



Bruce Museum Seaside Center Activity: Looking Closely with Magnifiers

Last week, Brendan Murtha, the Seaside Naturalist, [took us on a deep dive](#) into the nitty gritty of sand. This week, you and your learners can continue exploring the smaller things in life. Using the directions in this lesson plan you will learn how to make two different easy-to-use magnifiers and get some suggestions on how to use them.

Materials needed: clear plastic bottle (empty), scissors, dry erase marker or permanent marker, 2x popsicle sticks, hot glue or masking tape, clear empty jar with lid, water.

How do magnifiers work?

Magnifying glasses bend light and trick your eye into seeing something that isn't there.

- How do they do this?
 - A magnifying glass is a convex lens, meaning it is curved outwards like the underside of a spoon, on a stick or handle.
 - The lens of a magnifier must be transparent.
 - This allows light to travel through the lens. The curve of the lens bends the light as it travels.
 - Our eyes absorb the light rays that bounce off of objects, which is how we see. It is difficult to see in the dark because not enough light reaches our eyes.
 - The light rays that bounce off of objects travel in straight, parallel lines, called angles of inference.
 - The lens of a magnifier refracts the light so that as it passes through the lens the rays converge, our eye reads these converging lines and creates a false image of the object.
 - Depending on the curvature of the magnifier (convex or concave) the image may be larger or smaller than the original object.
 - If you still want more information on magnifiers, check out this [video](#).
- What are the parts of a magnifier made out of?
 - Lenses can be made out of glass or plastic.
 - Lenses can have a curve that makes them either concave or convex.



- Concave, or divergent lenses, have a negative focal length. This means they make objects appear smaller or farther away when viewed through the lens.
- Convex, or convergent lenses, have positive focal length. This means they make objects appear larger, or closer when viewed through the lens.

Let's get making!

The first type of magnifier that we will make is very simple, easy to take with you made of recycled materials but a bit limited in its application.

- Find a small empty glass jar with a lid.
 - Make sure the jar is very clean, any paper label has been thoroughly removed, and the lid fits tightly on the jar.
 - We used an empty plastic jar that we had been storing seeds in.
 - Fill the jar with clean water, and then screw on the top.
 - Fill it as much as you can, the air bubble gets in the way!
- Holding your jar horizontally over different objects you will see that you've created a magnifier!
 - Feel free to decorate the lid of your jar as you see fit but keep the sides/bottom clean and clear to allow light to travel through the convex lens that you have just created!



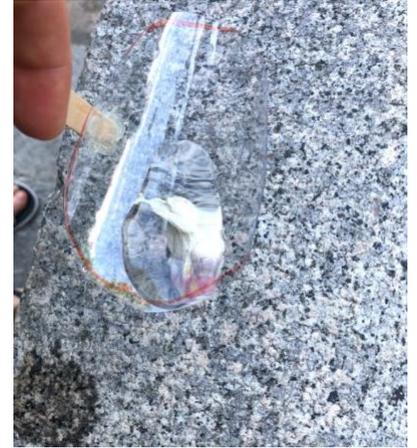
The second type of magnifier is also easy to make but will require a bit more effort.

- Using your marker draw a large circle on the top of your empty plastic bottle, just below the mouth, taking advantage of the bulge of the bottle's "shoulders" to create a convex lens.
- Add a little water into the bowl of your plastic circle, and you will see that it has become a magnifying lens!



- Pour out the water and carefully attach your popsicle sticks, using either hot glue or tape, to either side. This will enable you to hold your magnifier above items that you want to magnify.

Now that you have two different types of magnifiers it's time to try them out. While you can use them to magnify items in your home it's even more fun to go outside and use them outside. Since your plastic bottle magnifier requires water and won't be as easy to carry if it has water in it, bring an extra bottle of water to fill it as needed.



Some things you might want to try magnifying

- Any street signs that you see
- Small animals or plants
- Footprints in soil, sand or gravel
- The bark of trees
- Your own fingerprints!

Questions to extend the lesson

- What is similar about the way the two magnifiers work?
- What is different about the way the two magnifiers work?
- Could you modify either design to make it easier to use?
- Can you think of a new design, completely different from these?

