Summer Research and Preparation for Honors College Preparatory Biology

Success in a life science course requires a basic understanding of physical sciences and math concepts. In addition, students are required to be able to use the Internet (educational and government sites) and Library resources to obtain and disseminate information. Please read, study, and review the items in this document and complete the questions at the end. Also note that this assignment will be due on the first day of class.

Review basic chemistry (*it is recommended to go to the library and read a basic chemistry book*)

- Elements
  - Mass & matter
    - Protons, electrons, & neutrons, & isotopes
- Bonding
  - Ionic
  - Covalent
  - Hydrogen Bonds

Become familiar with the elements on the Periodic Table of Elements and know the commonly studied elements found in living organisms. (Carbon – C, Nitrogen – N, Oxygen – O, and Hydrogen – H, Phosphorus – P).

Know the scientific method and what occurs at each level.

- Observation
- Question
- Hypothesis
- Experiment
  - Data (Draw conclusions based on the data obtained)
  - Graphing data
    - Setting up graphs, charts, and spreadsheets with given data.
  - Equipment
    - Test tubes
    - Beakers
    - Graduated cylinders
    - Thermometers
    - Flasks
    - Triple-beam balances/digital balance
    - Probes

Know how to follow experimental procedure and recognize variables

- Dependent variables
- Independent variables
- Control group

Know the common units of measurement for the English and Metric system and one conversion factor for length, mass, & volume.

Common conversion measurements (*conversion factors)* to memorize

2.54 centimeters/ 1.0 inch
454 grams/1.0 pound (lb)
1 liter = 33.8 fluid ounces

Common temperatures to know

100 °Celcius = boiling point of water at sea level - Metric system
212 °Fahrenheit= boiling point of water at sea level - English system
0°Celcius – Freezing point of water at sea level – Metric system
32 °Fahrenheit. Freezing point of water at sea level – English system.

Common units to know

T	tera-	1,000,000,000,000	10^{12}
G	giga-	1,000,000,000	10^{9}
M	mega-	1,000,000	10^{6}
k	kilo-	1,000	10^{3}
h	hecto-	100	10^{2}
da	deca	10	10^{1}
NO PREFIX 1			10^{0}
d	deci	1/10	10^{-1}
c	centi-	1/100	10^{-2}
m	milli-	1/1,000	10^{-3}
μ	micro-	1/1,000,000	10^{-6}
n	nano-	1/1,000,000,000	10^{-9}

12 inches/ 1 foot
5,280 feet/ 1 mile
4 quarts/ 1gallon
16 ounces/ 1 pound

Be able to utilize basic mathematical principles

Fractions
Percents
Ratios and/or fractions

Sample problem -

An example:

A bacterium moves at 10 microns (micrometers) per second. How fast is it travelling in millimeters/second?

10 micrometers/1 second x 1 meter/1,000,000 micrometers x 1,000 millimeters/1 meter
= 0.01 millimeters/second

Show your work when solving each problem

1. Convert 11 kilometers to miles.

2. A student observes a paramecium using a compound light microscope and measures its length at 1.5 micrometers. Convert to nanometers, millimeters, centimeters, & inches.

3. How many pounds is the human brain if the mass is 1.3 kilograms?

4. If 1 quart = 32 fluid ounces, how many fluid ounces are in 2 gallons?

5. 2 gallons are equivalent to how many liters?

6. A paper bag contains four items that are identical except for color (red, green, indigo, and yellow). What are the chances of picking a green item? What are the chances of picking the green item twice in a row?

7. Draw and label the steps of mitosis for an animal and plant cell.

8. Draw and label the structures in an animal and plant cell.