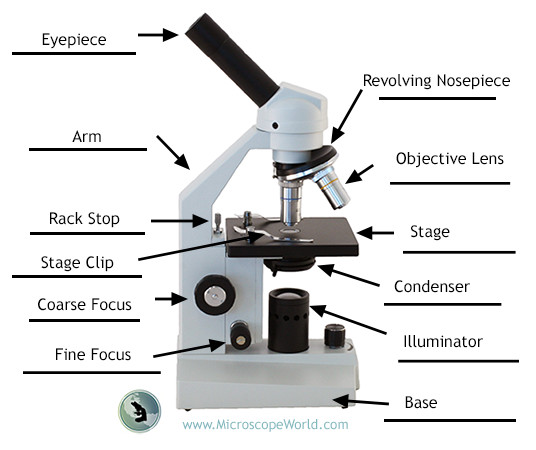
**Microscopy Labs: For Virtual Microscope Substitution**

View the following images in **Moodle Microscopy Lab** & the images below *instead* of the **Gateway Virtual Tab**. Sketch the following images and label the **microscope**. You can also refer to my websites at <https://www.jensbiology.weebly.com> (microscopy tab)

**Exercise A:** Review the microscope below, then label the microscope parts.



**Eyepiece**: The oculars are the eyepieces. They have a magnification of 10x); Monocular = 1 ocular; Binocular = 2 oculars. They are adjustable to the width of your eyes, and you can turn the dial to fine-tune the sample and are what you look through to view the sample. By adjusting the oculars until you see the sample in one view or one circle, you are increasing **resolution**, or the point at which two objects can be viewed as distinct and separate.

**Arm**: This is the back of the microscope that is for support, particularly when carrying it.

**Rack stop**: This is a small screw designed to protect the microscope objectives from hitting the stage. It is a screw that is found in the back near the arm.

**Stage clip:** This holds the slide in place on the mechanical stage by a spring-loaded mechanism.

**Coarse focus:** This is the larger knob that you use to bring the specimen into focus, and which moves the stage up and down.

**Fine focus**: This is the smaller knob on the side of the microscope that is used for sharper images and to “fine tune” the resolution of the sample.

**Base**: the bottom of the microscope that supports it, and which contains the light source (light bulb, fuse) and is used to support the microscope underneath when carrying it

**Illuminator**: The illuminator is the light source. There is an on/off switch and a separate dial to control the intensity and brightness of the light.

**Condenser**: This sits under the mechanical stage and is used to focus the amount of light on the slide. It can be moved up (right under the slide) or down (away from the slide) when looking at samples that are transparent or clear, such as urine or vaginal wet mounts or parasitology samples.

**Iris diaphragm:** This is the lever/knob (small) attached to the condenser, which can be adjusted to open or close the iris, like the pupil of the eye, to let in more let or to reduce the amount of light on the sample.

**Mechanical stage:** This is the flat surface that holds the slide. The stage clips hold the slide in place and flat on the surface. It can be moved up and down, as well as side-to-side to scan various areas of the slide.

**Objective Lenses**: There are 3-4 objective lenses on a rotating, locking revolving nosepiece. The lenses are designed to **magnify** the sample so you can see the detail more clearly.

* 4x is the scanning lens to start with, which should be the one locked into place when you store the microscope.
* 10x is the “high dry” lens, which you move to next.
* 40x is the lens we use the most to observe the detail in A&P
* 100x is the oil immersion lens, which can only be used with special immersion or mineral oil to magnify the sample. Using this lens without oil can damage or scratch the lenses.

**Total magnification:** **Total magnification** is the ocular lenses (10x) times the objective lens. Calculate the total magnification of the lenses below:

* 10x x 4x = 40x total magnification
* 10x x 10x = \_\_\_\_\_\_\_\_\_\_\_\_\_\_ total magnification
* 10x x 40x = \_\_\_\_\_\_\_\_\_\_\_\_\_\_ total magnification
* 10x x 100x = \_\_\_\_\_\_\_\_\_\_\_\_\_ total magnification

**Revolving nosepiece:** this is a movable, lockable dial that holds the objective lenses in place. You turn it and lock it into place when you reach the objective lens you wish to use.

**Cleaning and Storing the Microscope:** The microscope should be handled with care. Improper use or failure to clean it can damage it, particularly the lenses. Microscope lenses should be carefully cleaned with lens cleaner and dust-free, lint-free microscope lens tissue paper, because dust, oil, fingerprints, hair, and other things can damage and scratch the lenses. The other parts can be cleaned with dust-free, lint-free KIM wipes designed to clean the non-lens parts of the microscope. The microscope should be stored with the stage lowered, the plug wrapped around the arm either above or below the stage, with the oculars (eyepieces) turned facing away from the stage and the 10x objective in place, and the light switch turned off. You should remove the slide and put it back in the slide tray where it belongs.

**Transporting the Microscope:** When transporting the microscope, you should place one hand under the base, one hand around the arm, and carry the microscope close to your body (trunk) slowly and carefully. Place it carefully on the work area, plug it in, turn the oculars around to face your eyes, and now it is ready for use.

