

Science, Biology and the Scientific Method

What is Biology?

Biology (Greek or Latin origin)

Bios = _____

Logos = _____

Therefore Biology is the _____

What does it mean to be living?

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

What is Science?

The goal of science is to investigate and understand the _____ and to use those explanations to make useful predictions.

Science is an organized way of using evidence to learn about the natural world.

A way of learning about the natural world through

Characteristics of Science:

- **1. Observations lead to questions**
 - What is an observation?
 - Tools of observation?
 - Indirect Observation
Inference:

Hemingway

- In the same manner that you were not able to see the face of the young lady in the drawing, scientists sometimes fail to 'see' a certain set of _____ as relevant to their questions.
- Scientists sometimes tend to _____ from the same set of data in the same manner that you inferred totally different things from the same piece of evidence.

Investigating Tracks: Record your observations/inferences

	Observation	Inference
Picture 1		
Picture 2		
Picture 3		

- Based on the same set of evidence- many equally warranted answers to the _____ can be inferred.
- Scientists make similar inferences as they attempt to derive answers to questions about _____
- _____ (or story) may solely account for that evidence. Several answers are often plausible. Scientists may simply never find the answer as to what has really happened.

- 2. Knowledge comes from observation

Observation and experimentation

Empirical Knowledge: _____

Indigenous Knowledge: understandings, values and beliefs about the natural world that are unique _____ that has lived in the area for a long time.

- _____ passed on through generations.

Theories

- are inferred _____ for observable phenomena
- Theories _____ be proven true but can be proven false.
- They are extensively _____ and _____
 - _____
 - Plate tectonic theory
 - Evolution

3. Science is Progressive

- Theories are _____ and are always being examined and questioned.
- _____ can change theories

Variable: any condition that could _____ in an investigation.

Types of Scientific Inquiry:

- Controlled experiment: Determines the relationship of two variables that you can _____
 - Ex: You observe that grass is not growing on your lawn. You ask yourself why? You may suggest a number of possible answers and eventually come up with a hypothesis (possible explanation for your observations). You think it is because the lawn needs fertilizer.
 - From this you can make a _____ to be tested
 - Predict that adding fertilizer will allow new grass to grow
 - You now need to identify all of the _____ that could affect the experiment
- Independent Variable: the variable that the investigator in an experiment _____(Fertilizer)
- Dependant Variable: the variable that changes in _____ to the independent variable(grass)
- Controlled Variable: variables _____ by the investigator(sunlight, nutrients and temperature)
- It is also important to have a control. This is a reference for the experiment to be compared to.
 - Essential to see if a _____ occurred.
 - In this example you could have two patches of grass, one with fertilizer and one without(control)
- Correlational Study: look at a _____ between two variables
 - Smoking and lung cancer
- Observational Study: when _____ controlled(either by inability or investigators choice)
 - Ecology

Steps to the "Scientific Method"

- | | | | | |
|----|----|----|----|-----|
| 1. | 3. | 5. | 7. | 9. |
| 2. | 4. | 6. | 8. | 10. |