Microscopes

Describe how simple lenses are used in a microscope.

An important tool for studying life is the microscope.

- The microscope magnifies objects so you can see their very small features.
- When you put brine shrimp under a microscope, for instance, you can see many distinct features.

Location & Functions of Each Part

- **Eyepiece Lens**: The lens at the top which magnifies. They are usually 10x power.
- **Tube**: Connects the eyepiece to the objective lenses.
- **Arm**: Supports the tube and connects it to the base

The stage and light help you see the specimen.

- The stage is where you place the object to be viewed.
  - The stage can be moved up or down to focus the image.
- The light source helps to illuminate the object to be viewed.
  - The light can shine through a semitransparent object on a slide.

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Microscopes enlarge by magnifying through a convex lens.

- Light rays that enter a convex lens parallel to its axis, refract and meet at the focal point.

Most microscopes use at least two convex lenses.

Label them on your paper.

Eyepiece

- The first lens you look through is called the eyepiece and has a longer focal length.
- The eyepiece acts like a magnifying glass, magnifying the (already larger) image from the objective.

The objective has a very short focal length and creates a larger, inverted image of the object inside the microscope.

- Inverted means that the image appears upside down or backward compared with the actual object.

Objective Lens

- The second lens you look through, closest to the object to be viewed, is called the objective.

- Usually you will find 3 objective lenses on a microscope that are color coded.
The shortest lens is the lowest power, the longest one is the lens with the greatest power.

4X Scanning Objective

Each lens on a microscope has a magnification value.
- The eyepiece lenses on our school microscopes have a 10X magnification.
- Many of the objective lenses on our school microscopes consist of
  - 4X,
  - 10X, and
  - 40X powers.

The total magnification of the image is the power of the objective lens multiplied by the power of the eyepiece.

- For example, a 10 eyepiece lens with a 6 objective lens produces an overall magnification of 60 (10 x 6).

So most of our school microscopes have a total magnifications of:

10X Objective 10X Eyepiece

100X

Calculate the total magnification for each combination of lenses on a microscope:
- a. objective lens: 10 eyepiece: 10
- b. objective lens: 2 eyepiece: 5

Trace the path of light through a microscope.
- Notice the prism both refracts and reflects light rays.
Focusing the Image

1. Turn on the microscope.
2. Click the nosepiece to the scanning objective – the shortest objective lens.
3. Place the slide on the stage and secure it in place with the stage clips.
4. Adjust the slide to make sure the light hits the specimen on the slide.

5. Look through the eyepiece and focus using the coarse focus knob until the image is sharp.
6. After you have focused the specimen using low power, don’t touch the coarse focusing knob again.
7. Continue to magnify the specimen by clicking the nosepiece to the next longest objective.
8. Now, use the fine focus to bring the slide into focus.
9. When you are done, turn off the microscope.

Caring for a microscope

- Always carry the microscope with two hands.
- Keep cords clear from objects.
- Do not force the knobs.
- Always turn off the light.

Biological Drawings

- Biological drawings are an important part of the science of biology and all biologists must be able to produce good quality scientific drawings regardless of your artistic ability.
- Biological drawings follow certain rules.

Biologists often need to make a biological drawing of their specimens.
Rules for Biological Drawings

- Look at the specimen carefully and examine the significant features.
- **DRAW ONLY WHAT YOU SEE!!** Do not include what you think you should see.
- Only draw with a pencil.
- Make your drawings large and clear so that features can be easily distinguished.

- Always use distinct, single lines when drawing.
- To illustrate darker areas on a specimen, use dots.
- Do not shade in any area of your drawing.

Example: Insect Leg