**Stain**: Most of the slides we look at in A&P are stained with special stains, such as methylene blue, or Wright-Giemsa or safranin to improve **contrast**, or the ability of a structure to stand out against a background.

**Questions:**

1. What is the purpose of the oculars?
2. What is the purpose of the objectives?
3. How do you calculate the total magnification of the microscope?
4. What is the purpose of stain on the samples on the slide?
5. How could you increase resolution if the image you are looking at is blurry when you first look into the microscope?
6. What does magnification do to the sample on the slide?
7. What is the best way to transport a microscope?
8. Why is it important to clean the microscope and how should it be cleaned?
9. What is the correct way to store the microscope?
10. Which objective lens should be in place when storing the microscope?
11. How can you focus the microscope?

**Label the Microscope Parts Below:**

A microscope with text above it

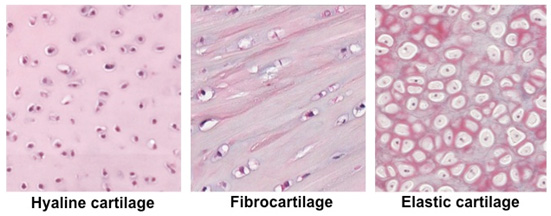
Description automatically generated

**Exercise B:** **Cell Biology and Histology (Tissues): Sketch Them Here:**

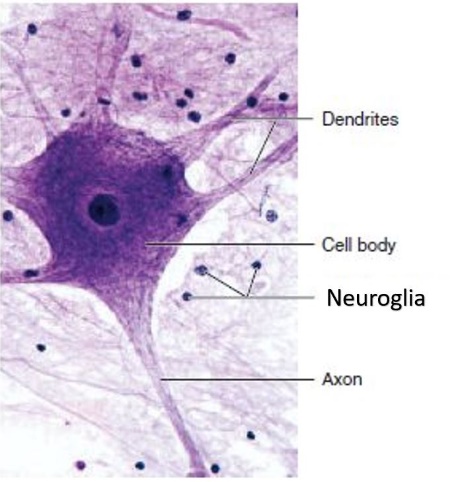
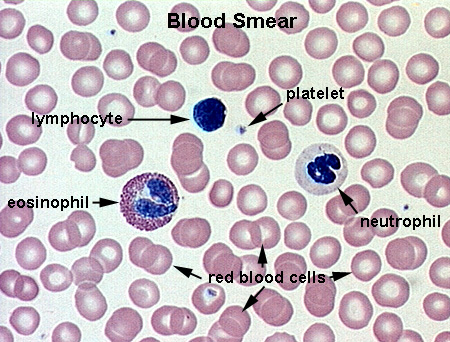
Bone 10x Cartilage 10x Blood 40x

Cheek Cell (Epithelial) 10x Cardiac Muscle 40x Skeletal Muscle 40x

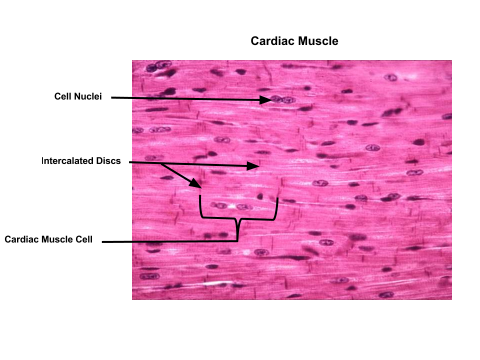
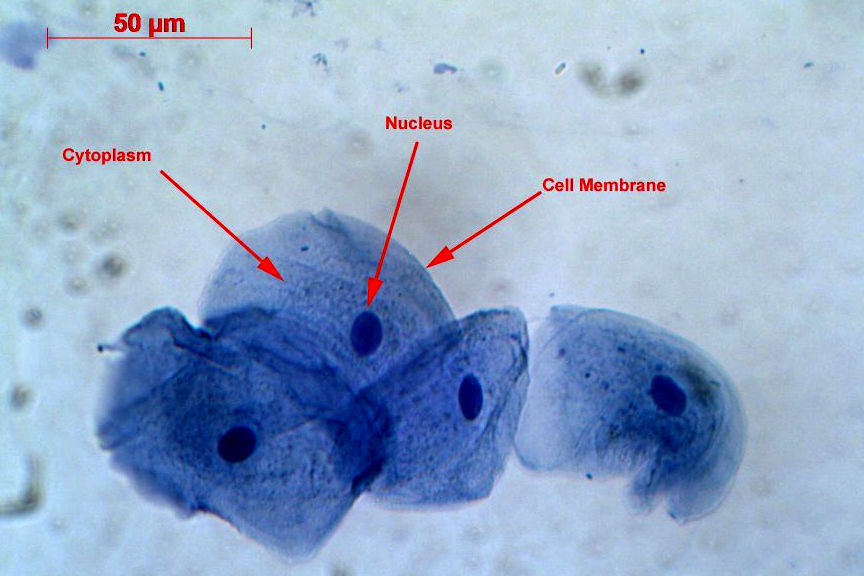
Smooth Muscle 40x Nervous Tissue 20x Cartilage 40x



