Microscope Kit
#6805

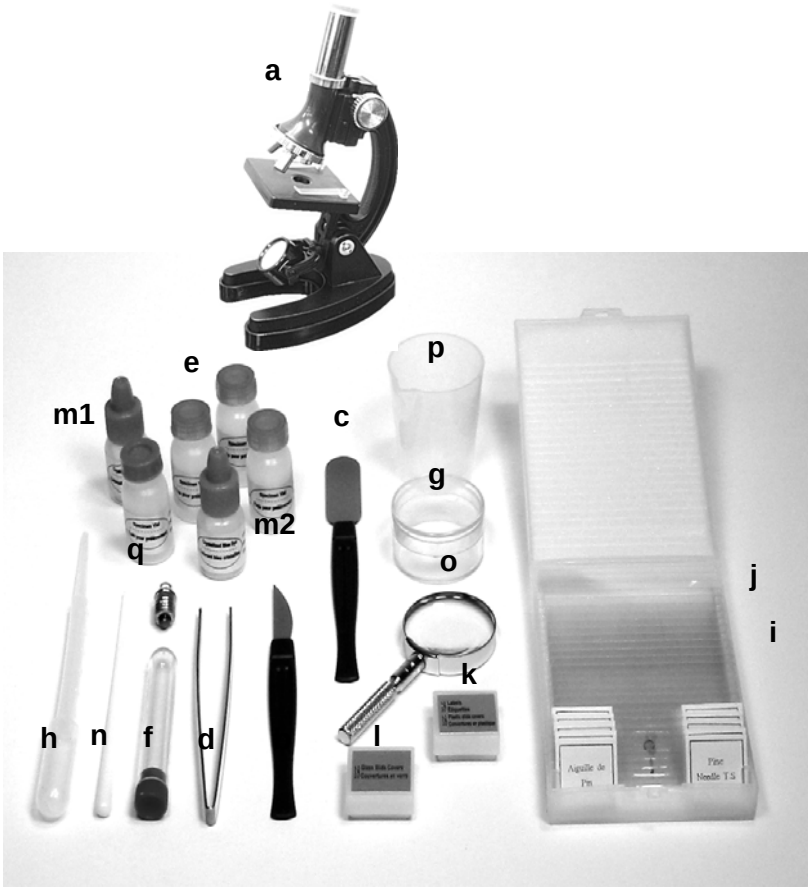
Instructions and Learning Guide

How to use your new microscope:

There's a whole tiny universe around you ready to be explored! With the iOptron #6805 microscope kit you can see millions of tiny living organisms in amazing detail.

Your microscope set contains the following parts. Check your microscope kit and make sure that you have all of the parts listed below.

- ☐ 1 die-cast microscope (a)
- ☐ 1 scalpel (b)
- ☐ 1 spatula (c)
- ☐ 1 tweezers (d)
- ☐ 4 collecting vials (e)
- ☐ 1 test tube with cap (f)
- ☐ 1 petri dish (g)
- ☐ 1 pipette (h)
- ☐ 5 prepared slides (i)
- ☐ 18 blank slides (j)
- ☐ 18 slide labels (k)
- ☐ 36 slide covers (l)
- ☐ 2 small specimen vials (m1), (m2)
- ☐ 1 stirring rod (n)
- ☐ 1 magnifying glass (o)
- ☐ 1 measuring graduate (p)
- ☐ 1 spare light bulb (q)



Part Descriptions:

a) **Die-cast metal microscope –** The microscope holds small items, called samples, to be studied on clear slides. It shines a bright light from its mirror or bulb through the small sample, and then lenses make the sample look very big. This microscope can make things look 300 times, 600 times, or even 1,200 times bigger than you can see them with your own eyes.

b) **Scalpel –** A scalpel is a sharp blade that is used to cut very thin pieces of material so you can look at them with your microscope.

c) **Spatula –** The spatula has a large flat blade, but it is not as sharp as the scalpel. It is used for scraping off bits of material for testing and to push down on soft samples to mash them flat.

d) **Tweezers –** The tweezers are like little pinchers. They are used to pick up small samples and to handle samples that you don't want to touch with your hands – like slimy mold!

e) **Collecting vials –** These are little plastic bottles with tight-fitting lids. They are used to carry your samples from the place you collected them to the place you have your microscope set up.

f) **Test tube with cap –** This thin, clear tube is used to hold liquid samples when you want to see if anything is happening, like when a sample changes color.

g) **Petri dish –** This is a round, flat dish with a clear cover. It is used to grow and observe samples such as molds.

h) **Pipette –** This is a soft plastic tube with a squeeze bulb on one end that you use to transfer a drop or two of liquid to a slide for examination.

i) **Prepared slides –** These are slides with professionally prepared samples on them for you to examine.

j) **Blank slides –** These are clear slides for you to use in preparing your own subjects for examination.

k) **Slide labels –** These are little pieces of paper with sticky backs. You can stick them on your slides and record information, such as the name of the sample, or when the sample was prepared.

l) **Slide covers –** These are little circles or squares made of thin, clear plastic. They are used to cover very small samples on a slide. When they are clean and dry they stick to the glass slide with a static electricity charge.

m) **Small specimen vials** – These small containers are for collecting and storing small quantities of liquid samples for later study.

