Chapter 1 Notes Continued:

Section 3: Microscopy

Microscopy: The study or use of microscopes

Types of Microscopes:

1. **Compound Light Microscope (CLM)**

a. Uses glass lenses and a beam of light to magnify
b. Must have very thin, translucent (can see light, but not through it) living nor non-living specimens
c. 2000X max magnification
d. Small working distance
e. 2-D images

2. **Stereomicroscope**

a. Uses glass lenses and a beam of light to magnify
b. Specimens may be rather large and opaque (doesn't allow light through)
c. Specimens can be living or non-living
d. Provides a 3-D view of the object
e. 100X magnification
f. Large working distance

3. **Scanning Electron Microscope (SEM)**

a. Uses magnetic lenses and a beam of electrons to magnify
b. Provides a 3 dimensional view of larger dead specimens

4. **Transmission Electron Microscope (TEM)**

a. Uses magnetic lenses and a beam of electrons to magnify images
b. Must use very thin, dead specimens
c. Magnifications in excess of two million times
d. 2-D images

Microscope Terminology

1. **Depth of Field:** thickness of the object space that is acceptable to focus. The distance between the closest and farthest objects in focus as viewed by a lens at a particular focus and with given settings. **Distance in front of and beyond your specimen.**

2. **Resolution:** the shortest distance between two points on a specimen that can still be distinguished by the observer or camera system as separate entities. **The ability for your microscope to discern or differentiate between two separate points. This improves <u>clarity</u> and allows for more detail to be seen.**

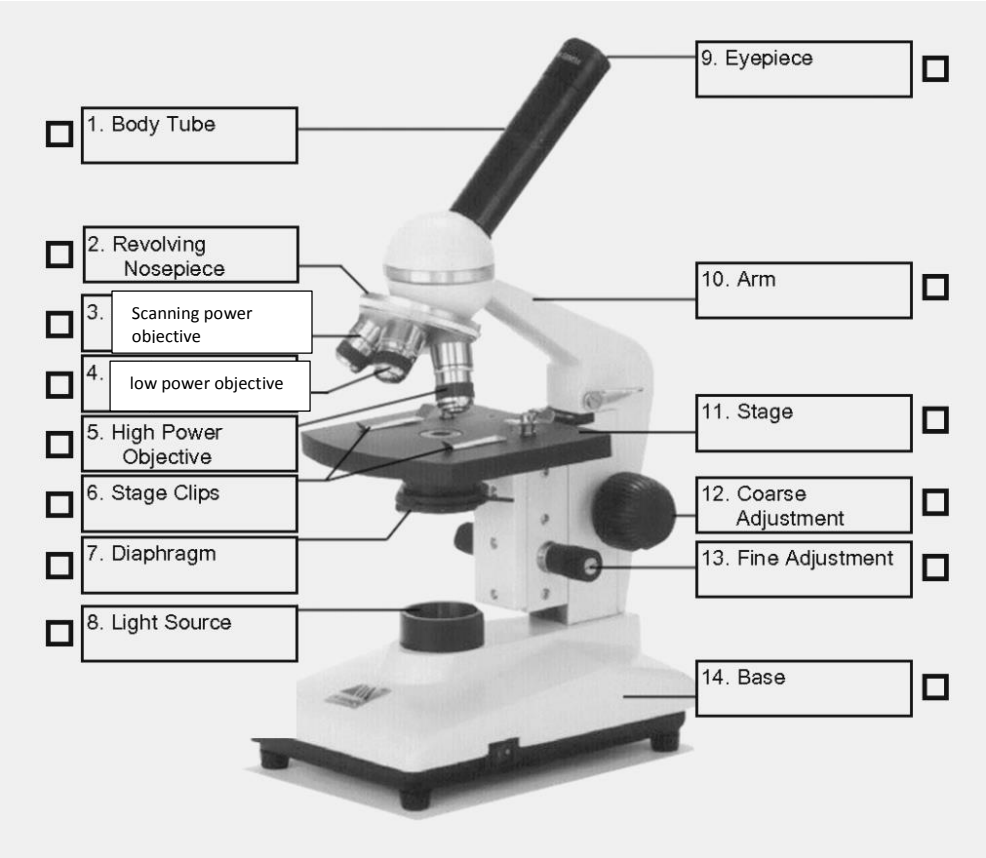
3. **Working Distance:** distance from the front lens element of the objective to the closest surface of the coverslip when the specimen is in sharp focus. **Distance between objective lens and specimen on stage.**

4. **Parfocal:** ability of microscope to stay in focus under all powers.

5. **Contrast:** difference in light intensity between the image and the adjacent background relative to the overall background intensity. **Ability to see the difference between light and dark.**

6. **Field of View:** Circular area (diameter). **It is the area of the slide you are looking at as you look through the eyepiece. The higher the magnification, the smaller the field of view**. Need to know field number and magnification of objective.

Labeled Compound Microscope



Microscope Parts and Functions:

Microscope Parts	Microscope Functions:
base	supports microscope
low power objective	magnifies 4x (red line)
light source	provides light
stage clips	secures slides for viewing
diaphragm	regulates amount of light
revolving nosepiece	holds and positions the objective lenses
arm	supports the tube and stage, attached to base
medium power objective	magnifies 10x (yellow line)
high power objective	magnifies 40x (blue line)
coarse adjustment knob	moves stage up and down in large increments; used for first focusing
stage	supports or mounts the slide
fine adjustment knob	provides sharp focus
body tube	connects eyepiece and objective lenses; rotates the eyepiece
eyepiece	ocular lens

Microscope Magnification:

The largest number on the objective is the amount of magnification.

In this example, the objective magnification is 100x

Total Magnification:

To calculate total magnification, you multiply the scanning objective by **the eyepiece** which **is always 10x** magnification. **(See chart below)**