
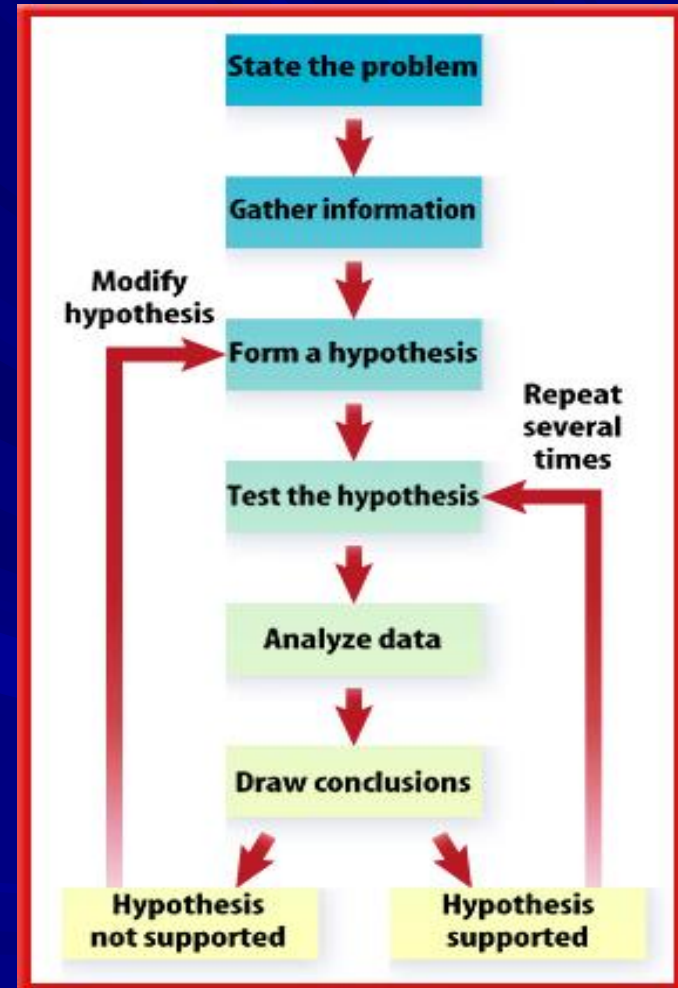


The Scientific Method

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Scientific Methods

- An organized set of investigation procedures is called a **scientific method**. 
- Six common steps found in scientific methods are shown.



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Stating a Problem

- Many scientific investigations begin when someone observes an event in nature and wonders why or how it occurs.
- Then the question of “why” or “how” is the problem.
- Sometimes a statement of a problem arises from an activity that is not working.

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Researching and Gathering Information

- Before testing a hypothesis, it is useful to learn as much as possible about the background of the problem.
- Have others found information that will help determine what tests to do and what tests will not be helpful?



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Forming a Hypothesis

- A **hypothesis** is a possible explanation for a problem using what you know and what you observe. 🔊
- For example, NASA scientists hypothesized that a ceramic material might withstand the heat and forces of reentry and could work on the space shuttle.



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Testing a Hypothesis

- Some hypotheses can be tested by making observations.
- Others can be tested by building a model and relating it to real-life situations.



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Testing a Hypothesis

- One common way to test a hypothesis is to perform an experiment.
- An **experiment** tests the effect of one thing on another using controlled conditions. 

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Analyzing the Data

- An important part of every experiment includes recording observations and organizing the test data into easy-to-read tables and graphs.
- Interpreting the data and analyzing the observations is an important step.
- If the data are not organized in a logical manner, wrong conclusions can be drawn.


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Drawing Conclusions

- Based on the analysis of your data, you decide whether or not your hypothesis is supported.
- For the hypothesis to be considered valid and widely accepted, the experiment must result in the exact same data every time it is repeated.

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Being Objective

- A **bias** occurs when what the scientist expects changes how the results are viewed. 
- This expectation might cause a scientist to select a result from one trial over those from other trials.

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Being Objective

- Scientists can lessen bias by running as many trials as possible and by keeping accurate notes of each observation made.
- Valid experiments also must have data that are measurable.
- For example, a scientist performing a global warming study must base his or her data on accurate measures of global temperature.

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Being Objective

- The experiment must be repeatable.
- Findings are supportable when other scientists perform the same experiment and get the same results.