

Name: _____ Period: _____ Date: _____



Penguin Bay Biology

- Biology Class, Simplified -

0.4 Student Notes

Scientific Laws and Theories

Hypotheses

A hypothesis is an educated _____ that must be _____ in order to be proven correct or incorrect.

- Example: _____ I use a toothpaste containing fluoride, _____ I will develop fewer cavities.

A 'guess' is only a hypothesis if it is _____.



Theories

A theory is a well-tested _____ of experimental data.

Scientific theories are created by repeatedly _____ a hypothesis through the formula outlined in the _____.

One scientist alone can _____ create a theory. In science, a theory implies that something has been _____ through experimentation.

Theories must **always**:

- Be totally supported by _____.
- Be verified by _____ testing.
- Be subject to _____ by peers.

A theory can be _____ if additional data is found.

In order for a _____ to become a theory, every scientist who tests the hypothesis must come up with _____ the same _____.

Laws

Laws are _____ based on repeated experimental _____ that are:

- Based on proven, reliable _____.
- Accepted to be true because they are consistently _____ to be true.

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- Different from _____ because they are _____ based on observations of phenomena, rather than _____ of phenomena.

Pure and Applied Science

_____ science is a field of _____ science.

- Example: Biology, Chemistry, Geology, etc.
_____ science uses the _____ from pure science to _____ practical problems.
- Example: Engineering, Medicine, Forensics, etc.

Experimentation

A valid scientific experiment must test only _____ variable at a time and include a _____ group to compare the variable with.

- Example: When testing a new drug, the _____ group is given the medication and the _____ group is given a placebo (fake drug).



The data obtained by experimentation will be either _____ or _____.

Quantitative data is obtained by making _____ which result in _____ sets of numeric information.

- Example: Measuring the _____ of everyone in class.

Qualitative data is obtained by observation or _____.

- Example: Most of the shirts in the room are _____.

Quantitative and qualitative data are both _____ and useful if collected carefully following the _____.

Well-planned experimentation is vital for reaching an _____ conclusion. You should be able to use your data to reach a _____ conclusion that others can _____ by following your methods.

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Representing your _____ in an understandable way is a critical step in the process of _____ your results.

_____ is often a good way of accomplishing this.

Graphing Data

Y axis: the _____ axis where the _____ variable is placed.

X axis: the _____ axis where the _____ variable is placed.

- Example: In an experiment measuring the effect of water quality on plant growth, the water quality would be the _____ variable and the plant growth would be the _____ variable.