Lab 1, Part 1: How do you quantify motion? Excel Analysis of the 1-D Motion of an Amoeba.

This is the first week of a two-week lab studying cell motion. This week we will learn how to use Excel to analyze the 1-D motion of an amoeba from stop-motion images. Next week we will be analyzing videos of cell motion—1) wound closure, 2) neutrophil motion, and 3) bacteria motion—to determine whether or not a patient should be prescribed antibiotics. Clearly, the relative speeds of the wound closure, the neutrophils, and bacteria will affect your decision. Thus it becomes important that we learn how to quantify the motion of cells.

Your lab group has been provided with a copy of the movement of *Dictyostelium discoideum*. This motion is shown as a sequence of outlines of the amoeba cell at 3.0-minute intervals. From the outlines, your task is to record and analyze the motion of the amoeba—specifically, the position, instantaneous and average speed, and instantaneous and average acceleration. Rather than do all of the mathematical calculations by hand, Excel (or any spreadsheet program) can help you do the calculations much more quickly and efficiently. Today you will practice and master the skills necessary to bend Excel to your will and make it do the grunt work. After today, you will ALL be expected to be experts at these skills so take turns and help each other learn. Some of you may feel that you are already familiar with Excel; please READ the Technical document anyway! It contains specific scientific norms that you need to learn.

At the end of the lab today, **your group will submit one set of graphs** (y vs. t, v vs. t, and a vs. t). These will be reviewed by the TA for completeness/accuracy/conventional structure. Good attention to detail now will save you time later! Remember, your TA is here to help you with equipment and Excel, but the physics is up to you and your group! (The bridge between the Physics and Excel is up to you, too!)

Approximate Timing: (2 hours)

- o Introduction: 15 minutes
- o Data Collection: 25 minutes
- o Data Entry/Data Table: 25 minutes
- o Data Analysis/Graphs: 35 minutes
- o Class Discussion/Summation: 20 minutes