

**NOEO**  
**SCIENCE**  
**BIOLOGY 2**  
EXPERIMENT GUIDE



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SCIENCE  
BIOLOGY 2  
EXPERIMENT GUIDE**

Created by Dr. Randy Pritchard

**noeo science**  
MOSCOW, IDAHO

# Noeo Science Packages

**GRADES 1-3 /  
AGES 5-8**

Biology 1  
Chemistry 1  
Physics 1

**GRADES 4-6 /  
AGES 9-12**

Biology 2  
Chemistry 2  
Physics 2

**GRADES 7-8 /  
AGES 12-15**

Chemistry 3  
Physics 3

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# Introduction

Science is not a spectator sport. The best way for you to learn science is by doing hands-on experiments and activities. Each experiment and activity builds on the material that you cover in the week's readings, and at the end of each experiment there is a section that explains what should have happened, and *why* it happened.

You might notice that in between the Experiments there are some Activities and Optional Activities. Activities include the supplies you'll need, but they don't require as much explanation as Experiments, and you won't be answering questions about them. Optional Activities are fun, optional things to do related to the reading of the week – most of the time they're outings or family activities, or they need materials that we didn't want to require you to buy.

## Experiment Kits

There are 4 experiment kits, including all of the wild and wacky materials that you will need for your experiments. Each kit lists its contents sorted by what you'll need for each week's experiments.

You're going to have *fun* learning science!





# unit 1:

# THE MICROSCOPIC WORLD

## ***Week 1: The Microscope***

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WEEK 1: THE MICROSCOPE

# Experiment: Make a Simple Microscope

## Our Question

What is  
a simple  
microscope?

## Materials

### *Included in Kit*

- cardstock
- toothpick (to poke a hole)

### *From Home*

- tape
- cling film
- scissors
- book or newspaper

## Instructions

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 Kit*

- microscope
- slide

#### *From Home*

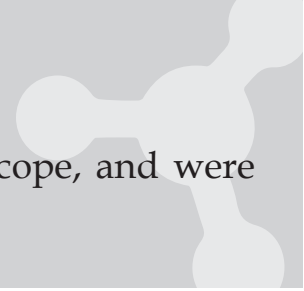
- tape
- hairs
- feathers, optional

## Instructions

1. Open your new microscope and slide preparation kit and examine what's inside.
2. Read the instructions, and put the batteries into your microscope.
3. Locate the blank slides in your microscope slide preparation set.
4. 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. 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 versus a pet.

## What We Learned

You became more familiar with your new microscope, and were able to compare 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?

## Materials

### ***Included in Kit***

- microscope
- tweezers
- pipette
- slide (from your microscope kit)
- cover slip (from your microscope kit)

### ***From Home***

- 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 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. If you are having trouble getting the temporary mount to work, then open your green prepared slides, and take out the prepared onion epidermis slide.
5. View it with the lowest magnification, then increase the magnification.
6. Draw and describe what you see 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 each cell – each blob 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 cloth 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. Look at the netting through your microscope. View it on low power then increase the magnification. Sketch what you see.

3. Next, look at a shirt or rag, stretching it to be able to see the fibers. 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 or knitted together—under the microscope, you were able to see the pattern!



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 and 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.
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 under the microscope. 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*.