

THE NATURE OF SCIENCE

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Assumptions of Science

- 1.
- 2.
- 3.
- 4.

The Practices of a Scientist

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1. Asking questions

- ▶ Scientific questions are ultimately fueled by _____ about the world
- ▶ There is no single _____. Scientists use _____ to uncover the true nature of the world.
 - ▶ Scientific questions focus on _____, _____, and _____.
- ▶ Scientific questions are different from other types of questions because their answers must be supported by _____.

- Empirical evidence -

2. Modeling

- ▶ Models are _____ of parts of _____.
- ▶ Models can include _____, _____, _____, and _____.
- ▶ All models have _____ and _____.

- ▶ Scientific models are based on _____. When new evidence is uncovered that the model cannot explain, the model is _____.
- ▶ The goal of modeling is to make _____.

3. Experiment

▶ When scientists want to answer questions, they develop _____. Experiments are procedures to _____

- Observation -

- Inference -

▶ *Experiments are meant to test the effect of one _____ on another.*

- Independent Variable -

- Dependent Variable -

- Control -

▶ Control groups are _____ to experimental groups, except for one single _____.

▶ Control groups are insurance against _____ or _____.

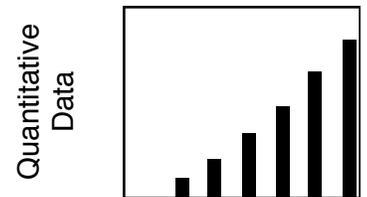
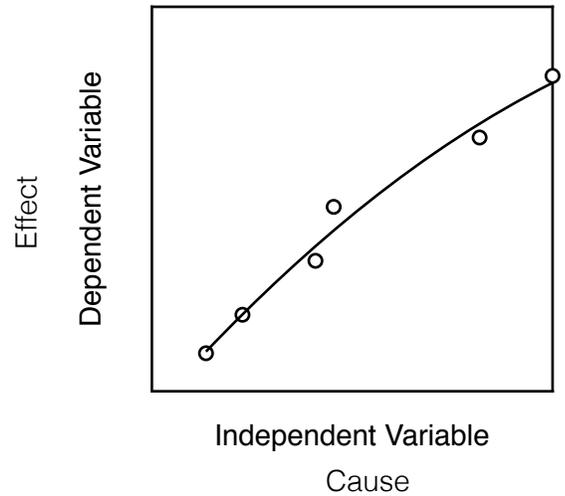
▶ Controlled variables are kept _____ between all trials, control and experimental group.

4. Analyzing Data

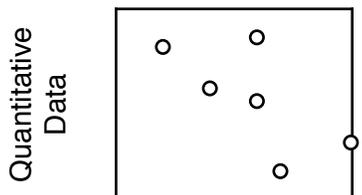
▶ The products of experiment are _____. Once collected, data are _____ to reveal patterns.

▶ Limitations of data, such as _____, and _____ must also be considered

- Qualitative Data -



Qualitative Data



Quantitative Data

- examples:

- Quantitative Data -

5. Apply Mathematics

- ▶ Mathematics is a tool for _____ data and _____.
- ▶ Math is also used in science to _____ and make _____.
- ▶ Mathematics involves computational thinking, which uses _____ and _____ to create computer simulations.
 - ▶ Computer simulations of natural and designed systems have greatly enhanced our ability to _____ and _____

6. Construct Explanations

- ▶ Explanations include _____. Claims are made _____, and are supported by evidence.
- ▶ _____ become _____ when they are used to _____.

- Hypothesis -

- Theory -

- ▶ The ultimate test of 'truth' in science is _____.
- ▶ The measure of any theory or explanation is its _____.

- Falsifiability -

- ▶ Theories or explanations that are not _____ can be said to be unscientific
 - ▶ In addition to predicting outcomes of experiments or studies, scientific theories must also predict hypothetical _____ that would show themselves to be _____.

7. Argue from Evidence

- ▶ Argumentation is a process of _____. The goal is to _____.
- ▶ No explanation in science is exempt from _____.

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