Magnify That

Purpose

- To learn about observation skills and how tools can help people make observations.
- To learn what "magnification" means.
- To learn that scientists use tools, such as magnifying lenses, to examine objects.

Overview

Students will learn about magnification and how a magnifying lens works. They will examine a variety of different objects, first without a magnifier and then with a magnifier, and compare what they observe. They will practice observing details of these objects with a magnifying lens.

Student Outcomes

Students will be able to identify a magnifying glass and its purpose. They will be able to describe how the same object looks different when using the unaided eye versus a magnifying lens.

Science Content Standard A: Science as Inquiry
- Abilities necessary to do scientific inquiry

Science Content Standard B: Physical Science
- Properties of objects and materials

Science Content Standard C: Life Science
- The characteristics of organisms

Science Content Standard E: Science and Technology
- Understanding about science and technology

Time

- Part 1: One 30-45 minute class period
- Part 2: One 30-45 minute class period, or longer if this is included as a center

Level

Primary (most appropriate for grades K-4)

Materials

- Elementary GLOBE book: *Discoveries at Willow Creek*

Part 1:

- Magnifying lenses (one for each student in your class)
- Paper
- Scissors
- Objects to observe (some good choices are: leaves, wood, sponges, items of clothing, newspaper, hands/fingers, etc.)
- Copies of *Magnify That Student Activity Sheet 1*

Part 2:

- Magnifying lenses (one for each student in your class)
- Salt and sugar
- Black construction paper
- White chalk or crayons
- Optional – additional magnifiers of different strengths
- Copies of *Magnify That Student Activity Sheet 2*

Preparation

Read the Elementary GLOBE book *Discoveries at Willow Creek* - either read it to the class or have students read it to themselves. The books can be downloaded from www.globe.gov/elementaryglobe.

Teacher's Notes

A lens is a curved shape you can see through. A magnifying lens is a convex lens that makes close objects appear larger. Both sides of the lens curve outward, and it is thicker in the middle than on the edges. It is also called a hand lens. When a magnifying lens is placed directly on top of an object, the object appears the same and does not look any larger. If you raise the lens, the object appears larger, or magnified. If you raise the lens too close to your eyes, the object will become blurry. Both marbles and drops of water can act like lenses; they can magnify objects because they are clear and have a curved surface that is thicker in the middle than on the edges.

When looking at objects through a magnifying lens, the objects look larger. You can discover and examine small details that you might not otherwise be able to see. For example, when you look at a newspaper with a magnifying lens you will learn that the black parts of pictures in the newspaper are not solid black; instead they are made of tiny black and white dots.

Using magnifying glasses with children:
Younger primary grade children may recognize that an object looks larger under a magnifying lens, and older primary grade children may observe more details not seen with the unaided eye. Magnifiers encourage children of all ages to look at objects a little more closely. A hand magnifier (magnifying glass or hand lens) with an unbreakable acrylic lens and handle is a perfect tool to help children investigate the environment. This magnifier has the advantage of being small, mobile, and inexpensive. They are available in several sizes, in a variety of shapes, and are ideal for outdoor activities. The magnification, or power, varies among magnifying lenses. Try to have several different powers of magnifiers available. When you introduce the magnifiers, let the students use them on their own for a while. Let them explore different objects. Plan viewing opportunities that permit students to view objects in different ways – with the naked eye, magnified, and magnified under different powers. This tool will come in handy with all types of scientific investigations!

What To Do and How To Do It

Part 1:

1. Discuss with your students how people use their senses to discover things in their environment. Ask the students what senses they use when they observe things. Discuss the advantages and limitations of each of the five senses (sight, sound, touch, smell, taste).
2. Ask the students the following question: Why do objects look different when magnified?
3. Then discuss with your students why the GLOBE students needed a magnifying lens in the *Discoveries at Willow Creek* book. Tell them that they are going to learn how to use a magnifying lens so they can use it as a tool when making observations.
4. Pass out a sheet of paper (scrap will do!) to each student. Show them how to fold it into quarters. On the inside corner (where there are no edges), have students make a mark one centimeter along the edge in each direction. Then have the students cut out the area between the marks. This will create a square hole in the middle of the paper. *Note for younger students:* Have younger students put their thumb over the inner corner and trace around it with a pencil. Then they should cut this out and it will make a window for them to look through that is roughly the same size.
5. Have the students hold the hole in front of one eye and look closely around them - at their hands, shoes, clothes, pencil, etc. Ask the students if they notice anything different about what they are observing.