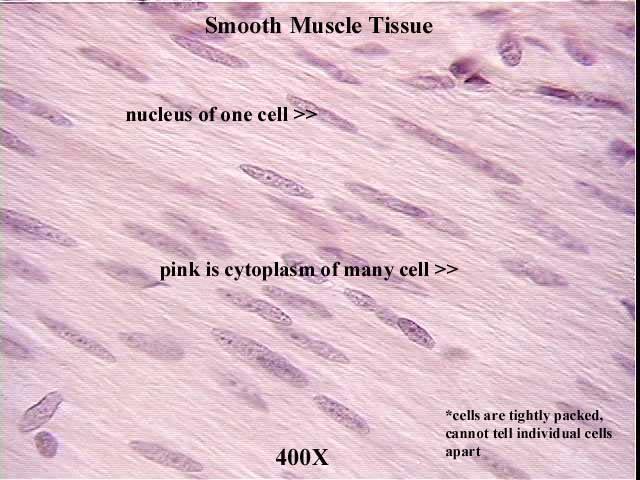
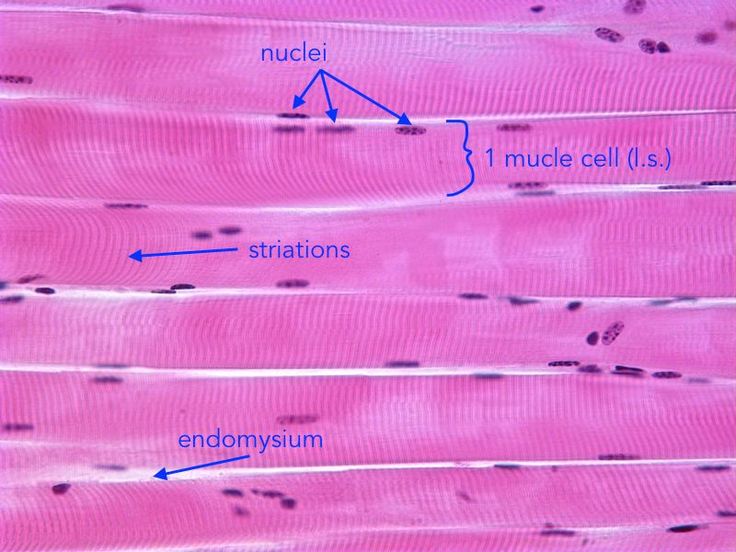
**Osteon of Bone**: 20x **Cartilage Types:** 40x



**Blood Smear:** 100x **Neuron and Neuroglia:** 40x

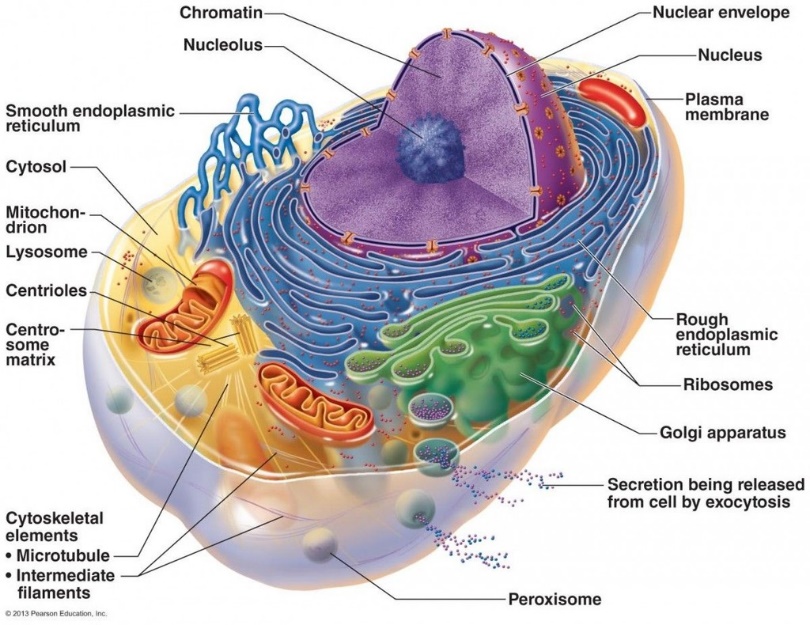


**Epithelial (Cheek) Cells:** 40x **Cardiac Muscle:** 40x

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**Skeletal Muscle:** 40x **Smooth Muscle:** 40x

**Exercise C:** Review the Parts of the Cell and Label the Cell Below It:





Eukaryote Cell. Cell images courtesy Pearson Education, Inc., [www.pearson.com](http://www.pearson.com), accessed 9/12/2023.

Microscopes. Microscopy images courtesy Microscope World, [www.MicroscopeWorld.com](http://www.MicroscopeWorld.com), accessed 9/12/2023.

Microscope Slide Images. Images courtesy The Biology Corner, [www.BiologyCorner.com](http://www.BiologyCorner.com), accessed 9/12/2023, and OpenStax Anatomy and Physiology 2e, <https://openstax.org/details/books/anatomy-and-physiology-2e>, accessed 9/12/2023.