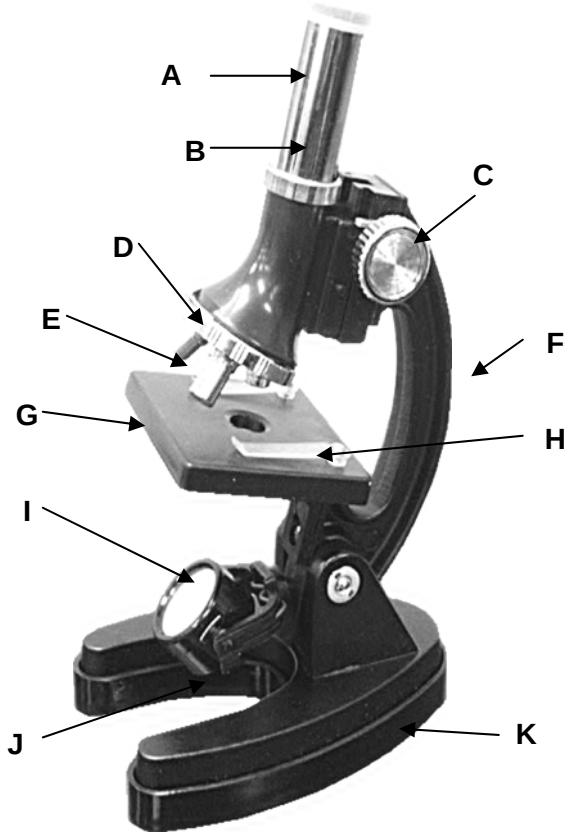
n) **Stirring rod –** Use this rod to mix liquids until they are well blended. An example is when you mix salt in water.

o) **Magnifying glass –** This is useful for taking a close look at a sample before you examine it under the high-power magnification of your microscope.

p) **Measuring graduate –** This plastic cup is marked with measuring lines so that you can accurately measure quantities of liquids in your experiments.

q) **Spare light bulb –** This spare bulb will replace the one in the illuminator lamp when it eventually wears out.

Parts of Your Microscope:



A. Eyepiece
B. Body tube
C. Focusing knob
D. Revolving lens turret
E. Objective lenses
F. Arm
G. Stage
H. Slide clip
I. Mirror
J. Electric illuminator (on opposite side of mirror)
K. Base (battery compartment)

A. Eyepiece – The eyepiece is where you look into the microscope. It is a small magnifying lens that collects the image projected by the objective lens.

B. Body tube – This is the main tube of the microscope. The image from the sample on the slide travels up this tube to the eyepiece.

C. Focusing knobs – Turn these knobs very slowly to bring the image of your sample into focus so you can see it sharply.

D. Revolving lens turret – The turret holds the three objective lenses. To change the lenses, rotate the turret slowly until each lens clicks into position.

E. Objective lenses – These lenses give three different magnifying powers when working with the eyepiece lens. They make samples look 300 times (300X), 600 times (600X) or 1,200 times (1,200X) bigger than you can see them with your eyes alone.

F. Arm – This curved piece is the "backbone" of the microscope and holds everything together. You can tilt and adjust the angle of this arm to set the most comfortable viewing position.

G. Stage – The stage is the flat platform that supports your slides for viewing.

H. Slide clips – The two clips on the stage hold your slide in position so that it doesn't move around while you are looking at it.

I. Mirror – The mirror aims light from a bright source, like a window or a table lamp, upward through the slide you are studying so you can see it more clearly.

J. Electric illuminator – When there is not enough light available for the mirror to fully illuminate your slide, you can turn the mirror over and use the bright electric illuminator bulb as your light source.

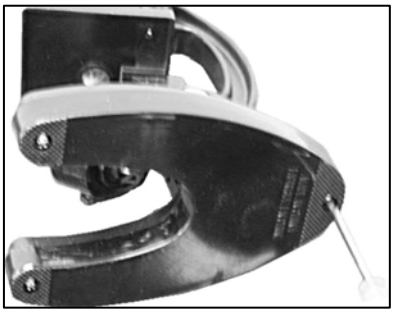
K. Base (battery compartment) – The base provides a solid support for your microscope. It also holds the batteries for the electric illuminator. See the first section in 'Getting Started' for instructions on installing and changing the batteries.

