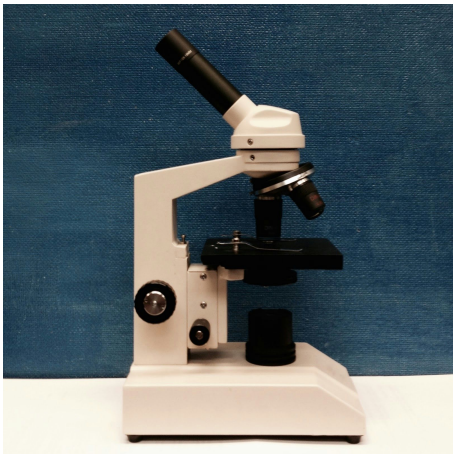
Lesson 4: Introducing the Microscope

Summary

Students will think about the structures and functions of a microscope, then learn the common names for the different parts.



Next Generation Science Standards

Disciplinary Core Ideas

- ETS 2.A: Interdependence of Science, Engineering, and Technology

Science and Engineering Practices

- Asking questions
- Constructing explanations

Cross Cutting Concepts

- Structure and function

Vocabulary

Microscope
Structure
Function
Focus
Parts of a microscope (see Microscope Diagram handout)

Materials

★ microscopes (ideally 1/pair, but 1/table would work)
★ Microscope Diagram handout, included at the end of this file (1 per student; students can use one diagram for the Explore and the other for Explain. Or if you would like students to draw the microscopes themselves in Explore, then 2 students can share a handout and each cut out one diagram to use.)

Engage/Elicit (5 min.)

OPENER

- ❖ Where are lenses used? Think of as many examples as you can. Sample answers: glasses, binoculars, cameras, telescopes, microscopes.

- ➔ (Optional) If students photographed their finished (or unfinished) product, have a brief discussion about any notable designs or innovations.
- ➔ Point out to students that they had very limited time and resources to design their device. They essentially built a basic microscope.
- ➔ Let them know that scientists and engineers have improved on the design of the microscope for nearly 400 years. Today students will examine a modern microscope and note its features.

Explore (15 min.)

1. Explore the microscope on your table. Try to determine what the different parts are for.

Explain (15 min.)

2. Draw a diagram of the microscope, and next to each part write down what you think its function is.

- ➔ Discuss groups' ideas about what the different parts of the microscope do. Encourage students to try out different ideas to see if they are correct. (For example, if someone says the diaphragm makes the light brighter, have students test that hypothesis.) These are important science and engineering practices.

- ➔ Hand out the Microscope Diagram sheet and have students label the parts and functions correctly as a class.

➔ EL For English learners you might simplify the names. For example they could call the *objective lenses* simply *lenses* or even number them *lens 1, 2, and 3*. Stress the understanding of function over correct terminology, but encourage students to apply the terms they do know, and use them consistently.

Elaborate (5 min.)

➔ Let students know that structure and function is an important crosscutting concept across all sciences. Noticing the structures and functions of something (whether it is a bird or a piece of machinery) is one way to learn about it and understand it better.

3. What features does this microscope have that the microscope you designed didn't have? Why would these features be useful?
4. Is a microscope an example of science or engineering?
   Answers will vary. Designing and refining something to solve a problem is an example of engineering. But making a microscope also requires an understanding of lenses and light. Scientists might be more likely to *use* a microscope as a tool, though engineers might use one as well.

Extend

For students who finish early:

EXTENSION

- ❖ Try to focus the microscope on a piece of paper. Draw what you see in your science notebook.

Evaluate (5 min.)

EXIT CARD

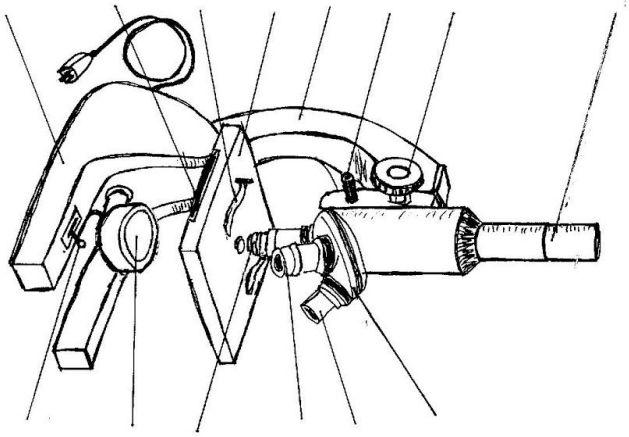
- Explain how the structures of the microscope work together to allow you to see an object magnified.

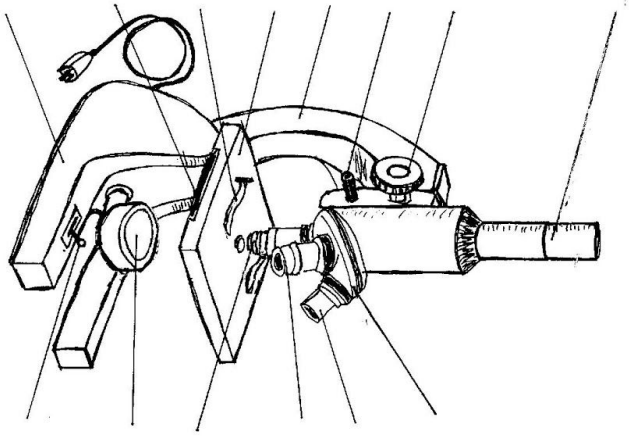
Homework

HOMEWORK

- Create a study guide that helps you to learn and remember the structures and functions of the microscope. For example, you might make a diagram with flaps to cover the names so you can quiz yourself.

Microscope Diagram Handout





Microscope Diagram Handout ANSWERS

Left side

eye piece
coarse adjustment knob
fine adjustment knob
arm
stage
stage clips
diaphragm (light adjustment)
base

Right side

nosepiece
low power objective lens
medium power objective lens
high power objective lens
lamp
on/off switch