

Introduction to microscopes:

Supplies needed:

- 1 hand lens for every 5 students
- 1 dissecting microscope for every 5 students
- 1 compound microscope for each group of students (2 students per group is ideal)
- If possible, a compound microscope attached to a projector.
- Pick one or two of the following (or make up your own):
 - 1 slide with a fruit fly (*D. melanogaster*) for every 5 students
 - 1 well slide with a drop of *Euglena* for every 5 students
 - 1 well slide with a drop of vinegar eels for every 5 students
- 1 prepared slide for every group of students
- You may need a specimen slide (eg fly, *Euglena* or vinegar eel) for each group of students if you do not have a compound microscope that can be attached to a projector or monitor

Directions:

This activity introduces the student to how to use a magnifying tool, magnification, and some of the applications of each type of magnifying tool. Using one macroscopic specimen (like the fruit fly) and one microscopic specimen, may make it most interesting as it highlights the strengths and weaknesses of the different magnifiers.

Start with the unaided eye. Split the students into groups of 5 and have each group look at the provided specimen. Have the student observe the fly or the drop of liquid and note what it looks like. Ask the students if they can identify the specimen with just their eyes. Tell the students to keep the answer to themselves if they can identify the specimen (some will have seen fruit flies).

Now put the slide under the hand lens. It often helps to put a piece of white or black paper under the slide. Show them how to use the hand lens, then allow each group to observe the specimen(s) with the hand lens. Ask if they can see more detail with the hand lens. Point out the magnification of the hand lens.

Introduce the dissecting microscope and put the slide under the microscope. Use the top or bottom light depending on what you're viewing. Show them now to focus and talk about how to calculate total magnification (objecting magnification x ocular magnification). Show them how to change the magnification on the microscope. Don't tell them for what the microscope is generally used. One of the goals of this lesson is to help them discover this. What new things

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have they learned about the specimen(s) using the dissecting microscope? What can they see that they couldn't see before?

If you have a compound microscope attached to a projector or monitor, put the slide on the microscope. Introduce the compound microscope. Talk again about magnification and have the students look at the objectives (read objective magnification) and calculate the maximum magnification for this compound microscope. Show them the specimen optimized for the compound microscope. If using the fly, talk about what they can see and can't see. Which microscope is better for viewing this specimen? They should be able to see detail in the wings, but not the rest of the body. Why? If using the micro-organisms, what can they see with the compound microscope that they couldn't with the dissecting? Which microscope is better for viewing this specimen? Why?

If you don't have a compound microscope attached to a projector or monitor, split the students into groups of 2 or 3 per student compound microscope. Introduce the microscope and talk about magnification as above. Show them the parts of the microscope and walk them through how to put a slide on the stage, make any adjustments necessary, and focus the microscope. If you have enough slides with the specimen(s) you've been examining to give one per group, do so. If not, one slide per 5 students and each group of 5 students will view the specimen with the compound microscope. Talk about what you see as above.

An extension would be to give each group a different prepared slide and have them examine what is on the slide. This is a nice way to make sure that they know how to focus properly before moving on with another lesson.

This lesson can be done as an introduction to another lesson with or without using lab notebooks to record what students observe. If recording, be sure to have students draw what they see, label anything they recognize, take notes as to what they think they are examining as well as what type of magnifier they used for each picture and the magnification at which they were examining the specimen when they drew the picture. A nice lab notebook page to model can be found here: <http://www.greatscopes.com/journal.htm>

Follow-up or embedded questions:

1. Compare and what you saw with just your eye, the hand lens, the dissecting microscope, and the compound microscope.
2. What types of samples are best observed with a dissecting microscope? With a compound microscope?