Development of Hypotheses

Dana Desonie, Ph.D.

cK-12 *f*lexbook
next generation textbooks

AUTHORS
Dana Desonie, Ph.D.

To access a customizable version of this book, as well as other interactive content, visit www.ck12.org

Printed: July 25, 2012

CONCEPT **1**   Development of Hypotheses

- Describe the characteristics of a good hypothesis.

What is a hypothesis?

An educated guess? Is that what you learned a hypothesis is? Lots of people have learned that, but it's not exactly right. So what is a hypothesis? There are two hypotheses listed below to address a question about carbon dioxide in the atmosphere. Check out what those hypotheses are and what to do with them next.

Asking a New Question

Before we develop some hypotheses, let's find a new question that we want to answer. What we just learned – that atmospheric CO_2 has been increasing since 1958 — leads us to ask this question: why is atmospheric CO_2 increasing?

Possible Answers for the Question

We do some background research to find the possible sources of carbon dioxide into the atmosphere. We discover two things:

- Carbon dioxide is released into the atmosphere by volcanoes when they erupt.
- Carbon dioxide is released when fossil fuels are burned.

A **hypothesis** is a reasonable explanation to explain a small range of phenomena. A hypothesis is limited in scope, explaining a single event or a fact. A hypothesis must be **testable** and **falsifiable**. We must be able to test it and it must be possible to show that it is wrong.

From these two facts we can create two hypotheses. We will have **multiple working hypotheses**. We can test each of these hypotheses.

Hypothesis 1

Atmospheric CO_2 has increased over the past five decades, because the amount of CO_2 gas released by volcanoes has increased.

Hypothesis 2

The increase in atmospheric CO_2 is due to the increase in the amount of fossil fuels that are being burned.

Usually, testing a hypothesis requires making observations or performing experiments. In this case, we will look into the scientific literature to see if we can support or refute either or both of these hypotheses.

Vocabulary

- **falsifiable**: Able to be proven false by an observation or experiment and therefore testable.
- **hypothesis**: A good working explanation for a problem that can be tested.
- **multiple working hypotheses**: Two or more hypotheses that can be tested simultaneously or in sequence.
- **testable**: Able to be evaluated critically, usually using data.

Summary

- A hypothesis is a reasonable explanation to explain a phenomenon.
- A scientific hypothesis must be testable and falsifiable.
- Often, scientists as individuals or as a group test more than one hypothesis at a time to explain a phenomenon. This is called multiple working hypotheses.

Practice

Use this resource to answer the questions that follow.

http://www.teachertube.com/viewVideo.php?video
_id=195822&title=Hypothesis}_Machine

MEDIA
Click image to the left for more content.

1. Review: What is the purpose of the scientific method?

2. What is your task?

3. Create a hypothesis that explains how the machine works.

4. Examine your hypothesis. What questions do you have?

5. Revise your hypothesis and explain how you might test it.

Review

1. How is defining hypothesis as "a reasonable explanation" different from defining it as "an educated guess"?
2. If a hypothesis is shown to be wrong, is the question the scientists are trying to answer a bad question?
3. Why would scientists have multiple working hypotheses rather than just dealing with one hypothesis until it is shown to be right or is thrown out?