Name _____ Date _____ Period _____

Lab: Diversity of Cells

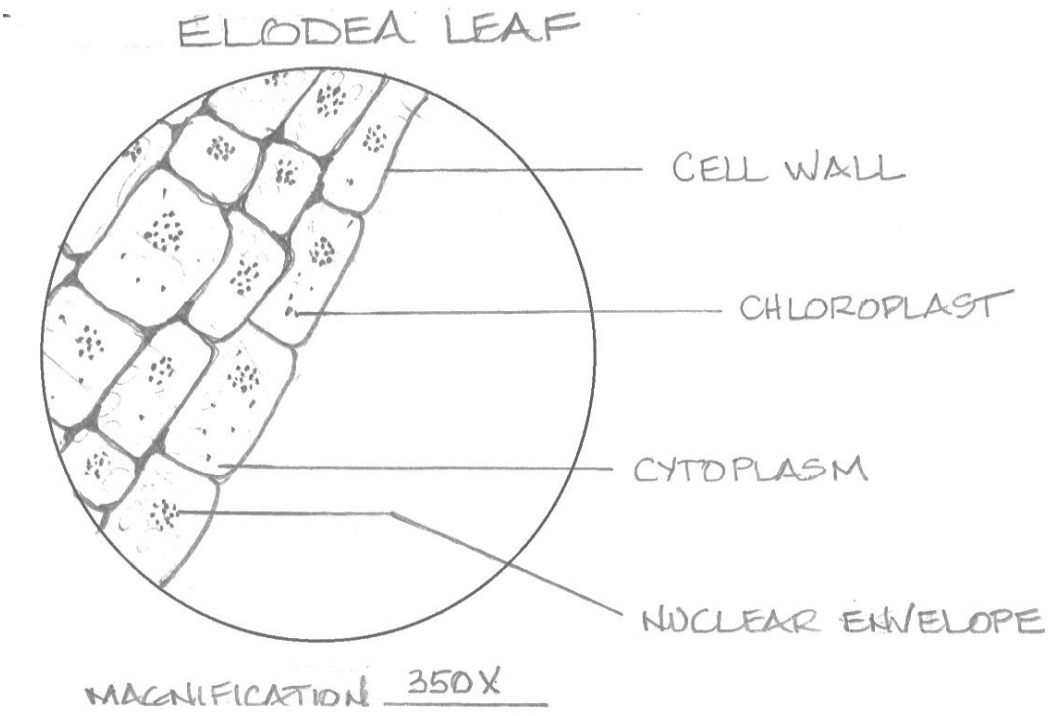
HONORS BIOLOGY: UNIT 2

Background: Living organisms include **unicellular organisms** living as only one cell, and **multicellular organisms** whose bodies are made of many cells. Various kinds of unicellular organisms exist, from bacteria such as the 1-2-µm-long *Escherichia coli* (*E. coli*) to protists such as the 200-µm-long paramecia. Multicellular organisms, e.g., humans, are made of a great variety of cells. Cells have various shapes, including flat cells (e.g., skin epithelial cells), disc-shaped cells (e.g., red blood cells), and long, narrow, extended cells (e.g., nerve cells). Cell sizes vary from a diameter of about 7 µm in red blood cells to a dendrite length of up to 1 m in nerve cells. Plant cells also have a variety of shapes and sizes, including rectangular compartmentalized cells (e.g., cork cells), cells resembling jigsaw puzzle pieces (e.g., spongy cells), and cells elongated from a few millimeters to several dozen centimeters in length (e.g., pollen tube cells).

Guidelines for Preparing a Laboratory Drawing

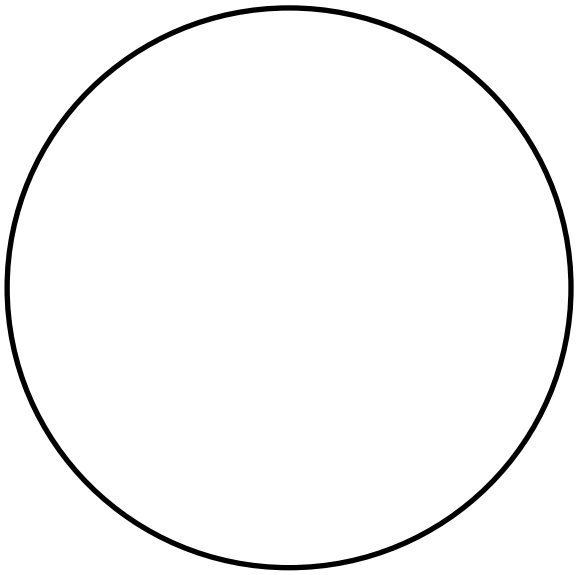
- *Draw circle to represent field of view in the microscope*
- *Use a ruler to draw label lines*
- *Label lines should point to the center of the structure being labeled*
- *Do not write on the label lines*
- *Print all labels horizontally*
- *Label the right-hand side of the drawing, if possible*
- *Do not cross label lines*
- *Include magnification*
- *Include a Title (what you are looking at)*
- *Drawings should be clear and accurate as possible*