6. Pass out the magnifying lenses and have the students repeat their observations. Explain the concept of seeing "details" here. Ask the following questions:
   - What do you see with the magnifying lens that you did not see before?
   - Do you see any details like lines, shapes, numbers, or textures?
   - Did you know the details were there before?
   - Describe two things that look different when using a magnifying lens.
7. Give each student a leaf. Encourage them to examine the leaf with and without the magnifying lens. Then ask them to focus their observations on the part of the leaf where the leaf stem (petiole) enters the leaf. Students should look at this specific part of the leaf first using their paper with the hole in it and then using the magnifying lens. Have the students draw what they see on the *Magnify That Student Activity Sheet 1* and share their results with the class.

Part 2:

Note to teachers: this activity works better with younger students when done at a center so an adult can work with a few students at a time.

1. Now have the students guess what certain objects will look like when viewed with a magnifying lens. Hold up containers of salt and sugar and ask the students what they think each substance will look like when magnified. Have the students write down how they think each substance will look on their *Magnify That Student Activity Sheet 2*. Note for younger students: These students will probably write "bigger" as their guess, because they might not think about the possibility of seeing details in something like salt and sugar.
2. Pass out a piece of black construction paper to each student. Have the students use white chalk or a white crayon to draw a line on the paper to divide it in half. Sprinkle a few grains of salt on one half of the paper and a few grains of sugar on the other half of the paper. Be sure to keep the salt and sugar away from each other on the paper. Have the students look at the salt and sugar with their magnifying lenses. Have them describe what they see, and write/draw a description on their *Magnify That Student Activity Sheet 2*.
3. The students will learn that salt and sugar grains look different when magnified. Both salt and sugar are crystals. Salt crystals are the shape of a cube and have flat sides. Sugar crystals are oblong and are slanted at both ends. Have a discussion with the class about how this information will help them make observations of other objects using a magnifying lens.

Adaptations for Younger and Older Students

Younger Students

Prior to doing this activity with kindergarten students, it might be helpful to discuss and practice observation skills with your students. One good way to do this is by using books from the "I Spy" series. Either read "I Spy" books with the students or use an "I Spy" poster with the class. Ask your students to practice observing details when looking at the books. The following Web site provides information on how to buy "I Spy" products and also has some good activities that you can print from www.scholastic.com/ispy.

Older Students

Discuss the appropriate uses of magnifying lenses versus microscopes. For example, it is possible to see details on a leaf with a magnifying lens, but not organisms in a drop of water – this requires more powerful magnification.

Further Investigations

- **Water as a Magnifier:** Cut a hole the size of 3 centimeters in diameter out of a piece of cardboard. Tape plastic wrap over the hole, making sure it is smooth and tight over the hole. Place this over a piece of newspaper. Squeeze a large drop of water from a medicine dropper onto the plastic

wrap. Look down through the water drop at the newspaper. Then slowly raise the cardboard and watch the print size change. Here you have made a magnifying lens out of a drop of water!

