BIO 141
EXERCISE 1

TITLE: Introduction to Basic Anatomy and the Metric System

GENERAL OBJECTIVES:

1. Become familiar with the anatomical terminology associated with the body, especially terms of relative position. Know the body cavities, their location and the main organs and membranes within them.
2. Be capable of relating surface areas or landmarks to the underlying organs.
3. Through the use of models and lab animals, learn the general organ systems of the body and the major components of each.
4. Become familiar with the base units of the metric system and be able to make metric conversions.

INSTRUCTIONS:

Part 1 - Anatomical Terminology, Body Cavities, Membranes and Organ Systems

1. Read the material and label all diagrams in Exercise 1 and 2 of the lab text.
2. Locate all relative positions, surface anatomical areas, and body cavities on the torsos located on the lab tables.
3. Study the various models and determine the planes and types of cuts illustrated.

Part 2 - The Metric System

Most of the industrialized nations of the world use the metric system for measurement. Because this system is already used in our scientific and medical laboratories, it is important for you to have a working knowledge of it. You already use this system to a limited degree, such as when you speak of 35 millimeter (mm) kodachrome slides, 8 mm movie film, the 100 meter (m) freestyle swimming event, etc. Many of your grocery items have both the English and metric systems on the cartons. Next time you are in your kitchen, stop and look at various items to determine the extent to which this system is already in use. The basic units of measurement are as follows:

length: measured in meters (m)
1 meter = 39.37 inches

weight: measured in grams (g)
1 gram = 0.035 ounces

volume: measured in liters (l)
1 liter = 1.056 quarts

One advantage of using the metric system is that subdivisions and larger units of the basic units of measurement are related by some power of the number ten.

Powers of Ten

$10^6 = 1$ million $= 1{,}000{,}000$

$10^5 = 100{,}000$

$10^4 = 10{,}000$

$10^3 = 1{,}000$

$10^2 = 100$

$10^1 = 10$

$10^0 = 1$

$10^{-1} = 0.1 = 1/10$

$10^{-2} = 0.01 = 1/100$

$10^{-3} = 0.001 = 1/1{,}000$

$10^{-4} = 0.0001 = 1/10{,}000$

A. Metric Length

1. You will find a meter stick in each carrel. Examine both sides of it, and note that one side is marked off in inches and the other side in centimeters. Using this meter stick, answer the following questions.

    a. How many inches are there in a yard?

    b. How many centimeters (cm) are there in a meter?

    c. How many inches are there in a meter?

    d. How many cm. are there in a yard?

    e. How many cm. are there in an inch?

2. Notice that the centimeters are divided into smaller divisions called millimeters (mm).

    a. How many millimeters are there in a cm?

    b. How many millimeters are there in 1 m?

    c. How many millimeters are there in 1 inch?

    d. How many millimeters are there in 3 cm?

    e. How many millimeters are there in 5 m?

3. A meter may also be divided into 10 decimeters (dm). There are several units larger than the meter. There are 10 m in 1 dekameter (dkm), 100 m in 1 hectometer (hm), and 1000 meters in 1 kilometer (km). Hectometer, dekameter, and decimeter are not commonly used. In using the microscope you will use smaller measurements than found on a meter stick. Each millimeter is divided into 1000 smaller units called micrometers (μm) (formerly micron). Obviously these units are very small, and

they are used when working with a microscope. For example, tissue is cut 3 to 10 micrometers thick before being placed on a slide. With the development of the electron microscope, still smaller units were developed. There are 1000 nanometers (nm) in a micrometer and 10 angstrom (°A) units in the nanometer (formerly millimicron). Nanometers and angstrom units are used in measuring with the electron microscope.

B. Metric Volume

1. Obtain a 100 ml graduated cylinder and a cup. Fill the cup with water and measure this amount by using the graduated cylinder. Note that in the metric system, you use decimals, not fractions. 1 1/2 is 1.5, 1 3/4 is 1.75, etc.

   a. How many milliliters (ml) are there in 1 cup?

   b. If there are 8 ounces in 1 cup, how many ml are there per ounce?

2. Fill a medicine bottle with water to the top line.

   a. How many ml are contained in 1 bottle?

   In measuring volume, the term cubic centimeter is often used. 1 cubic centimeter (cc) is equal to 1 ml.

   b. How many cc of water will the medicine bottle hold?

C. Metric Weight

1. The standard unit of weight is the gram. Using the balances provided, weigh an empty graduated cylinder.

   a. How many grams does the graduated cylinder weigh?

2. Now fill the graduated cylinder to the 100 ml mark with water and weigh it again.

   a. How much does 100 ml of water weigh?

   b. How much does 1 ml of water weigh?

3. Locate a pill on one of the lab tables and weigh it.

   a. How many grams does it weigh?

   b. How many mg does it weigh?

4. Using the knowledge you have gained, fill out the chart on the following page.

kilo-	hecto-	deka-	base unit	deci-	centi-	milli-
0.001 km	0.01 hm	0.1 dkm	1 m	10 dm	100 cm	1000 mm
1 kg						
	25 hl					
		10 dkm				
				5 dg		
					1 cm	
						10,000 ml

D. Temperature Scales

There are several different temperature scales. The two most important to you are the Fahrenheit (F) and Centigrade (C) or Celsius.

Converting Fahrenheit to Centigrade: add 40, multiply by 5/9, subtract 40

Converting Centigrade to Fahrenheit: add 40, multiply by 9/5, subtract 40

Comparison of Centigrade and Fahrenheit Scales:

	°C	°F
Boiling point of water 100	100	212
Normal body temperature	37	98.6
Freezing point of water	0	32

1. Determine room temperature using a centigrade thermometer _____.
2. Convert the centigrade temperature of the room to Fahrenheit _____.

Name_____ Show all work on this page or on a separate sheet.

Metric Conversions and Temperature Conversions:

1. 3 cm to mm
2. 3 cm to m
3. 3 cm to um
4. 73 mm to cm
5. 1250 um to mm
6. 1000 mm to cm
7. 32 g to kg
8. 3000 mg to g
9. 3250 g to kg
10. 35,000 mg to kg
11. 6 l to ml
12. 3200 ml to l
13. 3 cc to ml
14. 52 ml to cc
15. 35 km to m
16. 30,000 cm to km
17. 3°C to °F
18. 32°F to °C
19. 72°F to °C
20. 37°C to °F

mg = milligram

g = gram

kg = kilogram

mm = millimeter

cm = centimeter

m = meter

km = kilometer

ml = milliliter

l = liter

cc = cubic centimeter

21. What is your height in cm? What is your height in m?
22. What is your weight in kg? (1kg = 2.2 lbs) What is your weight in g?
23. What is your normal temperature in Centigrade?