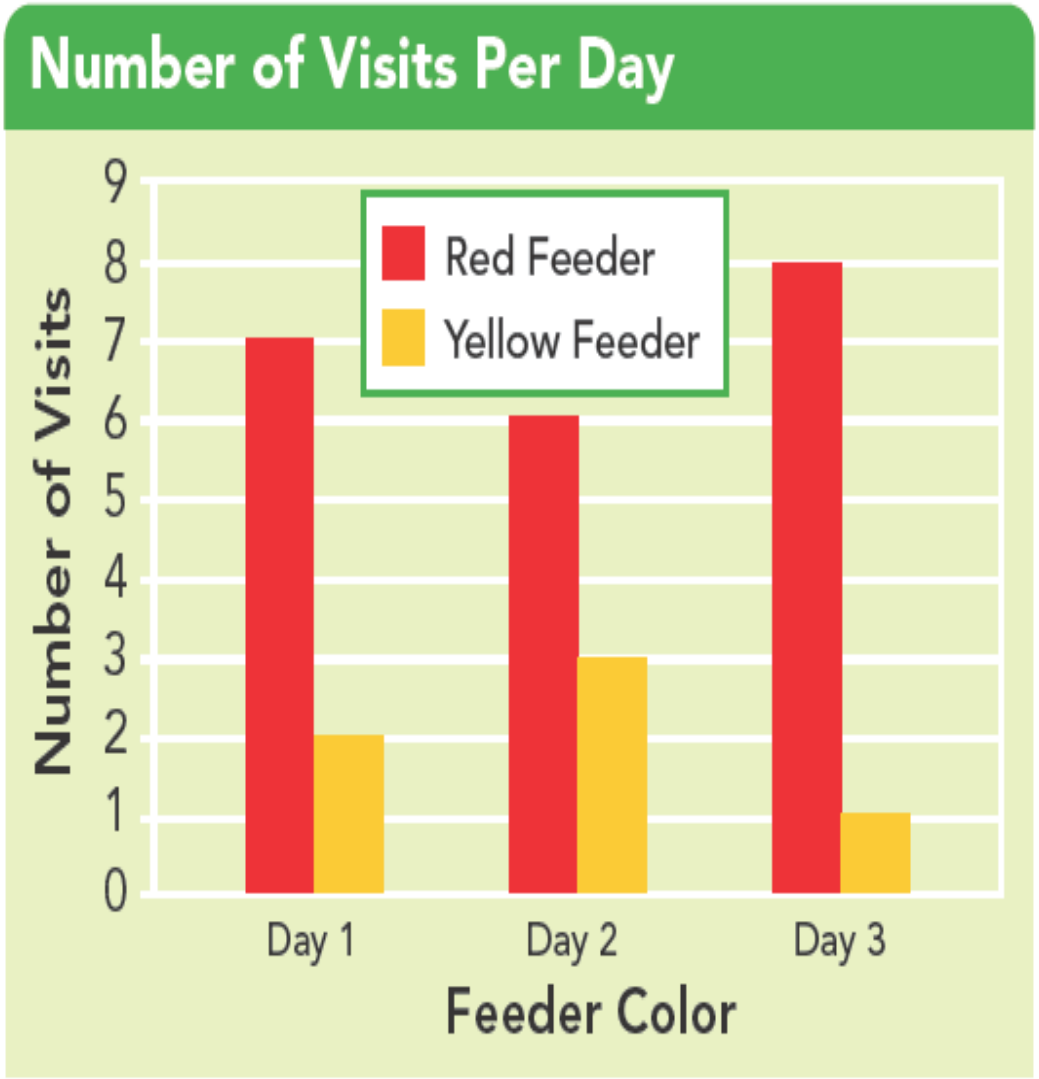
Data are facts, figure, and other evidence gathered through *qualitative* and *quantitative* observations.

Collect data→ they need to be interpreted→ you can draw conclusions about your hypothesis.

Do the Math pg. 39

Data Tables

A data table helps you organize the information collected in an experiment. Graphing the data may reveal whether there are patterns to your data. Do the data support the hypothesis that hummngbirds prefer red feeders?



Drawing Conclusions & Communicating pg. 40-41

A **conclusion** is a summary of what you have learned in an experiment.

Communicating is the sharing of ideas and results with others through writing and speaking.

Ways scientist communicate:

Scientists communicate by giving talks at scientific meetings, exchanging information on the Internet, or publishing articles in scientific journals.

Fig. 5 Drawing Conclusions pg. 40

Sometimes the same experiment can produce very different data. If the data in this table were yours, what might you do next?

Number of Visits Per Day		
	Red Feeder	Yellow Feeder
Day 1	4	5
Day 2	9	9
Day 3	5	4
Average	6	6

Assess your Understanding pg. 41

What are Some Other Types of Scientific Observation? pg. 42

Sometimes it is not possible or desirable to design a controlled experiment to investigate a question.

2 types of scientific investigations include:

observational research and **opinion-based research.**

Observational research involves methods where the researchers try to observe an event without interfering.

Opinion-based research involves asking people questions usin surveys and interviews. The collected data is then analyzed.

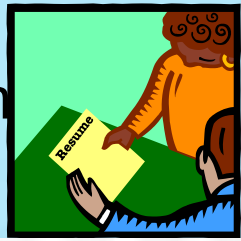


Fig. 7 Observational Research pg. 42

Pose Questions What question could you ask about this hornet's nesting habits that could only be answered by using observational research?

My Answer

Assess your Understanding