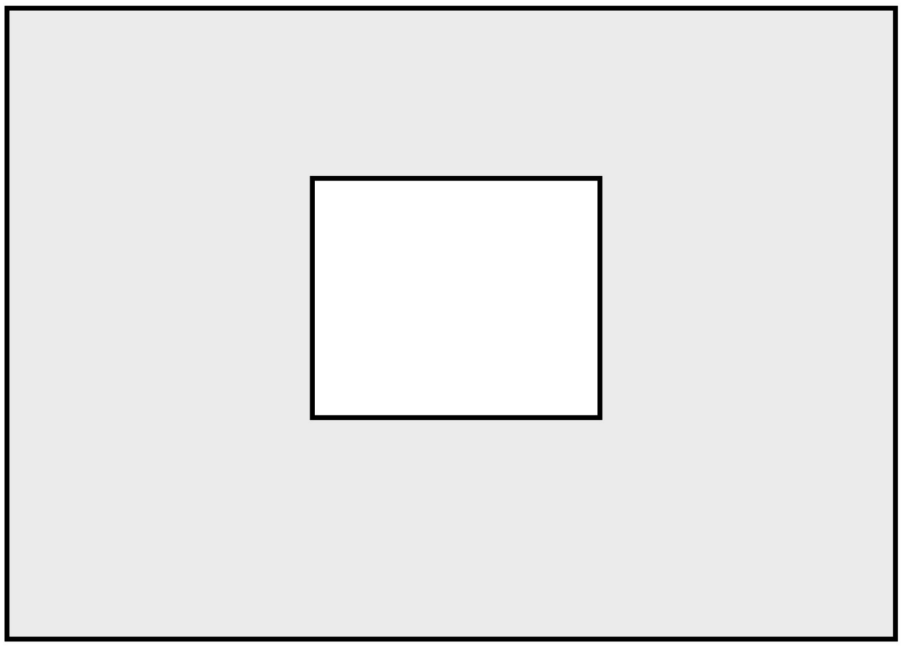
- **More Water Magnification:** Another simple activity for using water as a magnifier is to put a drop of water on a coin and observe how the water drop magnifies the details on the coin. Then add another drop of water and see if there are more details. Do this a few times until the coin is full of water.
- **Other Magnification Tools:** Investigate the use of digital cameras, binoculars, telescopes, and microscopes as magnifiers.

NAME:_____

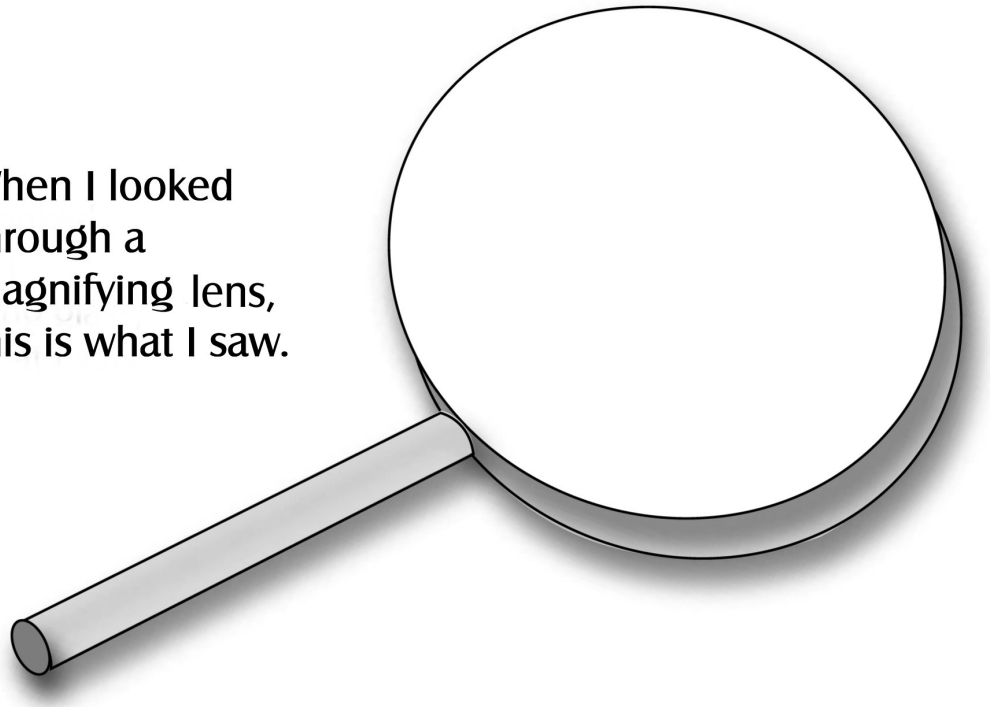
Magnify That Student Activity Sheet 1

Date: _____

When I looked through the hole in the paper, this is what I saw.



When I looked through a magnifying lens, this is what I saw.

