

A photograph of laboratory glassware. In the foreground, a test tube containing a purple liquid is held by a pair of metal tweezers. In the background, a rack holds several other test tubes containing green and blue liquids. The background is slightly blurred, showing a laboratory setting with a window.

Scientific Method

6 steps to know and understand

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1. Make an Observation

What have you seen recently in the world around you that raised a question in your mind?

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2. Recognize the research problem
 - The scientist must narrow the observations down to one research problem.
 - Example: Do market steers gain more weight when fed whole corn or whole wheat?

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3. Form a hypothesis

- A hypothesis is an explanation that can be tested.
- More than a random guess – the scientist usually has some idea of the answer to the question due to prior knowledge.
- Applied to this knowledge is reasoning power!

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4. Design the experiment

- An experiment is a procedure that tests a hypothesis by the process of collecting information under controlled conditions.
- Should use two groups:
 - Control: the standard, all conditions kept the same
 - Experimental: all conditions kept same except single condition being tested

Design the Experiment

- Only one condition is changed at a time!
 - Independent variable: the condition being changed.
 - Dependent variable: the condition that results from the change.
- Example: In testing the effects of a feed change on animals, the type of feed is the independent variable while weight gain is the dependent variable.

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5. Collect and analyze data
 - If data supports hypothesis, conclusions may be drawn and a recommendation made
 - If data does not support hypothesis, it helps the scientist create a new hypothesis.
 - Sometimes a second experiment is being created even as the first one continues.
 - Data may be numerical, or descriptive in form, depending on the experiment.

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6. Draw conclusions and create recommendations
 - Analyzing the data can take the greatest amount of time.
 - Scientists might end up with more questions than they started with.
 - Data may only be considered confirmed if it's repeated several times and yields similar results.
 - Only after a hypothesis is supported by additional data is it considered valid and accepted.