

**NOEO
SCIENCE
BIOLOGY 2
EXPERIMENT GUIDE**

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EXPERIMENT GUIDE**

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Noeo Science Packages

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WEEK 1: THE MICROSCOPE

Experiment: Make a Simple Microscope

Our Question

What is momentum?

Materials

Included in Kit

- Cardstock
- Toothpick (to poke a hole)

From Home

- Tape
- Cling film
- Scissors
- Book or newspaper

Instructions

1. Follow the Simple Microscope instructions on page 4 of *The World of the Microscope*.

What We Learned

Simple microscopes live up to their name—they are very simple, which makes them quite hard to use. Simple microscopes don't work incredibly well...but that's how Leeuwenhoek and Hooke began to uncover the microscopic world!



WEEK 1: THE MICROSCOPE

Experiment: Under the Microscope: Hairs

Our Question

What do different types of hair look like under the microscope?

Materials

Included in the Kit

- Microscope
- Slide

From Home

- Tape
- A hair

Instructions

1. Open your new microscope kit and examine what's inside. These next two weeks are going to be all about getting comfortable with all the parts of a microscope—because it is a new skill you need to learn.
2. First, put the batteries into the bottom of your microscope (unscrew the black part of the base). This is a light microscope, meaning that you can use natural light to illuminate the slide, which will be held on the stage with stage clips, or you can flip the mirror over to turn on the illuminator (that's what we recommend). It takes time and prac-

tice to learn how to focus your microscope on a specimen, especially with higher powers of magnification. However, you'll begin with low powers of magnification.

3. Rotate your microscope's nosepiece until the smallest lens (the low power objective, which is the lowest power of magnification) is above the stage.
4. Locate the blank slides in your microscope set.
5. Follow the instructions on page 12 of *The World of the Microscope* to compare a hair from an adult's head, a child's head, your pets, or any feathers you can find. This is a beginner's microscope, so you will only have to worry about the coarse focus wheel. Use the wheel to focus in on the hairs as you look through the eyepiece lens. See if you can see different thicknesses of the hairs from a human vs a pet.
6. Try looking at human hair again, only use all three powers of magnification. The goal is to get comfortable with your new microscope, so don't worry if some things are easier to observe than others.

What We Learned

You became more familiar with your new microscope, and were able to compare multiple different types of hair with it!



WEEK 1: THE MICROSCOPE

Experiment: Making a Temporary Mount

Our Question

What do the cells of an onion look like under a microscope?

Materials

Included in Kit

- Microscope
- Pipette
- Slide (from your microscope kit)
- Cover slip (from your microscope kit)

From Home

- Tweezers
- Cutting board
- Knife (use with an adult's help)
- Onion

Instructions

Follow the instructions on pages 14-15 of *The World of the Microscope*.

Extra Instructions for using the microscope:

1. Make a temporary mount of a tiny very, very thin piece of onion membrane (skin) by following the instructions in *The World of the Microscope* on pages 14-15.
2. How do you cut a very, very thin piece of onion? You can use a scalpel or box-cutter, but we suggest using the microtome (the black circular device from your microscope kit with two protected, rotating razor blades).
3. You should use a drop of water to make the onion specimen stay still, and then put a cover slip from your microscope over the drop of water, creating a temporary mount that you can wipe off when you're finished.
4. (You can also try to create a permanent slide of the hair from your last experiment using the gum media from your kit. Gum media is just like glue – put a cover slip on top of your slide once the hair specimen is in the glue. Then use a label from your kit so you don't forget whose hair is on the slide.)
5. Start with the lowest magnification lens, and get the microscope in focus. Then progressively turn the nosepiece and try to get the medium power objective (the middle lens) in focus. You may need to adjust the slide as you "zoom" in.
6. You may also choose to adjust the diaphragm to allow a smaller pinprick of light through the stage. This makes it easier to find the specimen through the eye-piece.
7. Finally, try the high power objective. Again, this will take practice and experimentation for you to see through the microscope. If you are having trouble getting the temporary mount to work, then open your prepared slides (the white plastic box in your microscope kit) and take out the prepared onion bulb sample.

8. Draw and describe what you see at each level of magnification in your lab manual.

What We Learned

Underneath the microscope, you were able to see the individual cells of the onion membrane. You may also have been able to see blobs near the edge of the cells—those are the nucleus of the cell, the cell's central unit.



WEEK 2: USING YOUR MICROSCOPE

Experiment: Under the Microscope: Band-Aid

Our Question

What will materials like gauze or a shirt look like under the microscope?

Materials

Included in Kit

- Microscope

From Home

- Band-aid
- Shirt or rag

Instructions

1. When the bandage is out of its wrapping, find the gauze in the middle of the bandage. There is a very thin layer of protective netting over the gauze pad; carefully remove it. (If you are having trouble with this step, you could simply put your pocket microscope on top of the gauze pad of the bandaid.)
2. Place the netting on the stage of your microscope, and view it on low power. Sketch what you see.
3. Next, place a shirt or rag on the stage, stretching it to be able to see the fibers. Try increasing magnification. Sketch what you see.

What We Learned

Though you aren't able to see it with your naked eye, all materials made from fibers like band-aids and t-shirts are woven together—under the microscope, you were able to see that weave!



WEEK 2: USING YOUR MICROSCOPE

Experiment: Under the Microscope: Paper

Our Question

What do different types of paper look like under the microscope?

Materials

Included in Kit

- Microscope

From Home

- Copy paper
- Notebook paper
- Toilet paper

Instructions

1. Tear a small piece of copy paper.
2. Look at the edges of the paper under your microscope. Be sure to tear it instead of cutting it with scissors, because tearing it reveals the fibers along the edges. Experiment with what you can see at different powers of magnification. Sketch the paper at the clearest magnification.
3. Tear a small piece of notebook paper, and repeat step 2.
4. Tear a small piece of toilet paper, and repeat step 2.

What We Learned

Paper is made from tree fibers—something you can't really tell with the naked eye, but which becomes pretty clear when seen under a microscope.



WEEK 2: USING YOUR MICROSCOPE

Experiment: Under the Microscope: Sugar Crystals & Rocks

Our Question

What do crystals and minerals look like under the microscope?

Materials

Included in Kit

- Microscope

From Home

- White sugar
- Small rocks
- Blank slide (from your microscope kit)

Instructions

1. Put a few grains of white sugar on the blank slide. View the sugar under the microscope, and sketch what you see.
2. Clean the blank slide off to use again, and put it back on the stage.
3. Pick a few small rocks--make sure that they're slightly flat on top--and wash and dry them.
4. Put the rocks one at a time on the blank slide. Be very careful not to scratch the lens of your microscope by bumping it on the rocks. View the surface of the rocks under the microscope, and sketch what you see.

What We Learned

Being able to see individual sugar crystals underneath the microscope is a little bizarre; you don't exactly think that you are eating crystals when you eat sugar! Depending on the type of rock that you found, you should have been able to see the crystals that make it up, or maybe tons of small particles like sand that were pressed together! For more information on the different types of rock you might have found, and how they look under the microscope, go to page 32 of *The World of the Microscope*.