BIO 110 L Prelab for   Name: __Chris Cooper_____

LAB 2: Metric Measurement & the Scientific Method   Date:_____

The **metric system** is a system of units for measurement developed in late 18th century in France by the chemist Lavoisier. The metric system is based on units of ten, thus simplifying inter-conversions This base-ten system is similar to our monetary system, in which 10 cents equals a dime, The modern metric system (*modern* meaning post-1960) is now widely used throughout the world and is called the International System of Units (SI)("*Système International d'Unités*" in French).

Metric units commonly used in biology include: meter (m) The basic unit of length   **liter** (L) The basic unit of volume   **gram** (g) The basic unit of mass   **degree Celsius** (°C) The basic unit of temperature

Scientific Method The scientific method is a way to ask and answer scientific questions by making observations and doing experiments. The steps of the scientific method are to:

1. Ask a Question   2. Do Background Research (Exploration)   3. Construct a Hypothesis

4. Test Your Hypothesis by doing an Experiment. The experiment will provide evidence to support or disprove the hypothesis.   5. Analyze Your Data and Draw a Conclusion   6. Communicate Your Results

Answer the following **questions:**

Fill in the blank spaces (5x3=15pts)

1. The metric system is based on units of _____**ten**_____

2. The modern metric system is called the _____**international system of units**_____

3. Metric unit of temperature is ____**degree Celsius** _____

4. A hypothesis can be tested by doing an ___**experiment**_____

5. The experiment provides evidence to __**support**_____ or _**disprove**_____the hypothesis.

Basic Math in testing a hypothesis

6. The weights of the 3 boys in Group Blue are 70kg, 45kg, and 85kg respectively.

What is their average weight? (10pts) _____**66.6 kg**_____ *(Do not forget the units)*

A given hypothesis states that height in cm divided by weight in kg is EXPECTED to be 5cm/kg.

   7. Mr. Mosquito's height is 160 cm . He weighs 74 kg. (15pts)

        What is the **expected** value when *height in centimeters is divided by weight in kilograms?* _____**5 cm/kg**_____ *(Do not forget the units)*

      A. What is the **observed** value when *height in centimeters is divided by weight in kilograms?* _____**2.16 cm/kg**_____ *(Do not forget the units)*
      B. Would you **SUPPORT** or **DISPROVE** the given hypothesis? **(Circle one)**
   8. Miss Froggy's height is 110 cm . She weighs 22kg. (15pts)
      A. What is the expected value when *height in centimeters is divided by weight in kilograms?* ____**5 cm/kg**_____ *(Do not forget the units)*

B. What is the observed value when *height in centimeters is divided by weight in kilograms?*
_____**5 cm/kg**_____ *(Do not forget the units)*

C. Would you **<u>SUPPORT</u>** or **DISPROVE** the given hypothesis? **(Circle one)**

A hypothesis is a statement that provides a possible answer to a question or an explanation for an observation that can be tested.

Using the hypothesis and data table below, complete questions 9- 12

<u>Hypothesis:</u> *Height in centimeters divided by weight in kilograms is **EXPECTED** to be 5 cm/kg.*

STUDENT	Height in cm	Weight in kg	Height/Weight = cm/kg	
			Expected	**Observed**
Mr. X	170 cm	64 kg	5cm/kg	2.66 cm/kg
Ms. Y	155 cm	75kg	5cm/kg	2.7 cm/kg

9. According to the hypothesis what is the **expected** value when *height in centimeters is divided by weight in kilograms? (10pts)*_____**5 cm/kg**_____*(Do not forget the units)*

10. Is **observed** height in centimeters divided by weight in kilograms for Mr. X **5cm/kg** ? (10pts)
   Yes <u>**OR**</u> No **(circle one)**

11. What is the **observed** average relationship between height and weight (Hint: Find the average of the 2 numbers in the observed column) (10pts) ___**1.86**_____ cm/kg

12. According to the data, would you **SUPPORT** or **<u>DISPROVE</u>** the hypothesis? (10pts) ***Circle one***

General Biology Lab (BIO 110L) Lab Report

<u>LAB 2:</u> <u>METRIC MEASUREMENT & THE SCIENTIFIC METHOD</u>   **Total points:100**

The **Scientific Method** is a way of gaining information about the world by rigorous testing to determine if the proposed solutions are valid. An important part of the scientific method is forming a **hypothesis**. A hypothesis is a statement that provides a possible answer to a question or an explanation for an observation that can be tested.

1. A given hypothesis states that height in cm divided by weight in kg is EXPECTED to be 5 cm/kg.
Mr.froggy's height is 180 cm. He weighs 90 kg. (3x5=15pts)

A. What is the **expected** value when *height in centimeters is divided by weight in kilograms?*
_____**5**_____ *cm/kg*

B. What is the **observed** value when *height in centimeters is divided by weight in kilograms?* _____**2**_____
cm/kg

C. Would you **SUPPORT** or **<u>DISPROVE</u>** the given hypothesis? **(Circle One)**

Using the hypothesis and data table below, complete questions 2 - 4.

Hypothesis: *Height in centimeters divided by weight in kilograms is equal to 5 cm/kg.*

STUDENT	Height in cm	Weight in kg	Height/Weight = cm/kg	
			Expected	Observed
Mr. X	175 cm	74 kg	5cm/kg	2.36 cm/kg
Ms. Y	160 cm	70kg	5cm/kg	2.28 cm/kg

2. Is **observed** height in centimeters/ weight in kilograms = 5 cm/kg (5pts)
YES or NO (Circle One)
3. What is the **observed average** value when height/weight? (5pts) _____**1.82**_____ cm/kg
4. Do your data **support** or **disprove** the hypothesis given? (5pts) **Yes   or   No** *(Circle One)*

5. What is the metric unit of measurement for temperature? (5pts)
a. Degrees Fahrenheit   b. **Degrees Celsius**   c. Either Fahrenheit or Celsius   d. Thermometer

6. The best choice among the given metric units to describe the distance between two cities is: (5pts)
a. Meters   b. Centimeters   c. **Kilometers**   d. Millimeters

Question 7 -9 ask you to use the information you have gained about metric system and make reasonable estimates about the quantities listed. Place a decimal point within the series of numbers so that the statements are reasonable. DO NOT FORGET THE UNITS!

7. Barry is 1545cm tall. (5pts)   *Answer*: ____**50.6 ft**_____

8.   The ambulance sped by at 10000 km per hour. (5pts)   *Answer*: __**6213.71 mph**_____

9. The ballpoint pen weighs 99990 g. (5pts) *Answer*: _____**220.44 lbs**_____

10. What does each unit represent? (6x3=18pts)

(a) mm = __**millimeter**_____   (b) m = ____**meter**_____   (c) cm = ___**centimeters**_____

(d) kg = __**kilograms**_____   (e) mL= ___**milliliters**_____ (f) °C ___**Celsius**_____

11. Circle the BEST **metric unit** for each. (9x3 =27pts)

(a) The length of an eyelash: **mm**   cm   m   km
(b) The height of a flagpole: mm   cm   **m**   km
(c) Your mass: mg g **kg**   lb
(d) Mass of 10 pennies: **mg**   g   kg   lb
(e) Your height: **ft**   km   cm   in
(f) Dropperful of medicine : fl. oz   L   **mL**   gal
(g) Mass of an aspirin tablet: **mg** g   kg   lb

(h) Mass of a bowling ball: mg   g   **kg** lb

(i) Distance from earth to moon   mi   m **km** yd