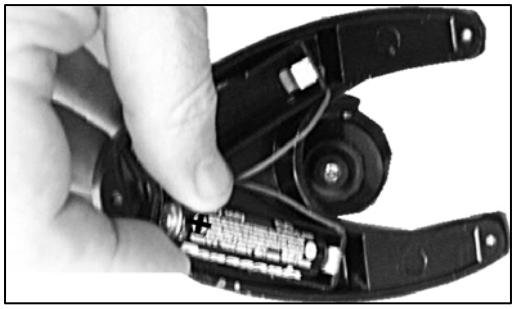
Helpful Hints

1) The most important parts of your microscope are the lenses. Handle them with care. If the lenses are dirty or dusty you can clean them with a soft cotton cloth or a special lens-cleaning tissue. Do not wipe them with a finger or a regular facial tissue.

2) Always store your microscope in its protective storage case.

Getting Started

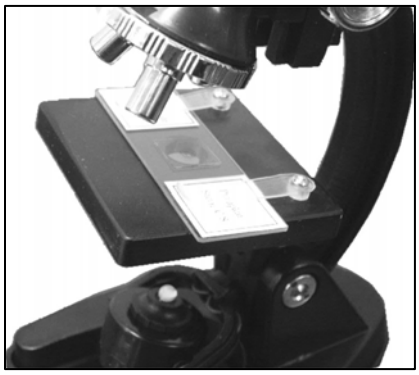




1) You will need to insert two AA alkaline batteries in the base of the microscope. First, you must remove the rubber antiskid bottom cover to access the battery compartment. You will need to use a Phillips-head (+) screwdriver to remove the two screws on this bottom cover. Once the cover is removed, insert the batteries as shown, making sure that the (+) and (-) terminals are properly aligned. Replace the cover and re-insert the screws. Do not overtighten.

2) Place the microscope on a flat surface near a bright light or window. There is no need to insert a slide just yet. Adjust the angle of the mirror so that when you look into the eyepiece you see a bright circle of light. **Do not point the mirror toward the sun as eye damage may result**. If there is no bright light available, or if the room lighting is poor you can use the microscope's electric illuminator. To turn on the illuminator flip the mirror over so that the light bulb is aimed upward. The light will come on by itself. Look through the eyepiece and adjust the angle of the light until you see a bright circle.

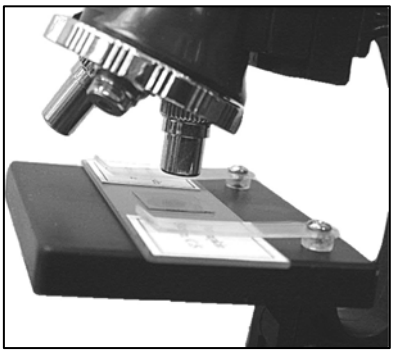
3) Once you can see a bright circle of light in the eyepiece your microscope is ready for use.



4) Choose one of the prepared sample slides from your set. Place it under the two spring clips on top of the stage.

5) Next, choose the magnifying power you want to use. Your microscope can provide magnifying powers of 300X, 600X, and 1,200X. Remember that the longer objective lenses provide the higher powers. Most observing is done at low-power, and we suggest that you start with the 300X setting.

6) To change the magnifying strength turn the revolving lens turret until you hear a click.



7) Turn the focusing knob until the objective lens is almost touching the slide. Don't let the lens touch the slide as you may break the slide and damage the lens. Now look through the eyepiece and slowly turn the focusing knob back until you see the sample clearly.

How to make your own prepared slides

Samples for examination should be very thin so that light can pass through them. If the sample is too thick it will appear dark in the microscope.

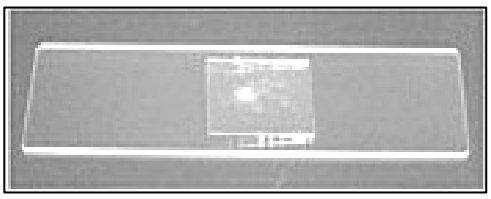
There are thousands of common items around the house and in the yard that can provide interesting samples. To name just a few you could start with cloth fibers, hair, plant or vegetable leaves, grass, paper, onion skin, pollen, dust, salt crystals, and even water!

Making a Temporary Slide

A) Start with a clean blank slide. Clean slides are important. If your slide is dusty or dirty, you should clean it with a soft cloth, so that you do not also magnify dirt or dust along with the sample you want to view. This can be distracting and even confusing!

B) Prepare a thin sample. You may have to slice it with the scalpel. Always be very careful. You should ask for adult help when using sharp objects.

