Name:_____

Unit 1: Introduction to Biology

Students will be able to:

1.1 Plan and conduct an investigation:

- Define the question, develop a hypothesis, design an experiment and collect information, analyze and interpret the data, communicate results, and extend knowledge by asking further questions.
- Communicate and interpret data using an appropriate graph.
    a. Utilize proper graphing conventions.

1.2 Obtain, evaluate and communicate scientific information

- Construct an explanation
- Use evidence to develop a scientific argument

1.3 Explain the characteristics of life

- Levels of Organization
    - Atoms to biosphere
- 3 parts of the Cell Theory
- 8 Characteristics of Life
    - Living things share a common genetic code
    - Living things are made up of cells
    - Living things obtain and use energy
    - Living things grow and develop
    - Living things respond to stimuli
    - Living things reproduce
    - Living things adapt to their environment and evolve as a population
    - Living things maintain a stable internal environment (homeostasis)

Key Words:

- Hypothesis
- Law
- Theory
- Biology
- Experimental group
- Control group
- Homeostasis
- Independent variable
- Dependent variable
- Cell
- Metabolism
- Growth
- Development
- Evolution

Introduction to Biology Unit	
Date	Topic
8/16	**First Day of School-Introduction Activities**
8/17	Start of School Stations Lab
8/20	Introduction to the Scientific Method Notes
8/21	Experimental Design Notes and Scientific Method Practice
8/22	Scientific Method Lab
8/23	Finish Scientific Method Lab and Graphing Guided Reading
8/24	Graphing Guided Reading
8/27	Substitute Sammy, Characteristics of Life Notes
8/28	Characteristics of Life Notes, Practice Free Response
8/29	Peer Review Free Response Practice
8/30	Unit Review
8/31	**Introduction to Biology Unit Multiple Choice and Free Response Test**

8/20/18

Objective: Students will be able to use the steps of the scientific method to complete an experiment.

Warm-Up:

1. When is your first unit test?

2. What are two things that I am expecting you to know at the end of this unit?

1.1 Scientific Method

Observations: We use our senses to gather information about the world around us. There are two types of observations.

