

Grade 4—Microscopes

Objective: Students will learn to understand and use microscopes and record their observations.

Related Next Gen Science Standards: LS1.A: Structure and Function: Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (4-ESS2-1)

Docent Guidelines:

1. Schedule a date and time with your teacher to have the students come into the lab.

Estimated time for this activity: 45-60 minutes.

2. Input the day and time into the Science Lab Master Schedule. Please make sure you add set up and clean up time to the class time, and add your name.

Note: Our science lab has two kinds of microscopes. The fourth graders will mainly use the simpler, larger microviewers and multi-image slides for this activity.

Supplies needed:

- Microviewers and microscopes (hopefully 1 per student; some may need to share)
- Slide sheets and slides for each table
- Desk lamps (2-3 per table, for extra light)
- Worksheets (microscope diagram and microviewer practice worksheet)
- Colored pencils/crayons

Procedure:

1. Discuss why scientists use microscopes.
2. Teach the parts of the microscope and how microscopes work. Have students label the parts on their own copy of the diagram. You could show the video listed below. Explain that 10x means the image will be magnified 10 times its actual size.
3. Have the students view slides in the microviewers and draw what they see on their worksheets. The prepared slide sheets come with booklets that explain what each image is and how much it has been magnified.
4. If students have time, they can try looking at slides with the compound microscopes with the mirrors.

Resources:

--Video: Parts of a microscope

<https://www.youtube.com/watch?v=1k659rtLrhk>

General Information for Reference:

A compound light microscope uses lenses to collect light to view objects on a slide. The microscope magnifies the object so that the smallest structures are visible

The microscope was created by Zacharias Janssen in the late 16th century. Prior to the invention of the microscope, the details of objects on slides were limited. Single microscopes were similar to using a magnifying glass.

The compound microscope works by enhancing the image that is projected by the first lens with a second lens and light. There is an additional set of lenses that are on the nosepiece. Modern microscopes can magnify objects up to 2,000 times the original size.

When adjusting the focus and magnification, the slide must never touch the lens of the microscope. Microscopes usually have multiple magnification settings, and the revolving turret can be used to change those settings so that the sample is magnified more. Microscopes also have two focus knobs: coarse and fine. The coarse focus knob brings the object of view into the focal plane, and the fine focus knob makes small adjustments to the focus once the object of view is in range. The slide should be prepared with a cover slip to protect both the sample and the lens of the microscope.

Microscopes are used in a variety of fields to view objects or organisms that are not visible with the naked eye. These devices are useful in biology and medicine to study or analyze specimens, such as bacteria, cells and body tissues. Some other uses of microscopes include for crime scene investigations, mineral specimens and chemical materials.

At crime scenes, forensic scientists collect evidence, such as bullet cases, to examine under a comparison microscope. In geology, mineral and rock specimens can be studied under a microscope to study their composition. In chemistry, different materials, such as metals and atomic structure of elements.

There are different types of microscopes used in science, including compound, dissection, scanning electron and transmission electron microscopes. The images can be either two or three- dimensional depending on the microscopes. Likewise, the magnification varies with different microscopes.

Microscopes help scientists see tiny organisms and understand the fine details of cells, fibers, nuclei and other structures invisible to the naked eye, which in turn influences education and research, helping scientists disseminate critical information to others. Microscopes facilitate the study of many scientific branches, including biology and immunology. Scientists use specific types of microscopes, such as electron microscopes, for facilitating microscopic studies within their own disciplines