Below is an example of a correct laboratory drawing of a microscopic specimen



Observation & Analysis Questions: (Answers will be self-graded in class discussion). Be sure to look at each cell type with a microscope and make a drawing using guidelines on page one of this lab.

MUSCLE (SKELETAL) Prepared slide - Be sure to observe and draw it under 400X.



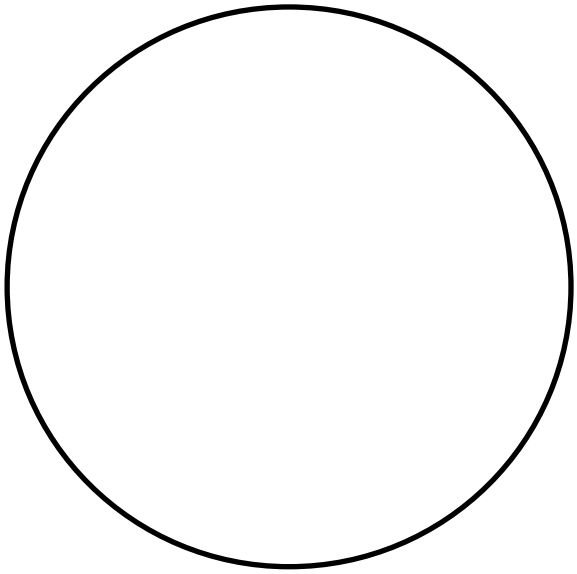
1. Muscle cells have an extraordinary amount of mitochondria compared to other cell types. Why?

2. Muscle cells have an extraordinary amount of ribosomes compared to other cell types. Why?

3. The cytoplasm of a muscle cells contains a large amount of the polysaccharide glycogen. Why?

4. Muscle cells contain a specialized group of four individual proteins that work together to efficiently transport a molecule around the interior of the muscle cell. The red colored structure, called Myoglobin, is found in muscle cells. What is this molecule that myoglobin carries around? (without this molecule the muscle could not process glucose to obtain energy.)

BONE (OSTEOCYTE)- Prepared slide. Be sure to observe and draw it under 400X.

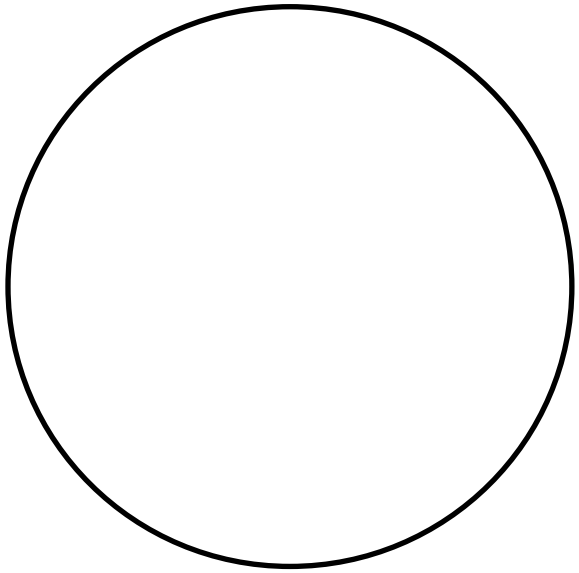


1. Osteocytes function to maintain and repair the (matrix) hard calcium bone that surrounds them. If an osteocyte dies, the surrounding "matrix" will be broken down and reabsorbed. This means a primary function of osteocytes is to store and secrete the materials (calcium salts) that make up the hard matrix of the bone. What type of organelle would you find in large amounts in an osteocyte, which would allow it to carry out this function? Explain.

2. Your F.O.V. (field of view) includes many bone cells. Prove you know what the actual cell is by drawing a quick sketch of one single osteocyte. No circle or scale is needed on this.

3. Bone cells are the "spider-like" shapes you just drew. Why do they have these spider-like arms radiating from their cell body?

