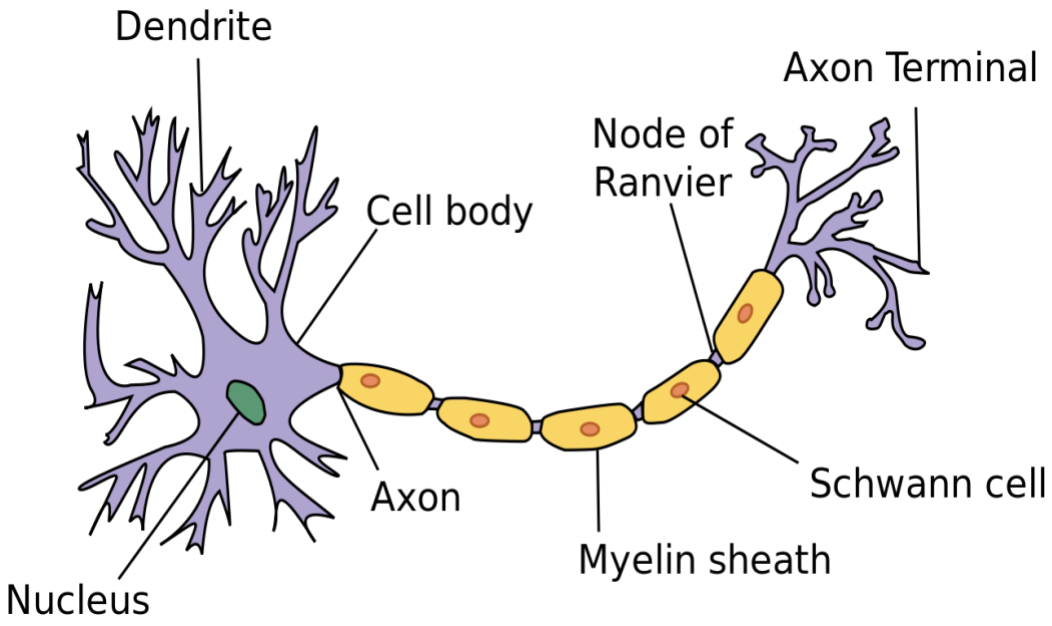
Skill Blitz Pre-Work: Learning to Love Laboratory Math

Name: _____

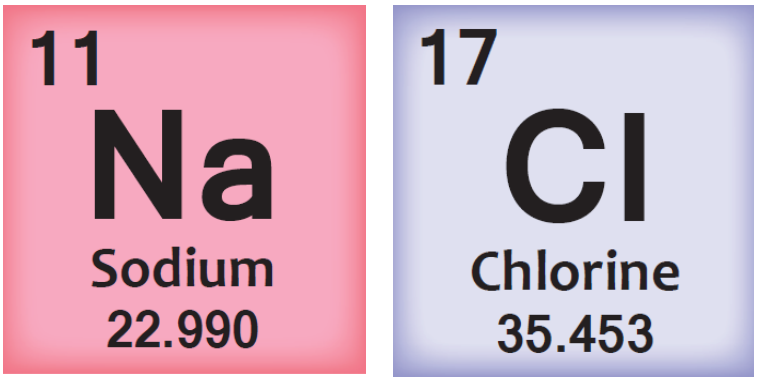
Scientific Notation and Measurements:

1. A typical individual bacterial cell is 1 micrometer long and 0.5 micrometers wide. Express the dimensions, using scientific notation, of a bacterial cell in:
    a. Meters
    b. Millimeters
2. You are looking at eukarytoic cells under a microscope. Eukaryotic cells are typically much larger than prokaryotic cells. Express the dimensions of the following types of eukaryotic cells. Write your answer in scientific notation.
    a. A white blood cell (a type of immune cell) is 12 micrometers in diameter. Express the diameter in nanometers.
    b. If we assume the white blood cell is a perfect sphere, what is the volume of the cell in micrometers$_3$?
    c. What if the shape of the skin cell was a square with a length of 9 micrometers. What is the volume of the cell in micrometers$_3$?
    d. A neuron's cell body (in purple) is 90 microns. Express this dimension in millimeters.
    e. A neuron's axon is 0.9 meters in length. How much longer is the axon than the cell body?



Concentrations, Solutions and Dilutions:

1. It's your first day in the lab, and you need to make 1 liter of a 1 molar (M) solution of NaCl. How much NaCl (in grams) will you need to dissolve in 1 liter of water?



2. Your mentor in the lab says that you don't really need to prepare an entire liter of NaCl. Instead, you should make 100mL. How much NaCl (in grams) will you need to dissolve in 100mL of water?

3. In your first experiment, you will be testing how well cells grow in different concentrations of salt (NaCl). You decide to start your experiment by treating cells with 300mM of NaCl. Describe how you would prepare that concentration for your experiment. Let's say you will prepare 50mL of a working concentration.

4. The day after you treat cells with 300mM of salt, the cells don't look so good. Your mentor suggests that perhaps this concentration was too high. You decide to test a range of salt concentrations instead. Describe how you would prepare 5 concentrations in a 2-fold dilution series to test.