



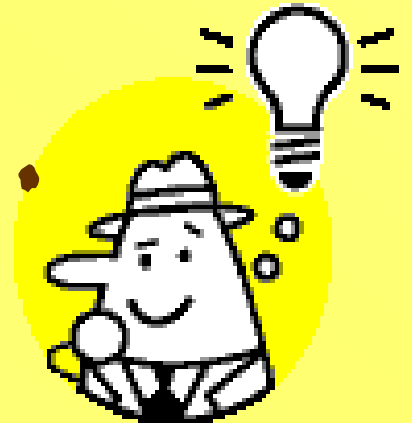
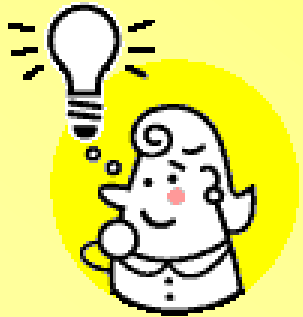
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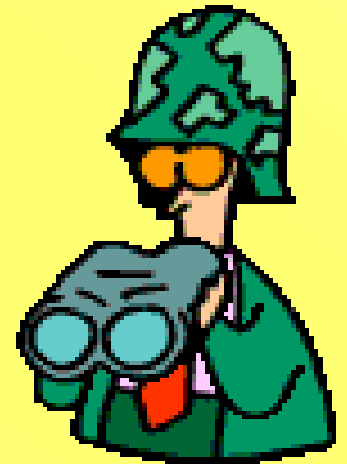
Scientific
Method

THE SCIENTIFIC METHOD

A way of thinking
about problems and
solving them.



1. Observe the
world and your
surroundings.



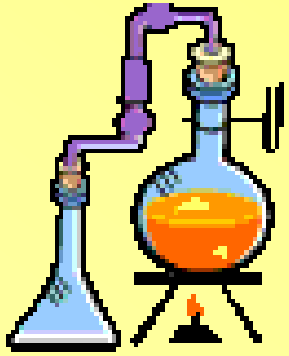
2. Ask
questions
about your
observations.



3. Form a hypothesis:
(a possible explanation
of the observation or
problem)



4. Test hypothesis with a controlled experiment



A Controlled Experiment

- ◇ Contains a control group and an experimental group
 - Control group – does not receive experimental treatment/condition
 - Experimental group – receives treatment/condition
- ◇ The experimenter changes only 1 variable between the control and experimental groups
 - Variable – thing that changes during an experiment (also called experimental variables)
 - Control – thing that does not change during an experiment (also called control variables)

Variables

- ◇ There are two kinds of experimental variables in an experiment
 - Independent Variable – the variable that is changed by the experimenter
 - Dependent Variable – the variable that changes because of the independent variable (it depends on the independent variable) – it is measured or observed

Example Experimental Variables

You've decided to experiment with tomato plants. You are trying to figure out which color of light they grow best in. You grow 5 plants under normal light bulbs, 5 plants under green lights, and 5 plants under blue lights. All of the plants receive the same amount of water and nutrients, are kept in the same size pots, have the same amount of soil, and are the same variety of tomatoes.

Which group is the control group?

- ◇ the plants grown under normal light

What is the independent variable?

- ◇ the color of light

What is the dependent variable?

- ◇ the plant growth



Example Control Variables

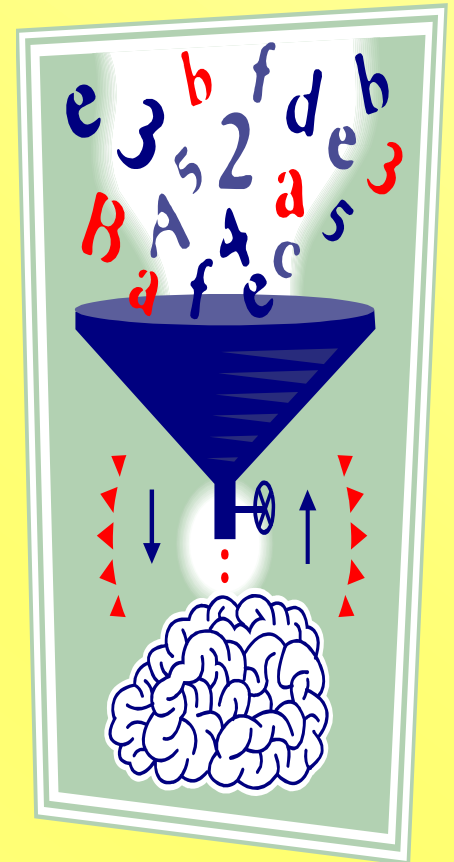
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What are the controls/control variables?

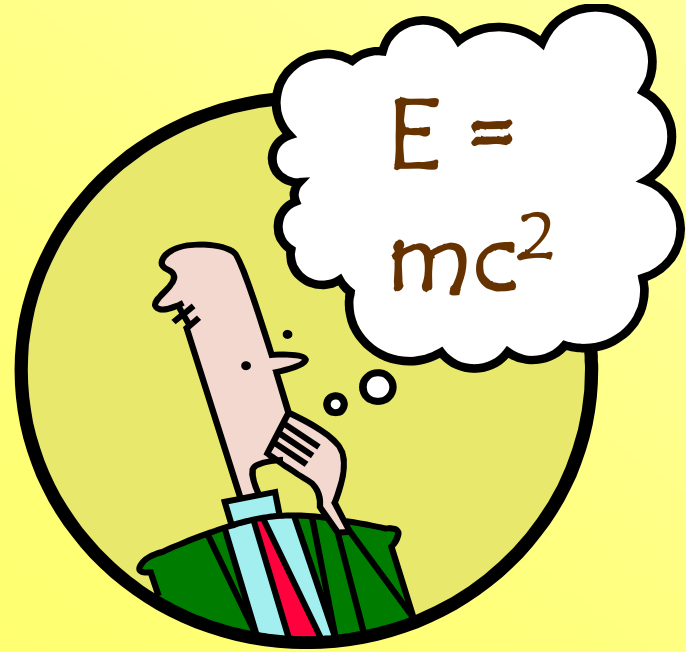
- ◇ the amt of water & nutrients, amt of soil, size of pot, variety of tomatoes, etc

It is not always possible to control every variable. Scientists do the best they can to control variables.

5. Gather data (results)



6. Analyze
results
(think
critically)



7. Conclude –
support or reject
hypothesis

Then what?

- ◇ If your conclusion supports your hypothesis:
 - Retest – Getting the same results repeatedly gives your data validity. So, even if your conclusion is supported, you retest to make sure that your results were not just a fluke.
- ◇ If your conclusion does not support your hypothesis:
 - Think again about another possible explanation for your problem or observation and redo the scientific method.
 - Retest – Again, you want to make sure that your results were not just a fluke.