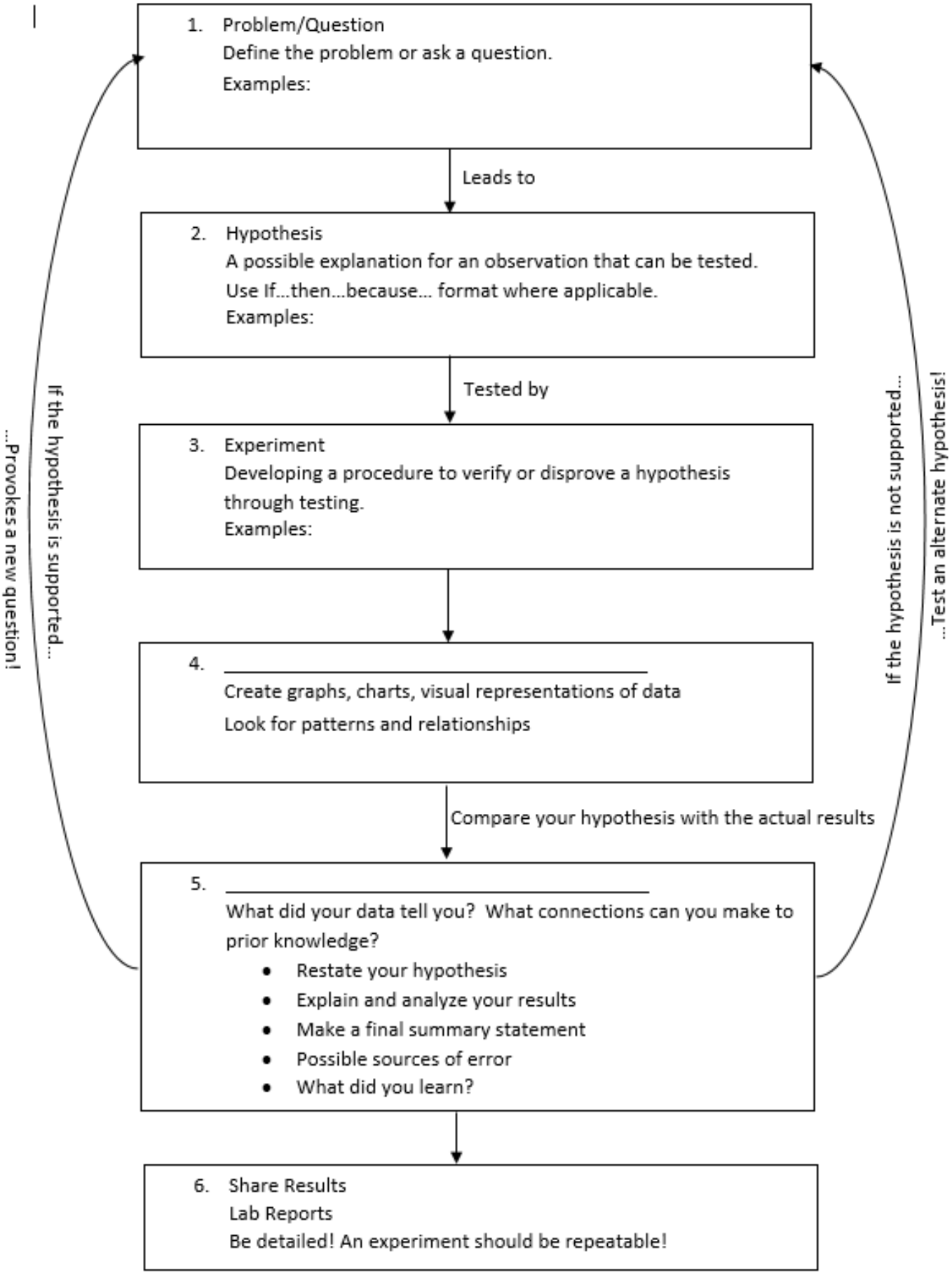
Types of observations:

- Qualitative Observation: _____
    - Color, shape, feel, taste, sound
    - Example: _____
- Quantitative Observation: _____
    - Based on exact measurements
    - Example: _____

Inference: a logical interpretation of an event that is based on observations and prior knowledge (not testable)

- Example: _____

The Scientific Method



Experimental Design

An experiment is a set of conditions that allows a scientist to measure the effects of a particular treatment.

The goal of an experiment is to manipulate or change one variable, while keeping all others the same to see what the result is. The first step in experimental design is to figure out what you want to change, and what you think the result of that change might be.

Types of Variables:

Independent Variable: the variable that is being changed by scientist.

Dependent Variable: the variable that is being measured as a result of the change.

Constant Variables: all other variables that stay the same for all trials.

Experimental Group vs. Control Group

Experimental Group: a group that receives the treatment and measures the effect.	Control Group: a group that receives no treatment and is used for comparison to see if the treatment worked.

Other Important Aspects of Experimental Design

Materials:

- A bulleted list that includes all of the materials you used in your experiment.

Procedure:

1. A numbered list that details the steps you took to complete the experiment.

Measurement	Base Unit
Length	Meter
Mass	Gram
Volume	Liter
Time	Seconds
Temperature	Celsius or Kelvin

Characteristics of a Well Designed Experiment

- Only one significant variable is tested through the experiment.
- A control group is present.
- The sample size is large enough to draw a valid conclusion about the hypothesis.
- Conclusions must be based on measureable quantities or clear criteria.
- Conclusions are drawn based on data, not on the opinion of the observer (bias).

Scientific Theory vs. Scientific Law

Scientific Theory:

An explanation that applies to a broad range of phenomena that is supported by experimental evidence. A theory explains a series of related phenomena.

