



MAKER ED

# LEARNING IN THE MAKING: Observation Machines

## INTRODUCTION

Have you ever looked under a microscope to see parts of the world not visible to the naked eye? How about a telescope to gaze at objects far away out of reach? Each of these technologies - we call them “**observation machines**” - helps you look closely at and explore the complexity of the world around you. Observation machines illuminate new and different aspects of the natural world and heighten sensitivity to its art, beauty, and design. Like the unique perspectives through which you experience the world, they each allow a different angle on the world.

Observation machines have two key parts:

### 1. LENS

a transparent or see-through material, often circular or curved - like the human eye - that focuses light as light passes through it.



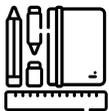
### 2. LIGHT

light waves are bent or redirected as they pass through a lens, illuminating new aspects of whatever it shines on.



## YOUR CHALLENGE

Your challenge is to build an observation machine that will allow you to see natural objects in a new light.



### Tools & Materials of Making

Below are some parameters for selecting tools and materials

- **Anything transparent or see-through**, such as a plastic bag, a plastic water bottle, thin paper, a magnifying lens, net, or sheer fabric
- **A source of light**: this could be a flashlight, small LED, a lamp, the sun shining through your window
- **Cardboard** or another firm material, like foam.
- **Tools for connecting & attaching**, such as tape, glue, binder clips, or clothes pins.

### Subject

Science & Art



### Standards

**NGSS 1-PS4-3**

Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.



### Grades

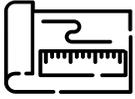
K-2nd  
3-5th



### Key Terms

- Lens
- Light
- Perspective





## ACTIVITY INSTRUCTIONS

### 1. CHOOSE AN OBJECT IN NATURE

Step outside and collect an object from nature. What catches your eye? What would you like to investigate further? This could be anything from a flower to a leaf or a blade of grass or a woodchip.



### 2. LOOK FOR A LENS

Pick a transparent or see-through material. This can be clear, like part of a plastic bag or water bottle, or it can be shady, like thin paper. You can even use your eye.

### 3. FIND A SOURCE OF LIGHT

Light comes from many places. You can use a flashlight, lamp, ceiling light or even the sun outside - just **be careful** not to touch hot light bulbs or stare directly into the light, because you can hurt your eyes or burn yourself.

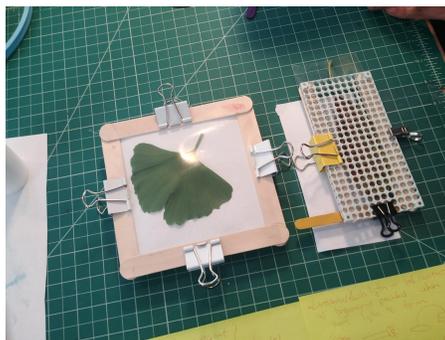
### 4. BUILD A STRUCTURE

Your observation machine might hold your object in place, allowing you to view it from all angles or a specific angle (like pictured below). Or your observation machine might work like a magnifying glass - a lens through which you look at your object.

### 5. OBSERVE YOUR NATURAL OBJECT

Examine your natural object with your observation machine.

- What do you **see**?
- What do you **think** about what you see?
- What do you **wonder** about what you see and think?



### Reflect



- What about your object do you notice with your observation machine that you didn't notice before?



### Things to consider



Does what you notice about your object change depending on **how close** or **how far** your source of light is to your observation machine?



Can you move your light **around** all sides of your object?



**Record your observations.** Take notes, draw a picture, say your noticings out loud.



**See, Think, Wonder** is a *thinking routine* from Project Zero. Check out more at:

[pz.harvard.edu/tinking-routines](http://pz.harvard.edu/tinking-routines)



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Created in collaboration with:  
Carolina Simon-Pardo



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