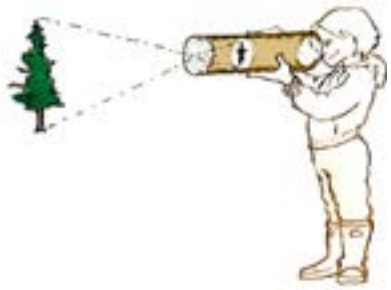
ART at the MUSEUM

Make a Camera Obscura

Level: Elementary



Summary

You will build a simple camera obscura (pinhole camera) from materials around the house, and experience what early photographers saw when they took pictures.

Estimated Time

Approximately 1 hour

Materials and Resources Needed

- paper towel tube
- tinfoil
- masking tape
- large needle
- scissors
- white paper-the thinner and smoother the better. Tissue paper (the kind you use for wrapping presents) or tracing paper is best, and white plastic grocery bags work (even though they're plastic and not paper) but you can experiment with whatever you have--writing paper, toilet paper, paper towels--test them out!
- a sunny day

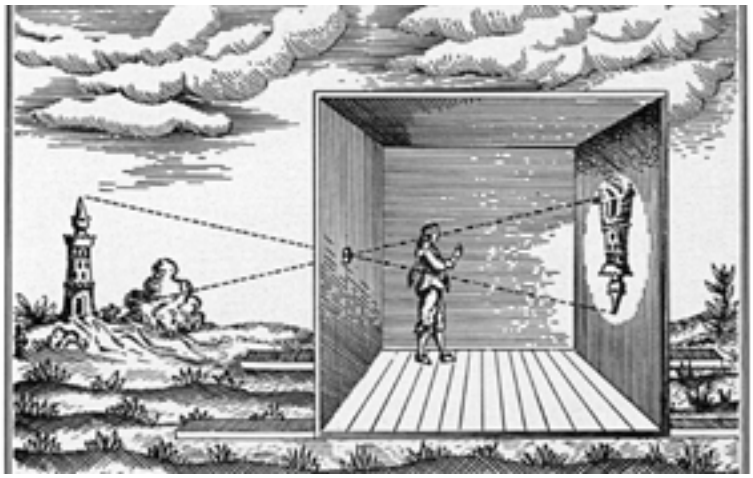
Background

Every couple of years the Alaska State Museum organizes Alaska Positive, a state-wide photography exhibit. Most of the pictures are taken with a digital camera, but that hasn't always been true-in fact, digital cameras have only been around since 1975! Before 1975, photos were taken with a camera and film. Film was covered with special chemicals, and when light hit the chemicals on the film through a small hole in the camera, it reproduced an image of whatever the camera was pointing at.

But how did the image get through the hole???

People have known that light will reproduce an image through a hole for a long time--at least since the around 400 BC. Boxes would be built, sometimes as big as a room, with a small hole in the side. The image of the scene outside the box was projected inside onto a wall inside the box. Because the light rays cris-cross when they go through the hole, the picture looks upside down. A box for projecting an image through a small hole is called a Camera Obscura (meaning "dark chamber"). Leonardo DaVinci was one of the first people in 1490 to describe how one worked.

For hundreds of years, people were amazed at the camera obscura, and used it for looking at the sun during an eclipse, but they had no way of saving the image so they could see it when the box was gone. The best they could do was to trace around the image on a piece of paper inside the box.



Using an early Camera Obscura
from the book *Ars Magna Lucis et Umbra*
written by Anastasius Kirchner , 1646

The first photo, of houses in the alley, taken out the window of Joseph Niepce's workshop.

Then, in 1827, after ten years of trying to figure it out, scientist Joseph Niepce discovered that if he coated the paper with photoreactive chemicals, he could save the image, and the first formal photo was created. It took 8 hours to cause enough light reaction to save the image.

Between 1827 and 1975, most photos were taken using the same principles as the camera obscura.

You can build your own camera obscura with materials from around the house. We have no way of saving the images because we don't have modern film or any special photoreactive chemicals, but you can still see what got people so excited for hundreds of years. Go back in time and experience the start of modern photography for yourself! What upside down image will you see through a camera obscura?

Make a Camera Obscura

- Cut your paper tube in two pieces, 1/3 and 2/3 long.
- Carefully, with the help of an adult, poke a small hole in a square of foil. The square of foil should be big enough to completely cover the end of the paper tube.
- Tape the foil over one end of the short piece of tube you cut. Center the hole you poked in the middle of the end of the tube.
- On the end of the longer piece of tube, tape a piece of thin white paper.
- Tape the two pieces of tube back together, with the end covered in paper in between the two pieces, and the foil on the outer end.
- Look through the tube from the open end. If you see any light leaking in, except from the pinhole you made, wrap your entire tube in foil to block it. (Don't cover your pinhole.)

museums.alaska.gov

Assessment

Did you see an image inside your camera obscura?

- Go outside -a sunny day works best. Look at something (trees show up well) through the open end of the tube. Let your eyes adjust.
- What do you see? Is it upside down?
- To make a picture that LOOKS like an old fashioned picture (but uses modern technology), take a picture of your image with a cell phone through the camera obscura.

Explore-what else can you do?

