THE SCIENTIFIC METHOD

Designing a Controlled Experiment

1. The factors in an experiment that can be changed are called _____. Some examples of variables would be: Changing the temperature, the amount of light present, time, concentration of solutions used.
2. A controlled experiment works with _____ If several variables were changed at the same time, the scientist would not know which variable was responsible for the observed results.

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THE SCIENTIFIC METHOD

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4. An experiment is based on the comparison between a _____ with an _____
   a) These two groups are identical except for one factor.
   b) The control group serves as the comparison. It is the same as the experiment group, except that the one variable that is being tested is removed.
   c) The experimental group shows the effect of the variable that is being tested.

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THE SCIENTIFIC METHOD - EXAMPLE

In order to test the effectiveness of a new vaccine, 50 volunteers are selected and divided into two groups. One group will be the control group and the other will be the experimental group. Both groups are given a pill to take that is identical in size, shape, color and texture.

Describe the control group.

Describe the experimental group.

What variables are kept constant?

What variable is being changed?

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TYPES OF VARIABLES

_____(Cause)

- Is the variable that is changed or manipulated by the scientist.

_____ (Effect)

- Is the one observed during the experiment where data is collected during the experiment.

In our vaccine example what is the Independent and Dependent variable?

Independent

Dependent

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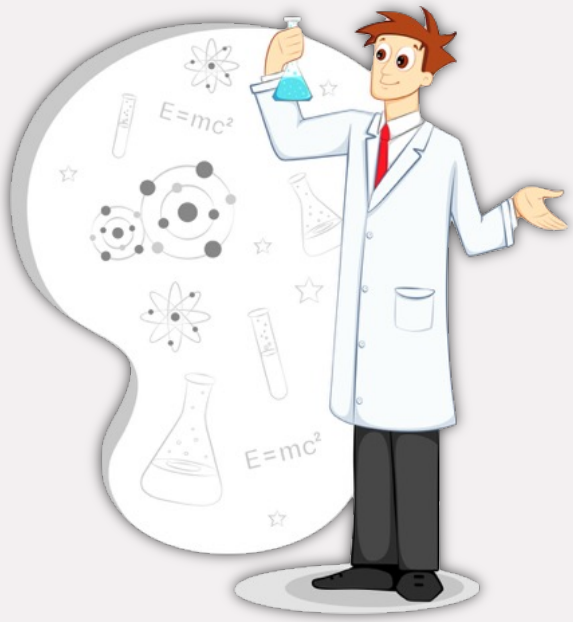

FORMING A THEORY

A theory may be formed after the hypothesis has been tested many times and is supported by much _____.

Theory

A broad and comprehensive statement of what is thought to be true. A _____ is supported by considerable evidence.

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IN A "CONTROLLED EXPERIMENT", ALL VARIABLES MUST BE KEPT _____ EXCEPT THE ONE VARIABLE THAT IS BEING CHANGED.

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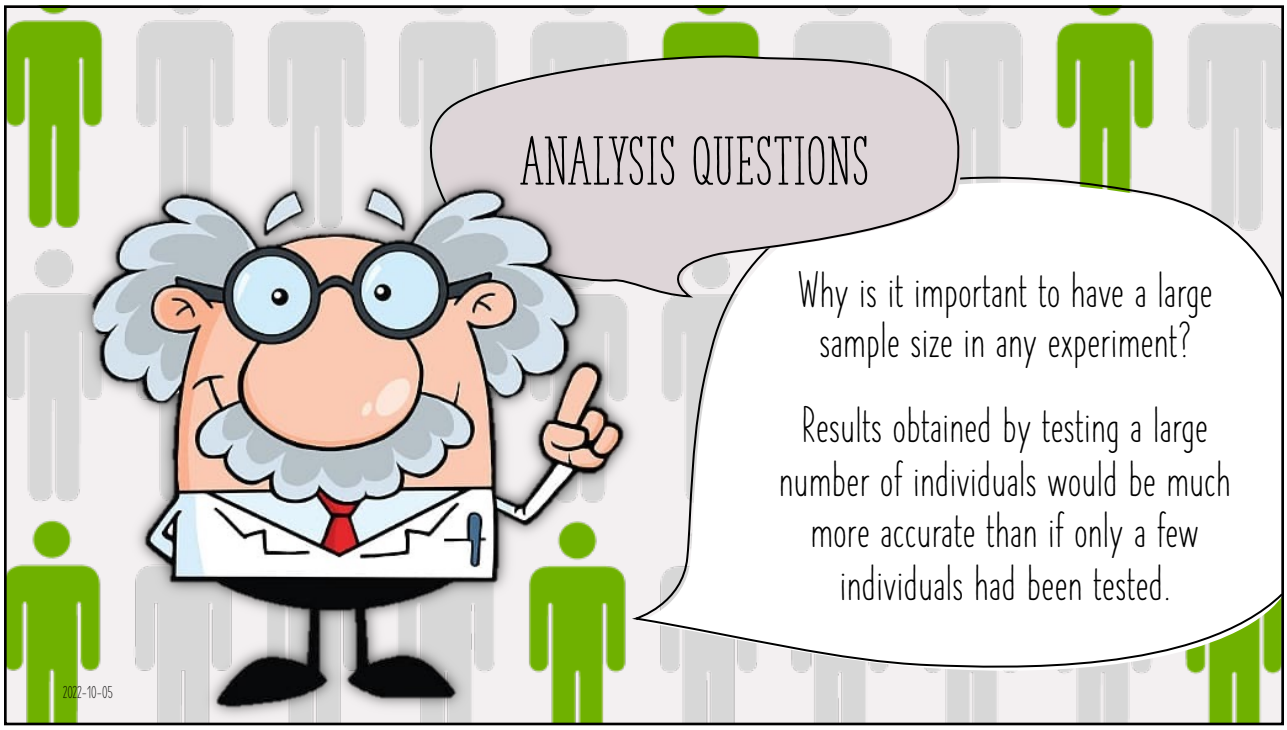

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ANALYSIS QUESTIONS

Why is it important to repeat the experiment many times?

What is the importance of the control?

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ANALYSIS QUESTIONS

How is a theory different than a hypothesis?

Why is it so important that a scientist accurately describes the procedure used in the experiment?

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ANALYSIS QUESTIONS

What is the difference between the independent and the dependent variables in an experiment?

In a "controlled experiment", why must all of the variables, except one, be kept constant throughout the experiment?

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