C) Pick up your sample with the tweezers and put it on the center section of the slide. Add one drop of water. To enhance viewing you may add a drop of dye instead of water.



D) Gently place a slide cover over the sample, being careful not to allow any air bubbles in.

E) Remove any excess water or dye with a piece of paper towel by pressing it down gently over the slide cover.

F) Now you can observe your slide.

History of the Microscope

During the late Middle Ages (around A.D. 1200 to 1450), the growing demand for eyeglasses led to experimentation with lenses and making small things appear larger. As a result of this experimentation, the first microscope was created (probably in Holland in the late 16th century—the Dutch were masters at the craft of magnification).

The first microscopes were operated with only one lens—then the compound microscope was invented in the 1590s, which used two or more lenses to magnify objects even more. Among the most famous people to use a compound microscope was Robert Hooke of England. During the 1600s, Hooke observed and recorded the miniscule parts of nature previously unexplored, such as the intricacies of feathers, insects, and even mold. Furthermore, Hooke introduced the concept of cells—the smallest independently functioning part of an organism.

Today scientists use microscopes to aid in the world of medicine, help build better and stronger materials for everyday use, and even discover hidden mysteries about ancient cultures and environments.

One of the most powerful scientific instruments is called the scanning electron microscope (SEM). Instead of magnifying objects using lenses, like your microscope, the SEM focuses a beam of invisible particles called electrons on the object, and collects the electrons as they bounce back. These electrons are then turned into a black-and-white image on a television screen. SEMs can magnify some small objects as many as 100,000 times—that's about 50 times more powerful than the strongest ordinary compound microscope.

Cells

One subject that's easy to observe with your microscope is a cell. Both plants and animals have cells. Plant cells (which Robert Hooke identified) have structured walls, and basically serve as mini–food factories. Photosynthesis takes place inside the plant cell. Photosynthesis is the conversion of solar energy into chemical energy (or the production of oxygen and glucose from water and carbon dioxide).

Unlike plant cells, animal cells have a permeable membrane (instead of rigid, structured walls). This permeable membrane—through which certain things can pass—encases a number of even smaller specialized components called organelles. An animal's body (including yours) is entirely made up of these cells. They range in size and shape, depending on their function and location. Even the cell's life span varies from type to type—heart muscle cells, cartilage cells (the soft tissue connecting your bones at the joints), and most neurons (brain cells) can never divide, regenerate, or be replaced. On the other hand, liver cells are replaced about every 500 days, cells in your stomach lining about every two days, and skin cells about every one to 34 days.

Check this out! Try taking a toothpick and gently swiping the inside of your cheek. Then take those cells you've gathered on the toothpick and make a slide for your microscope. (See "How to make your own prepared slides" on page 6.) What do you see when you observe the slide under magnification?

Now look at the prepared slides included with your microscope. Can you see the rigid walls that plant cells are known for?

Frequently Asked Questions

1) What can I see with my microscope?

You can see thousands of things that are difficult or impossible to see with your eyes. You can see tiny plants and animals. You can observe plant and animal cells. You can see the differences between different plants, different papers, different fibers, and hairs from different people. You can study crystals, rocks, and minerals. The uses for your microscope are practically endless.

2) What is meant by power?

Power is a measure of the seeing ability of your microscope. It is really a short way of saying "magnifying power." Your microscope has three powers. They are 300X (pronounced "300 times"), 600X, and 1,200X. This means that your microscope can magnify the view of a sample so that it appears 300 times, 600 times, or 1,200 times larger than the way you see it with your own eyes.

3) I look through my microscope and all I see is darkness. Why?

This could be because the mirror or light bulb is not positioned properly to aim light up into your microscope. Or maybe the sample you are looking at is too thick so the light cannot shine through it.

4) All I can see is a partial circle of light. Why?

To see your sample properly, the light source must be centered through the slide to provide the brightest and most even illumination. Try gently moving the mirror or light until you see a full, evenly lit circle while looking through the microscope.

5) I have a very thin sample on my slide, but I can't see any detail.

First, make sure that the image is in sharp focus by adjusting the focusing knobs. If the problem still exists you should add a drop of red or blue stain to the sample. Stains make hard-to-see objects like plant cells stand out so they can be seen better.

BATTERY INFORMATION:

This unit uses two AA batteries. Always use fresh batteries. Do not use rechargeable batteries. If the microscope will not be used for a long time, remove the batteries. Nonrechargeable batteries are not to be recharged. Different types of batteries or new and used batteries are not to be mixed. Do not take batteries apart. Exhausted batteries are to be removed from the microscope. The supply terminals should not be short-circuited. Do not dispose of batteries in fire. They may explode.

WARNING! CHOKING HAZARD –
Small parts. Not suitable for children under 3 years.