Example: Cell Theory, Evolution

Scientific Law:

Statement that describes some aspect of a phenomenon that is always true. A scientific law relates to a single action.

Example: Gravity

Name:_____

8/21/18

Objective: Students will be able to use the steps of the scientific method to complete an experiment.

Warm-Up:

1. Determine if the following observations are qualitative or quantitative.
    a. The color of a student's hair.
    b. The number of students with blond hair.
    c. The texture of a dog's fur.
    d. The height of a table in inches.
    e. The number of bacteria strains on a keyboard.
    f. The color of the leaves of a plant that grows in a dark place.

8/22/18

Objective: Students will be able to use the steps of the scientific method to complete an experiment.

Warm-Up:

1. What is the difference between a control group and a constant variable? How are they similar?

8/23/18

Objective: Students will be able to analyze graphical data and draw conclusions.

Warm-Up:

1. In the relationships below circle the dependent variable and underline the independent variable. (look for things that can be measured)
    a. People gain weight based on the amount of calories they take in.
    b. The amount of sunlight available influences how fast a tomato will ripen.
    c. The amount of television watched by children impacts attention span.

2. Hypothesis – The more time a student spends thinking before blurting out, the less time they spend in the Assistant Principals office.
    a. Draw and fill in the independent and dependent variables in the space below:

8/24/18

Objective: Students will be able to analyze graphical data and draw conclusions.

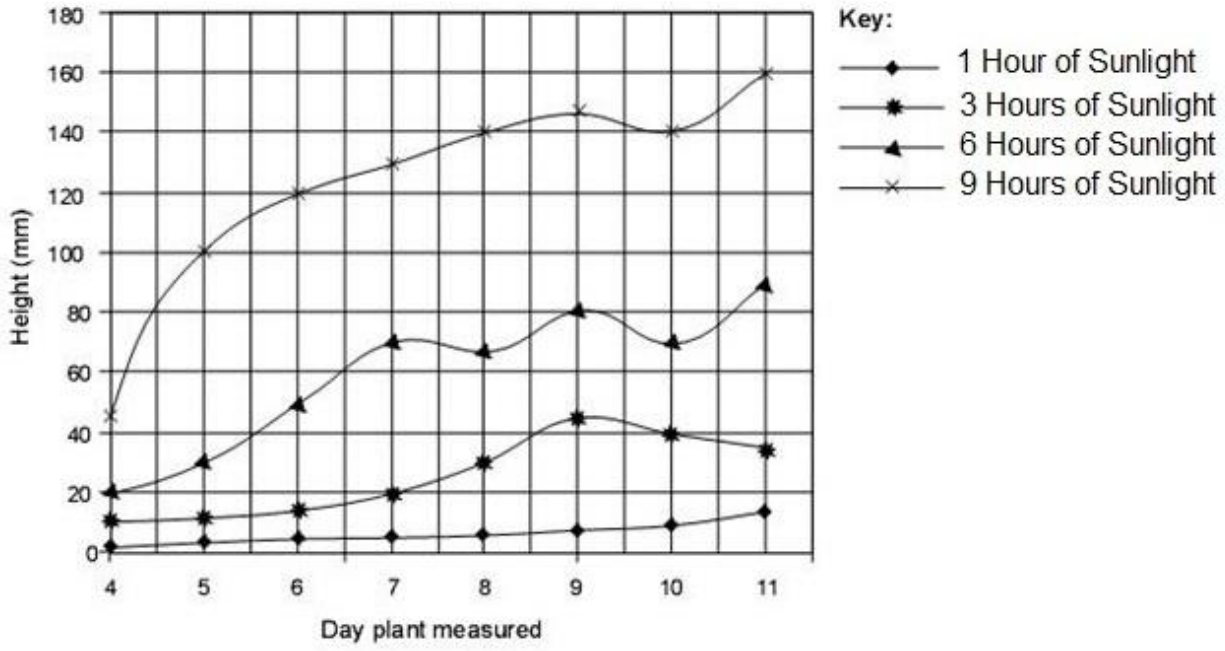
Warm-Up:

1. Draw a T-chart to compare and contrast a scientific law and a scientific theory.

8/27/18

Objective: Students will be able to classify an object as living or non-living using the 8 characteristics of life.

