**Biology: Unit 1: Scientific Inquiry, Practice, & Laying Foundations: Ward and Prater**

**Section 1: There will be a quiz on this section**

**Learning targets for this section include:**

**LT1: I can Identify a scientific question and make a hypothesis that can be tested**

**LT2: I can Identify the characteristics of an experiment including independent variable, dependent variable, control, and constants.**

**LT3: I can Design and conduct an experiment**

**LT4: I can Design and conduct an experiment**

**LT5: I can Communicate the results of an experiment**

**LT6: I can Distinguish between qualitative and quantitative data**

We notice things all around us. For example, we see lightning bugs and ask, “How do lightning bugs glow? Or why are moths attracted to light?”. These questions are related to making observations

Science terms

**Observation**-using all senses (sight, touch, smell, sound, and taste) of awareness

**Science**-the act of observing, identifying, describing and explaining natural phenomena (observable facts)

**Research**-finding out what is known about a topic

**Hypothesis**-an educated guess that can be tested through experimentation. Also defined as a proposed answer to a problem.

**Experimentation**-carrying out experiments to test a hypothesis and gain a better understanding of a concept. A test of a hypothesis.

**Analysis of data**-making sense of experimental results

**Conclusion**: explaining whether the data collected and analyzed supports the hypothesis in an experiment

**Theory**-a general principle that explains phenomena. It must be supported by hypotheses and conclusions must continue to hold true over a long period

Steps in the Scientific Method:

1. Observe

2. Question

3. Research

4. Hypothesize

5. Experiment

6. Analyze

7. Conclude

* When conducting research, avoid biased information. (ex. Drug manufacturers may create a brochure about a product but this is not the best source of finding out side effects or problems with the drug)
* What is considered a reliable source?
  + Sites that are updated daily
  + News outlet sites
  + Government agency or university websites (.gov or .edu)
  + Journal articles that are peer reviewed; this means the articles are scrutinized by anonymous scientists with knowledge of the concepts.

**Inductive Reasoning v. Deductive Reasoning-what is the difference?**

Inductive reasoning relies on only observation.

(Ex. Taylor notices that every time she throws a ball up it comes down). This is an observation so it is inductive

Deductive reasoning relies on general truth like a law of a theory to explain the observation

(Ex. Cory says “of course it comes down because of Newton’s Theory of Gravitation”.

**Conducting Experiments**

Setting up a **controlled experiment** allows testing of a hypothesis by changing only one variable at a time.

**Variables**-a condition in an experiment

**Independent variable (manipulated)**-a variable or factor that is changed (manipulated) during the experiment. To be a valid experiment, the experimenter will only test one independent variable at a time!

**Dependent variable (responding**)-Measurable(data) response to changing the independent variable

**Control or control variable**-The variable that is not the experimental nor manipulated group and will be used as a basis of comparison to judge the effect of the independent variable

\*Once the independent variable is chosen, you will have one control group and one or more experimental groups

**Constants**-everything in an experiment that is kept the same to insure the accuracy of your results

Data collected can be **qualitative or quantitative**

**Qualitative data-**data collected that is generally gathered from observation with your senses like the color of a liquid or the texture of a solid. (Ex. The color changed from clear to blue); Qualitative data is sometimes subjective; it depends on the person)

**Quantitative data**-data collected that involves measurements. There must be a number and usually a unit in the data. Quantitative data is objective. There is an actual value

Insert: Safety Procedures in the Laboratory (two pages of safety rules for the lab) Read over this aloud in class. Students complete safety quiz in groups of four. Go over correct answers

Two pages on equipment and materials-This is done in lab groups. Pictures of equipment and description of the function are matched.

**Section 2: Lab equipment: there will be a quiz that you take in a group on basic lab equipment.**

**LT9: I can Recognize and safely use lab equipment**

**Section 3: there will be a quiz over material in this section**

**Learning targets in section 3 include:**

**LT7: I can I can describe the eight characteristics of life**

**LT8: I can Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis**

**Biology is the study of life!**

**What Is Life?**

All Organisms that are alive share eight characteristics (**DGCHARMS):**

1. Living things are made up of units called cells.

**Cell**-a collection of living matter enclosed and separated from its surroundings (basic unit of life)

**Unicellular**-a single-celled living thing

**Multicellular**-a living thing made of many cells

2. Living things **reproduce**.

**Sexual reproduction**-two cells from different parents unite to produce a new cell that will become an organism.

**Asexual reproduction**-a new organism has a single parent

3. Living things all have a **universal DNA.**

Directions for inheritance are carried in the DNA

4. Living things **grow and develop**.

Each organism has a distinctive life cycle (pattern of growth and change)

5. Living things have a **metabolism**; they obtain and use materials and energy.

**Metabolism**-break down nutrients into energy

6. Living things **respond to their environment**. They show Sensitivity.

They respond to light, temperature, and environmental change

7. Living things maintain **Homeostasis**.

**Homeostasis**-process by which organisms keep their internal conditions relatively stable.

8. Taken as a group, living things **Adapt to their environment** over time.

Basic traits inherited from their parents do not change but organisms evolve over long periods

Adapt and **Evolve**-change over time