Name:

Biology Notes Outline

Chapter 1 The Nature of Science

Biology

* What is Biology?
	+ Biology = The study of and
		- We will focus on the structure and function of the parts of all living things.
			* Macromolecules
			* Cells
			* Ecosystems
			* Genetics

Observation vs. Inference

**Observation:**  Using one of the to make understand the world around you.

* + 1. Sight, touch, hearing, smell, (NOT in science class!)
		2. . Example: There is one TV in the room.
* Recorded as in an experiment. Data =

**Inference: Logical** interpretation/explanation.

* 1. Using to make sense of what you are observing
	2. **BASED** on observations
	3. **Example**: You entered the classroom and a new adult was by my desk. You might infer that I or that the person is a
	4. **Clues** You Are Making an Inference; I think.., Like…, Because…
	5. Used in writing the **CONCLUSION**  of a lab report.

Scientific Process

Scientific Process: = investigation

 Steps:

1. Question:
	* 1. State/Identify a or (What you want to know/understand/find out)
2. Gather
3. Form a – educated **EXPLANATION** for an observation.
	* 1. Must be Must be and falsifiable.
		2. Usually in  **f**ormat.
		3. NOT a “guess”. NOT simply a prediction.

4. Test hypothesis with an

5. **Data:** Record **observations (“facts”)**

6. **Conclusion:** NOW analyze –

* 1. **Based** on **data**
	2. Decide if hypothesis was or not.
	3. **NOTE: A hypothesis is NOT “proven” – it is**
* This is a process that changes and doesn’t have to occur in order.
	+ You can skip steps

Experiment Requirements

1. **Variable:** A quantity that can vary & can affect the experiment outcome
	1. **Independent** variable:
		* 1. What scientist
			2. Must have only independent variable.
			3. It is what you are Usually the part of hypothesis.

Experiment Requirements

B. **Dependent** variable: ; the outcome “depends” on what the independent variable causes.

* It is usually the part of the hypothesis.

C. **Constants:** All other variables are kept the for each test.

**Controlled Experiment:** Experiment that contains 2 set-ups, with ONLY ONE factor/variable different between the set-ups.

1. **Control Group:** to to.
	* 1. Used for comparison to the experimental group.
		2. Helps determine the effect of the independent variable in the experimental group.
2. **Experimental Group:** The group **containing** the independent variable – what you are testing.

I Have My Data (Recorded Observations) & Conclusion, Now What?

1. **Report** Those Findings!!
	1. Very Important Step
	2. **Why**?
		1. . – so YOU get the credit & not someone else
		2. Peers Check Work
		3. Repeat Experiments
		4. Build Off

When Experiments Are Not Possible

* When subjects need to not be disturbed
* .
* Too many
	+ Example: It is difficult to run a controlled experiment during human medical studies….WHY?
	+ Different ages, races, genetic makeup, pre existing medical conditions
	+ Goal would be to try to find subjects that are as similar as possible (but it never will be truly controlled)

Theory vs. Law

* Theory vs. Law
* **Theory**: based on observations & investigations
	+ Usually the simplest principle that unifies the many observations.
	+ It explains it happens.
* NOTE: BOTH can be with data.

How a Theory Develops

* Theory occurs when a hypothesis
* In science, the word theory applies to a that unifies a broad range of observations
* Oh, that is just one person’s theory! (Poor use of the word theory)
* A theory is a well tested explanation that explains many observations

Characteristics of Life Cont…

* 1. Made of Cells
	+ Cell:
		- Unicellular Organisms
* Entire organism is made up of
* Exp: Bacteria and protists
* Multicellular Organisms
* The organism is made up of
* Cells have
* 2. Reproduce
	+ Reproduction is the
		- Asexual Reproduction
			* A single parent organism
				+ Clone/Exact Copy
		- Sexual Reproduction
* . contribute genetic information
* Involves the combination of male and female sex cells
* 3. Obtain and Use Energy
	+ Living organisms need energy to
		- Exp: Food Digestion, Photosynthesis, Healing Injuries
* 4. Maintain Homeostasis
	+ Homeostasis = in the body that are necessary for life
		- * Body temperature, Blood volume, pH balance, Water balance, etc

Characteristics of Life Cont…

* 5. Pass on Genetic Information
	+ Genes carry
		- Genes are
	+ Heredity is the reason children resemble their parents
	+ Mutations change DNA code and can be passed from generation to generation
* 6. Respond To Their Environment.
	+ An example is a plant’s leaves and stems growing toward light
	+ Organisms react to stimuli: Light, Temperature, Odor, Sound, Gravity, Heat, Water, Pressure, etc
* 7. Grow and Develop
	+ Growth means
	+ Development involves

* 8. Adapt to their Environment through Evolution.
	+ Adaptation =
		- A process that

* + - Species obtain adaptations

Scientist:

|  |  |
| --- | --- |
| What is spontaneous generation? | What is biogenesis? |
| Describe the experiment your scientist performed relating to spontaneous generation. |
| What was your scientists’ hypothesis?  | What was the end result of your scientists work with spontaneous generation? |

Same Group Information: As a small group, go over the information you found regarding your scientists. Select 3 main points to share. Make sure everyone agrees that all information shared is accurate. You will be expected to share information with other people after this activity.

|  |
| --- |
| Scientist Name: . |
|  |
| 1. |  |
| 2. |  |
| 3. |  |

Different Group Information: Share your main ideas with people that looked up other scientists. Record all information in the table below.

|  |  |
| --- | --- |
| Scientist Name: | Main Ideas |
| Redi |  |
| Leeuwenhoek |  |
| Needham |  |
| Spallanzani |  |
| Pasteur |  |

Recap and Review

Scientist:

|  |  |
| --- | --- |
| Explain citing specific evidence what your scientist did and contributed to the spontaneous generation debate.  | Explain citing specific evidence how your scientists work fits into the bigger picture of scientists reviewing, retesting, and refining each other’s work.  |