Theory, Law, and Hypothesis Worksheet

A theory is defined by Webster as a plausible or scientifically acceptable general principle or body of principles offered to explain phenomena. Theories are not proven by science nor will they ever become proven. Theories are the most accepted explanation for an event. They must be consistent with data. Explanations must have a scientific reason and that reason has the ability to change with new data. Several big theories in science include: cell theory, big bang theory, theory of evolution, atomic theory, and molecular kinetic theory.

*Task:* Choose one theory and describe the theory and the data that supports that theory.

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A law is a statement of fact meant to describe, in concise terms, an action or set of actions. It is generally accepted to be true and universal, and can sometimes be expressed in terms of a single mathematical equation. They are accepted at face value based upon the fact that they have always been observed to be true. Examples of laws include: the law of gravity, Newton's laws of motion, the laws of thermodynamics, Boyle's law of gases, the law of conservation of mass and energy, and Hook’s law of elasticity.

*Task:* Choose a law and describe the law and provide any mathematical equations that show it.

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Hypothesis: A hypothesis is not just an educated guess. Webster’s dictionary definition of guess is the following: to form an opinion from little or no evidence. This is the opposite of what scientist’s do, they observe and then make quality inferences that lead to accurate hypotheses.

Hypotheses are statements that include a possible explanation for an observed event. It is based on qualitative and quantitative observations and is also scientifically based. A hypothesis is never proven absolutely right, but can be proven wrong. More accurately though a hypothesis is supported by the data or not supported by the data. There is nothing wrong about a hypothesis when an experiment doesn’t support the hypothesis. Scientists can use the data to make a better hypothesis and continue with another experiment.

Directions: Take the following inferences and questions and turn them into formal hypotheses.

**Formal Hypothesis Format:**

If (dependent or *responding* variable) is related to (independent *manipulated* variable), then prediction (with explanation).

1. Chocolate may cause pimples.

Independent variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dependent variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Formal hypothesis:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. Does the color of the light affect plant growth?

Independent variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dependent variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Formal hypothesis:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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3. Bacterial growth may be affected by temperature.

Independent variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dependent variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Formal hypothesis:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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4. Can Ultraviolet light cause skin cancer?

Independent variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dependent variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Formal hypothesis:

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5. Temperature may cause leaves to change color.

Independent variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dependent variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Formal hypothesis:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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