Warm-Up: The following graph compares the growth of plants that were kept in the sun for different amounts of time. Use the graph to answer the following questions.



1. On day 7, the plants kept in the sun for 3 hours were how tall?

2. On day 7, the plants kept in the sun for 6 hours were how tall?

3. Write a sentence to compare the relationship of the two plants in questions 1 and 2.

4. What conclusion can you make about the plants based on the graph?

1.2 Characteristics of Life

Biology= _____

Levels of organization

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

What characteristics do all living things share?

1. Living things _____ – directions for inheritance (DNA)
2. Living things _____
   - Some organisms are made of only one cell and some are made of trillions of cells.
   - Cells are small self-contained units of living material that are separated from the surroundings by a barrier.
   - The cell -_____
     - **Uni**cellular = _____
     - **Multi**cellular =_____
3. Living things _____
   - Metabolism = chemical reactions in the body
   - Animals eat to obtain energy
   - Plants photosynthesize
4. Living things _____
   - Growth = getting larger
   - Development = changing shape and structure
   - Differentiation = cells look different and perform different functions
5. Living things _____
   - Stimulus = a signal

- Response = a reaction
- Organisms live in a constantly changing environment.

6. Living things _____
   - Sexual = DNA from 2 different parents
   - **A**sexual = single parent (cloning, budding)
7. Living things _____
   - Life has changed significantly over the history of the earth. The process of this change is known as **evolution.**
8. Living things _____
   - The steady state (balance) inside an organism's body is known as

     _____
   - While the environment outside changes an organism must be able to keep conditions inside mostly the constant. If homeostasis is disturbed the organism will become sick and will die if the balance is not fixed.

Reading and Questions:
Read the following excerpt from Miller and Levine Biology (2014). After completing the reading, answer the following questions on a separate piece of paper, to be turned into the teacher.

1. Of the scientists mentioned in the article, which do you think was most influential in shaping our current understanding of the cell and cell theory? Why?
2. Based on what you know about the scientific method, how was it used in our discovery new information about the cell and forming cell theory? Please explain your response.

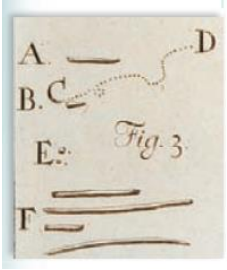
The Discovery of the Cell

What is the cell theory?

"Seeing is believing," an old saying goes. It would be hard to find a better example of this than the discovery of the cell. Without the instruments to make them visible, cells remained out of sight and therefore, out of mind for most of human history. All of this changed with a dramatic advance in technology-the invention of the microscope.

Early Microscopes In the late 1500s, eyeglass makers in Europe discovered that using several glass lenses in combination could magnify even the smallest objects to make them easy to see. Before long, they had built the first true microscopes from these lenses, opening the door to the study of biology as we know it today.

In 1665, Englishman Robert Hooke used an early compound microscope to look at a nonliving thin slice or cork, a plant material. Under the microscope, cork seemed to be made of thousands of tiny empty chambers. Hooke called these chambers "cells" because they reminded him of a monastery's tiny rooms, which were called cells. The term *cell* is used in biology to this day. Today we know that living cells are not empty chambers, that in fact they contain a huge array of working parts, each with its own function.



In Holland around the same time, Anton can Leeuwenhoek used a single-lens microscope to observe pond water and other things. To his amazement, the microscope revealed a fantastic world of tiny living organisms that seemed to be everywhere, in the water he and his neighbors drank, and even in his own mouth. Leeuwenhoek's illustrations of the organisms he found in the human mouth-which today we call bacteria-are shown in the figure to the right.

