

PROPERTY OF:

## BIOLOGY – UNIT 1 – CHAPTER 1 NOTES

### THE SCIENCE OF BIOLOGY

#### Science

Science = “having knowledge”

Major sciences = Earth science, life science, chemistry, physics

All the major sciences are inter-related

#### The Scientific Method

scientific method = a series of problem-solving procedures used by scientists

1. Determine the problem. (What do you want to find out?)
2. Make a hypothesis. (Write down an educated prediction to the problem.)
3. Test your hypothesis. (Perform an experiment. Follow a procedure to see if your hypothesis is correct.)
4. Analyze the results. (Present data using tables, charts, graphs, etc. Interpret the data by trying to find out what the data means)
5. Draw conclusions. (Explain the results of the experiment. State whether or not your hypothesis was correct.)
6. Replicating the work. (Your experiment is considered successful if other people can perform it and get the same results.)

Variable = a changeable factor in an experiment

An experiment can only test 1 variable at a time. (NO EXCEPTIONS!)

Control Group = a standard for comparison in an experiment

This is the part of the experiment that does not change

Experimental Group = the part of the experiment that is changed by the variable

Theory = an explanation backed by results obtained from repeated tests or experiments

Scientific Law = a rule of nature that describes the behavior of something.

Can be observed, but not proven!

#### Measurements

Length = the distance between two points (meter ... ruler)

Mass = the amount of matter in an object (gram ... balance)

Weight = a measure of the gravitational force on an object (Newton ... balance)

Area = the amount of surface included within a set of boundaries (meters squared ... ruler)

Volume = the amount of space an object occupies (liter ... graduated cylinder or beaker)

Density = the amount of matter that occupies a particular space (grams per milliliter ... balance and graduated cylinder or beaker)

Temperature = a measure of how hot or cold something is (a measure of how quickly the molecules are moving around) (degrees ... thermometer)

#### SI Prefixes

K – H – D – B – D – C – M

King – Henry- Died – Before – Drinking – Chocolate - Milk

Kilo – Hecto – Deca – Base – Deci – Centi – Milli

## Characteristics of Living Things

All living things...

- a. have order
- b. experience regulation
- c. grow and develop
- d. process energy
- e. respond to their environment
- f. reproduce
- g. evolve
- h. die

## Microscopes

Light microscope = magnifies objects using light

PRO = cheap, easy to use, color

CON = cannot magnify images very much

Scanning electron microscope = magnifies the outer surface of an object using electron beams

PRO = provides a lot of detail

CON = expensive, black and white

Transmission electron microscope = magnifies the inner portion of an object using electron beams

PRO = provides a lot of detail

CON = expensive, black and white

## Safety

Read the directions.

Follow the directions.

Ask the teacher for help.

**ALWAYS USE COMMON SENSE!**

## Major Themes in Biology

1. Levels of Organization
2. Structure-Function Relationship / Lock-and-Key Fit
3. Surface Area-to-Volume Ratio
4. Matter Cycles, Energy Flows
5. Evolution and Natural Selection

## LEVELS OF ORGANIZATION IN BIOLOGY

### **\*\*BIGGEST\*\***

13. BIOSPHERE = all living things on Earth  
(the whole Earth)
12. ECOSYSTEM = all the communities in a very large area; includes biotic and abiotic factors  
(desert, forest, grassland)
11. COMMUNITY = a group of organisms of different species in an area \*  
(all the animals in a food chain)
10. POPULATION = a group of organisms of the same species in an area  
(a pack of wolves)
9. ORGANISM = one individual organism  
(one lion, one person, one dog, etc.)
8. ORGAN SYSTEM = a group of organs with a specific function  
(nervous system, digestive system, respiratory system)
7. ORGAN = a group of tissues with a specific function  
(stomach, heart, brain)
6. TISSUE = a group of cells with a specific function  
(muscle tissue)
5. CELL = the smallest unit of life  
(brain cell, red blood cell, plant cell, animal cell)
4. ORGANELLE = a part found inside a cell  
(nucleus, cell membrane, mitochondria)
3. MOLECULE = a chemical made of 2 or more elements  
(water = H<sub>2</sub>O, carbon dioxide = CO<sub>2</sub>)
2. ATOM = the smallest unit made of only one element  
(hydrogen, carbon, helium, nitrogen)
1. SUBATOMIC PARTICLE = particles found inside an atom  
(protons, neutrons, electrons)

### **\*\*SMALLEST\*\***

\* NOTE: A TOWN IS NEVER AN EXAMPLE OF A BIOLOGICAL COMMUNITY!