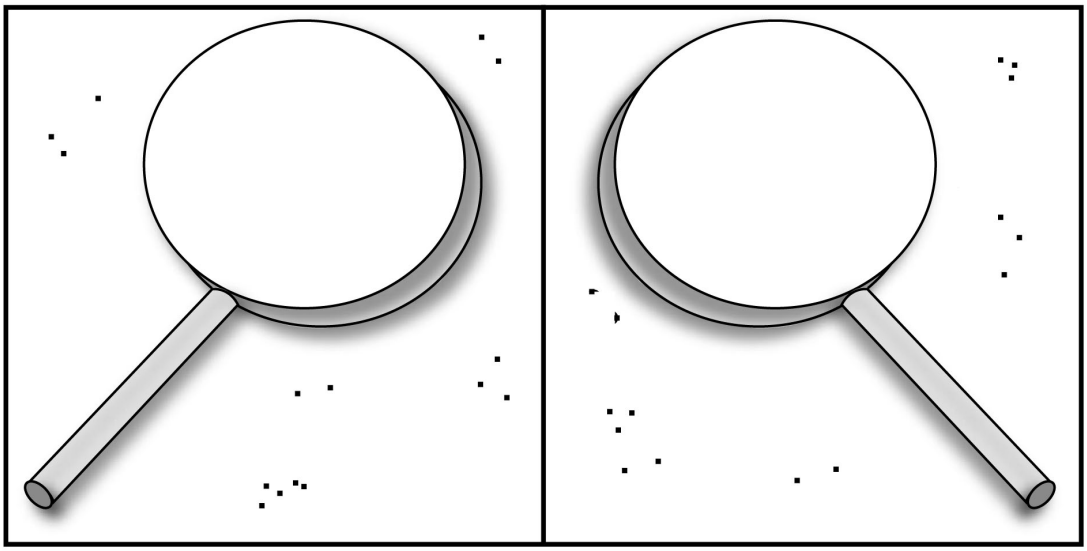


NAME:_____

Magnify That Student Activity Sheet 2

Date: _____

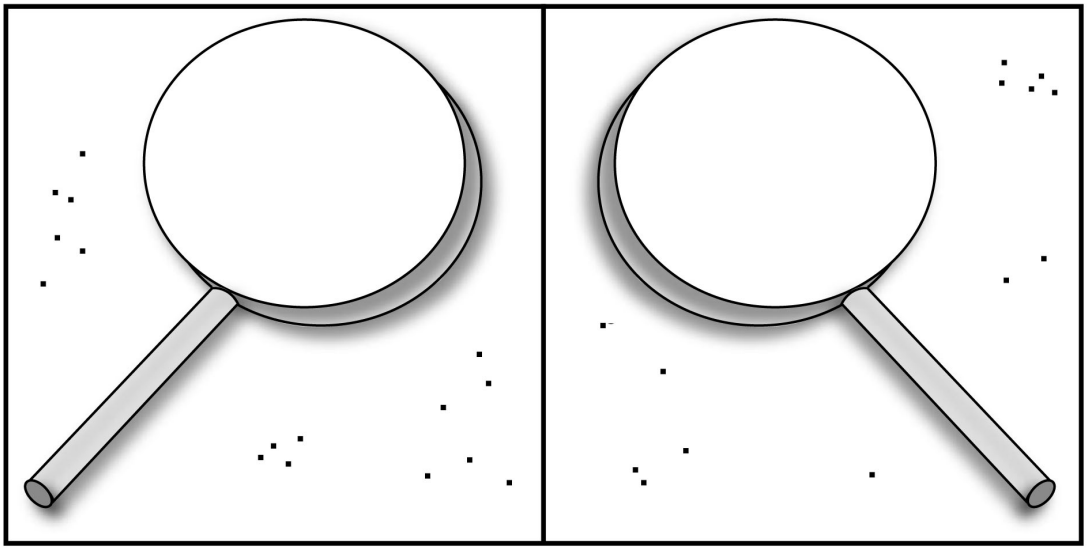
What I think I will see...
When I look at grains of sugar and salt with a magnifying lens, this is what I think they will look like.



Sugar

Salt

What I actually saw...
When I actually used a magnifying lens, this is what I saw.



Describe what they looked like with the magnifying lens. _____

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