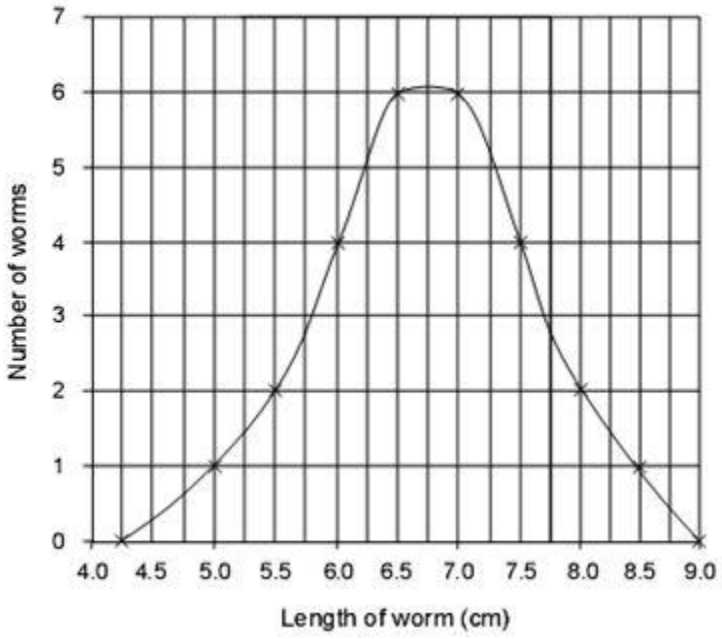
The Cell Theory Soon after van Leeuwenhoek, observations by scientist mad eit clear that **cells** are the basic units of life. In 1838, German botanist Matthias Schleiden concluded that all plants are made of cells. The next year, German biologist Theodor Schwann stated that all animals are made of cells. In 1855, German physician Rudolf Virchow concluded that new cells can be produced only from the division of existing cells, confirming a suggestion made by German Lorenz Oken 50 years earlier. These discoveries, confirmed by many biologists, are summarized in the **cell theory**, a fundamental concept of biology. The cell theory states:

- All living things are made up of cells.
- Cells are the basic units of structure and function in living things.
- New cells are produced from existing cells.

8/28/18

Objective: Students will be able to classify an object as living or non-living using the 8 characteristics of life.

Warm-Up: The line graph shows the number of worms collected and their lengths. Use the graph to answer the following questions.



1. What length of worm is the most common?

2. What was the longest worm found?

3. How many worms were 6 cm long?

4. What does the peak of the curve of the graph represent?

5. What conclusion can you make about the worms based on the graph?

8/29/18

Objective: Students will be able to use PEA format to make an argument about the characteristics of life.

Warm-Up:

1. Which of the following statements is false?
    a. Tissues exist within organs which exist within organ systems.
    b. Communities exist within populations which exist within ecosystems.
    c. Organelles exist within cells which exist within tissues.
    d. Communities exist within ecosystems which exist in the biosphere.
2. Using examples, explain how biology can be studied from a microscopic approach to a global approach.

Vocabulary Scramble: Use the definition to unscramble the vocabulary word. Then, draw a picture of the vocabulary word.

Word	Definition	Picture
ogbyoli	The study of life	
ooishsatmse	The ability of and organism to maintain a constant internal environment.	
lecl	The smallest fundamental unit of structure and function in living organisms.	
emlmatbois	The chemical reactions in the organism.	
rwohgt	Getting larger.	
vmeeloedpnt	Changing shape and structure.	
tolenuvio	Change in a species over time.	

8/30/18

Objective: Students will demonstrate their knowledge of the scientific method and characteristics of life on a unit review.

Warm-Up:

1. Go back to the front page of this packet and read through the essential outcomes. Put a star next to the topics that you still have questions about. Put a check mark next to the topics that you feel confident about.

2. How are you going to go about learning those topics that have a star next to them?

8/31/18

Objective: Students will demonstrate their knowledge of the scientific method and characteristics of life on a unit test.

Warm-Up:

1. Turn in your study guide to the basket.