- Experiment with different papers and materials--which works best?
- What happens if the hole in the foil is bigger?
- What does it look like if the hole isn't in the center of the foil?
- Will changing the shape of your hole change the image?
- Add more holes to the foil.
- Repeat the activity with different size camera obscuras--you could use oatmeal boxes, square boxes, a great big refrigerator box.
- Make a camera obscura big enough for you to climb inside of.
- Go visit a room size camera obscura! Here's a link to the places you can find one. https://www.camaraoscuraworld.com/en/list-of-obscure-cameras-around-the-world/
- If you REALLY want to get into this, you can buy photo paper and developing materials online, and try to take permanent photos.

Alaska Core Standards: In this activity, students focus on: light and engineering, problem solving: ETS1.A, ETS1.B, ETS1.C, PS3.D

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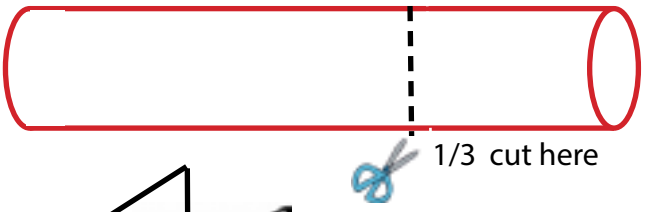
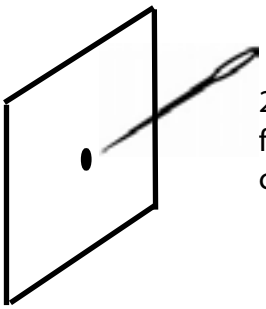
Build a Camera Obscura

1. Measure approx. 1/3 the length of the tube, and cut it off.

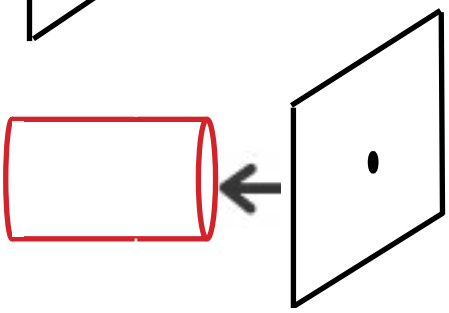


Materials

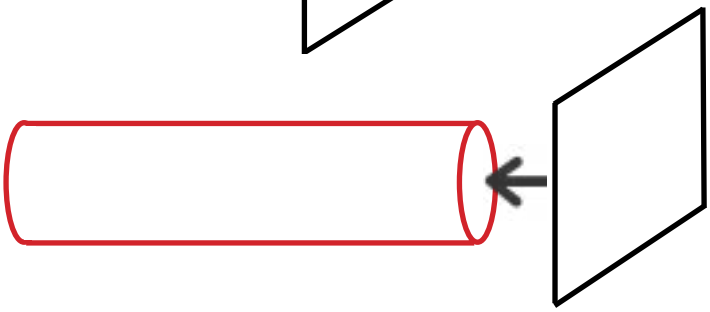
- paper towel tube
- aluminium foil
- needle
- thin white paper
- tape
- scissors



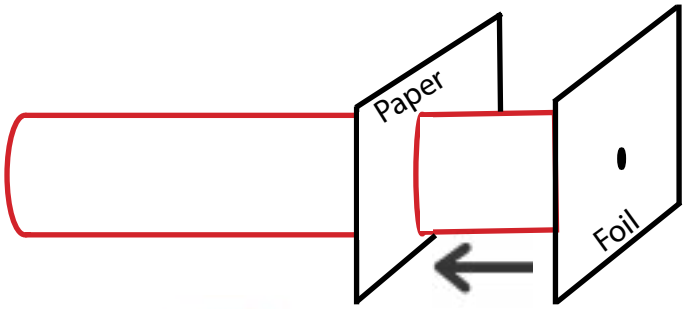
2. With a needle, poke a hole in a piece of foil . The foil piece should be big enough to cover the end of the tube.



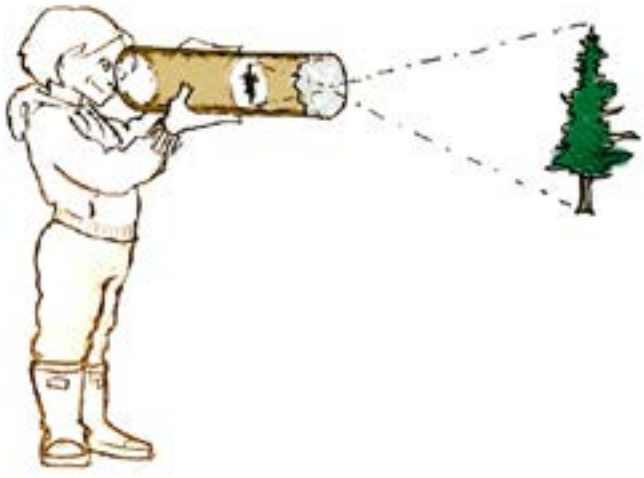
3. Tape the foil with the hole in it over the end of the shorter piece of the tube. Center the hole in the middle.



4. Tape the paper over the end of the longer piece of the tube.



5. Tape both pieces of the tube together, with the foil at one end and the paper in the middle.



6. Go outside and look through the tube at something (trees work well). Can you see an upside down image in your camera obscura?

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