

# Scientific Process

The Scientific Method is a dynamic and open-ended process that scientists use when they investigate a question they have. It is not a series of prescribed steps that scientists follow to prove a hypothesis. Rather, it's a general plan that helps guide their investigation. And while all scientists use the Scientific Method, they might not use all the steps, or they may complete the steps in a different order. For example, a scientist might make observations and collect data about a subject that interests him or her for years before formulating a hypothesis.

## DEFINING A QUESTION TO INVESTIGATE

As scientists conduct their research, they make observations and collect data. The observations and data often lead them to ask why something is the way it is. Scientists pursue answers to these questions in order to continue with their research. Once scientists have a good question to investigate, they begin to think of ways to answer it.

## MAKING PREDICTIONS

Based on their research and observations, scientists will often come up with a hypothesis. A hypothesis is a possible answer to a question. It is based on: their own observations, existing theories, and information they gather from other sources. Scientists use their hypothesis to make a prediction, a testable statement that describes what they think the outcome of an investigation will be.

## GATHERING DATA

Evidence is needed to test the prediction. There are several strategies for collecting evidence, or data. Scientists can gather their data by observing the natural world, performing an experiment in a laboratory, or by running a model. Scientists decide what strategy to use, often combining strategies. Then they plan a procedure and gather their data. They make sure the procedure can be repeated, so that other scientists can evaluate their findings.

## ANALYZING THE DATA

Scientists organize their data in tables, graphs, or diagrams. If possible, they include relevant data from other sources. They look for patterns that show connections between important variables in the hypothesis they are testing.

## DRAWING CONCLUSIONS

Based on whether or not their prediction came true, scientists can then decide whether the evidence clearly supports or does not support the hypothesis. If the results are not clear, they must rethink their procedure. If the results are clear, scientists write up their findings and results to share with others. The conclusions they draw usually lead to new questions to pursue.