Scientists at Work!

What are some types of scientific investigations?

Scientists carry out investigations to learn about the natural world—everything from the smallest particles to the largest structures in the universe. The two main types of scientific investigations are *experiments* and *observations*.

Scientific Investigations

Experiments

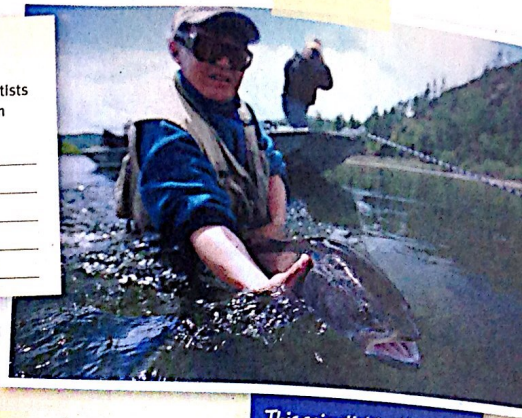
An **experiment** is an organized procedure to study something under controlled conditions. Experiments are often done in a laboratory. This makes it easier to control factors that can influence a result. For example, a scientist notices that a particular kind of fish is becoming less common in a lake near his home. He knows that some fish need more oxygen than others. To find out if this local fish species is being harmed by decreased oxygen levels, he might do the following experiment. First, he measures oxygen levels in the lake. Then, he sets up three tanks of water in a laboratory. The water in each tank has a different level of oxygen. Other factors that might affect fish, such as temperature, are the same in all three tanks. The scientist places the same number of fish in each tank. Then he collects information on the health of the fish.

Active Reading **5 Infer** Why would the scientist in the example want the temperature to be the same in all three tanks?

This scientist is studying salmon in a controlled laboratory experiment.

Visualize It!

6 Analyze List the factors that the scientists cannot control in the field investigation shown in this picture.



This scientist is observing salmon in their natural environment in Mongolia.

Active Reading

7 Identify As you read, underline reasons why a scientist might choose to do observations that do not involve experiments.

Other Types of Investigations

Observation is the process of obtaining information by using the senses. The word can also refer to the information obtained by using the senses. Although scientists make observations while conducting experiments, many things cannot be studied under controlled conditions. For example, it is impossible to create or manipulate a star. But astronomers can observe stars through telescopes.

Observations of the natural world are generally less precise than experiments because they involve factors that are not controlled by scientists. However, they may give a better description of what is actually happening in nature.

Important scientific observations can be made anywhere. The scientist who experiments with fish and oxygen levels in the example you read on the opposite page might observe a lake to find out which animals and plants live in it. His observations may or may not support the findings of the laboratory experiment.

Another type of investigation is the creation of models, which are representations of an object or system. Models are useful for studying things that are very small, large, or complex. For example, computer models of Earth's atmosphere can help scientists forecast the weather.