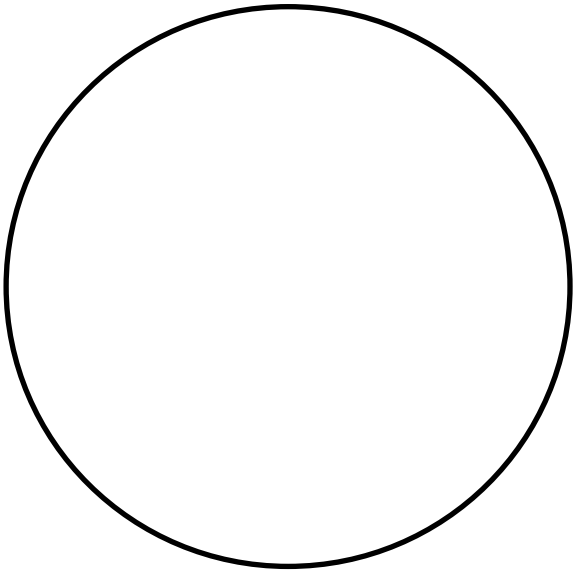
NERVE (NEURON)- Prepared slide. Be sure to observe and draw it under 400X.



1. Mature nerve cells do NOT have centrioles. As a result of this, what are they not able to do?

2. Why does this make spinal cord injuries major catastrophes?

ADIPOSE (FAT CELL)- Prepared slide. Be sure to observe and draw it under 400X.



1. Describe their basic shape.

2. Thinking about their main purpose, which organelle takes up most of this cell's space?

3. Explain your reasoning.

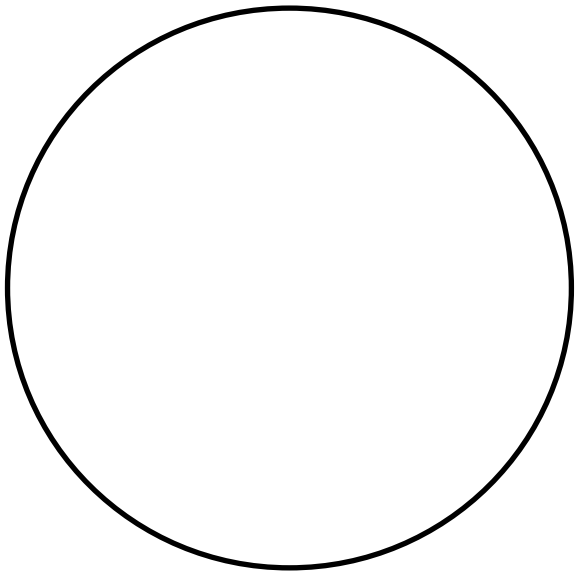
RED BLOOD CELL- Mature red blood cells have no nucleus and therefore are not true cells!

1. How would not having a nucleus affect the lifespan of the red blood cell?

2. Knowing the blood cells main job is to carry oxygen and carbon dioxide, explain why it is an advantage for them NOT to have a nucleus.

PLANT CELLS:

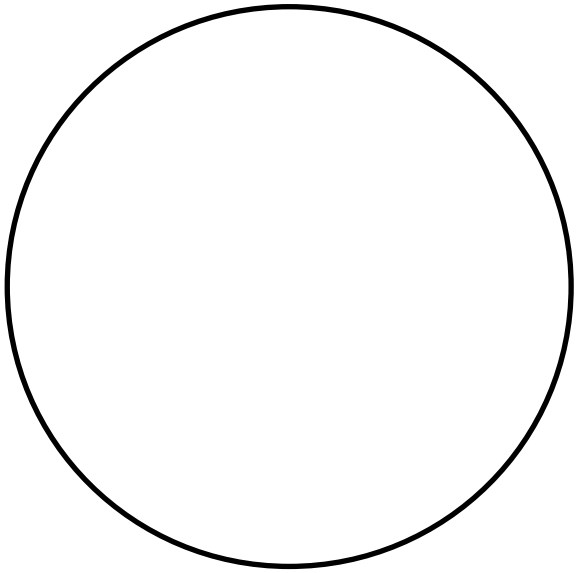
ELODEA- Prepare a wet mount slide of Elodea. Be sure to observe and draw it under 400X.



1. List 2 main structures/organelles visible in your drawings.

2. Why didn't you see the rest of the organelles listed on your typical cell drawing?

ONION- Prepare a wet mount slide. Be sure to observe it under 400X.



1. Notice the color difference between the onion and the elodea cells. Which organelle is missing from the onion cell? Explain

2. Could the onion cell preform photosynthesis? Explain.

PLANT CELLS Versus ANIMAL CELLS:

1. Based on your observations. List one way plant and animal cells differ, and one way they are similar.

2. Which appears to be more diverse….Plant or animal cells? Why do you think this is so?