Biology 105
Lab Practical Exam 1 – Review Sheet

The first lab exam will cover the following labs: Microscope, Metric/Measurements (including the Metric homework problems!), Biological Molecules, Cells, and Tissues.

Lab 1: Microscope

1.) We are working with “compound microscopes” in the lab. Why are these microscopes referred to as “compound”?
   a. You MUST be able to identify ALL the parts of the microscope that are labeled on the lab handout, including: oculars, head, arm, coarse adjustment knob, fine adjustment knob, base, lamp (or light source), mechanical stage, condenser, iris diaphragm, stage, and objectives.
      i. Use the attached BLANK diagram to quiz yourself! (Refer to your lab handout for the answers…)

2.) How would you properly focus the microscope, beginning with mounting your slide on the microscope beneath the 4X objective and continuing up to the 40X objective?
   a. For example, “I would put the 4X objective in place and move the stage all the way down. Then I would carefully place the specimen slide on the microscope stage and secure with the clip. I would use the coarse adjustment knob to focus the specimen while using the 4X objective. Then I would change to the 10X objective and ONLY use the fine adjustment knob to better focus my specimen. Finally, I would carefully move to the 40X objective and then ONLY use the fine adjustment knob to re-focus my specimen, if needed.”

3.) If you are using the 4X objective, what is the TOTAL magnification of the microscope? What would the total magnification be when using the 10X or 40X objectives?

Lab 2: Metric System and Measurements

1.) You must understand and be able to convert between the following prefixes WITHOUT consulting the table on your lab handout: kilo, hecto, deka, deci, centi, and milli.

2.) All other conversion information, including temperature conversions and the relationships between English and Metric units, will be given to you.

3.) You should be able to complete problems such as those that were given to you on the Metric/Measurements HW assignment. Please refer to the “Practice Metric/Measurement Problems” handout for more practice!
   a. Yes, you may use a calculator during the exam.
Lab 3: Biological Molecules

1.) How did we test for each of the three biological molecules (which “test” solution did we use)? HOW do these tests work and WHAT test result would indicate the presence of the particular biological molecule?

a. **Simple sugars:** Benedict’s solution tests for simple sugars. This solution contains cupric ions (Cu²⁺) that cause the solution to turn from blue to red when they become reduced to the Cu⁺ form. The chain form of the simple sugar glucose (remember that most glucose exists as a ring structure, but some glucose exists as a long chain!) has this reducing ability, because it contains a free aldehyde group. Thus, we see a positive response from foods that contain the simple sugar glucose!

b. **Starch:** Lugol’s iodine solution tests for starch. The structure of starch is a coiled chain of glucose molecules. Lugol’s iodine solution only stains for this coiled structure, so if starch is present, the sample will turn a dark blue/purple color.

c. **Proteins:** Ninhydrin tests for the presence of protein. Proteins are made up of long chains of many amino acids. Ninhydrin reacts with the amino acid at the very tail end of the chain. If protein is present, ninhydrin will produce the color purple in the sample.

2.) What was the negative control that we used for all the tests? Why did we choose this substance to be our negative control? What is the purpose of the negative and positive controls in an experiment?

Lab 4: Cells

1.) What is the difference between prokaryotic and eukaryotic cells?

2.) What kind of cells did you scrape from the inside of your cheek? (Be specific! You scraped “human epithelial cells”.)

   a. What stain did you use to make the cells visible under the microscope?
   b. What three structures could you see in your cells and what are their functions?
      i. Nucleus, cell membrane, and cytoplasm…
   c. Be able to identify a picture of the epithelial cells from the example slides posted on the website.

3.) You introduced blood cells from a sample of sheep’s blood into two solutions: isotonic and hypertonic solutions. What happened to the cells in each of these solutions and WHY? (Please explain in terms of where water is moving during these different situations.)

   a. What would have happened if you had placed the blood cells in a hypotonic environment? Why?

4.) Be able to identify the cells in the isotonic versus hypertonic solutions from the example slides posted on the website.
5.) How did you stain for the presence of starch in your potato slice?
   a. What is the name of those big round purple structures that you see in the potato cells and what is their function?

6.) We viewed (or at least tried to view!) three different bacterial shapes. Please be able to identify these three different shapes from the example slides posted on the website.
   a. Make sure you can bust out the Latin names for the shapes: bacillus, spirillum, and coccus!

Lab 5: Tissues

1.) Please make sure that you can identify the 14 different types of tissue from the pictures shown in the slides posted on the website.
   a. When identifying a tissue, you must use the full and proper name. For example, the sample is “simple squamous epithelial tissue” and not just “squamous”.
   b. For those tissues that you were given specific intracellular structures to identify (refer to your lab handout), make sure that you can identify these particular structures!
      i. For example, do you know what the collagen fibers and elastic fibers are when you look at a picture of areolar connective tissue?