

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) 200 grams (*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)
 - A. What is the **expected** value when *height in centimeters is divided by weight in kilograms*? 5 grams(*Do not forget the units*)
 - B. What is the **observed** value when *height in centimeters is divided by weight in kilograms*?
 ____2.16 grams (*Do not forget the units*)

- C. 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 grams (Do not forget the units)
- B. What is the observed value when *height in centimeters is divided by weight in kilograms*? _5
 grams _ (Do not forget the units)
- C. Would you **SUPPORT** 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

Hypothesis: *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	2.07cm/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 OR 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) 2.365 cm/kg?
12. According to the data, would you **SUPPORT** or **DISPROVE** the hypothesis? (10pts) **Circle one**

General Biology Lab (BIO 110L) Lab Report

LAB 2: METRIC MEASUREMENT & THE SCIENTIFIC METHOD

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 **DISPROVE** 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) 2.32 cm/kg

4. Do your data **support** 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: 154.5 cm*

8. The ambulance sped by at 10000 km per hour. (5pts) *Answer: 100.00km*

9. The ballpoint pen weighs 99990 g. (5pts) *Answer: 999.90g*

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

(a) mm =milometer (b) m = (c)Meter cm = Centimeter

(d) kg = Kilogram (e) mL= milliliter (f) °C Celsius

11. Choose 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

