



Developed with Brian Magnuson, TX

Camera obscura

Foam board pinhole camera

Volume 58 | Gr. 9–12

Time: 12–14 days



Standards

NCAS VA:Cr1.1.6a

Combine concepts collaboratively to generate innovative ideas for creating art.

NCAS VA:Cr2.1.6a

Demonstrate openness in trying new ideas, materials, methods, and approaches in making works of art and design.

NCAS VA:Re8.1.6a

Interpret art by distinguishing between relevant and non-relevant contextual information and analyzing subject matter, characteristics of form and structure, and use of media to identify ideas and mood conveyed.

Objectives

Students will...

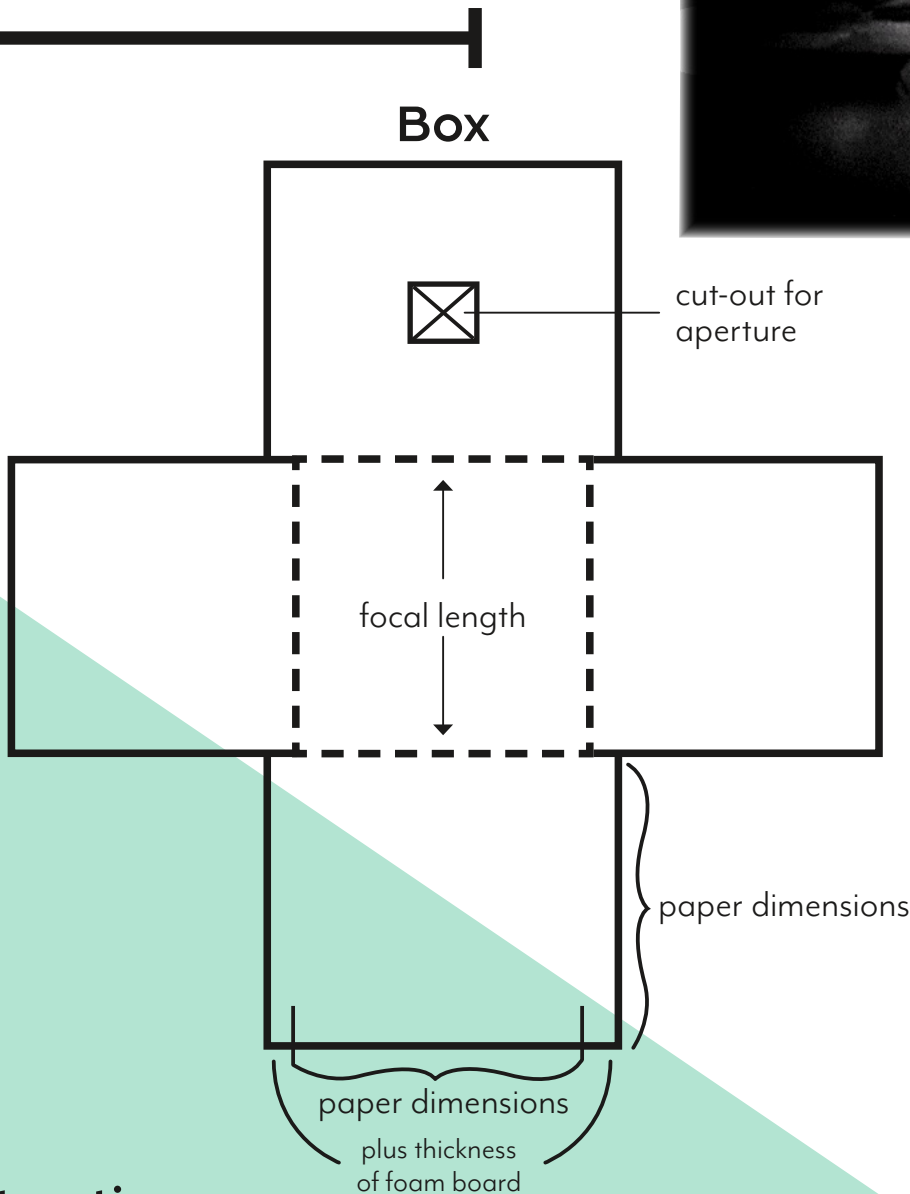
- Build a pinhole camera from scratch
- Learn the history and uses of optic machines in art
- Learn how light and optics work
- Learn to see a composition
- See how perspective works in nature and how to render it in art

Knowledge and skills

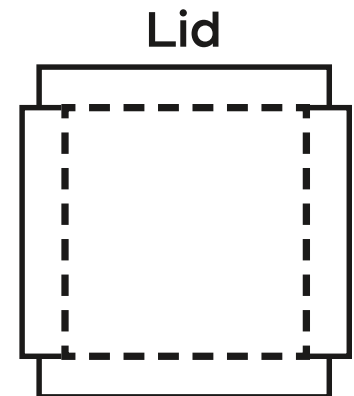
1. Perception. The student develops and organizes ideas from the environment.
 - a. Illustrate ideas for artworks from direct observation.
2. Creative expression/performance. The student expresses ideas through original artworks, using a variety of media with appropriate skill.
 - a. Create artworks based on direct observations, personal experience, and imagination.
 - b. Demonstrate effective use of art media and tools in drawings and photography.
3. Historical/cultural heritage. The student demonstrates an understanding of art history and culture as records of human achievement.
 - a. Analyze selected artworks to determine cultural contexts.
4. Response/evaluation. The student makes informed judgments about personal artworks and the artworks of others.
 - a. Analyze original artworks.

Introduction

If the room allows, build it into a camera obscura. If there is a window, block it with cardboard, heavy black paper, or whatever you can find that will block out the light. In one area, cut out a hole so light can pass through. Then place a painted or black-taped CD over the hole, or whatever else you may want to use, as an aperture. Use the room-sized camera obscura to demonstrate what happens in the camera body. Discuss the history of optics in art from Renaissance to today's cameras and scanners as tools in art.



--- score line
— cut line



Instructions

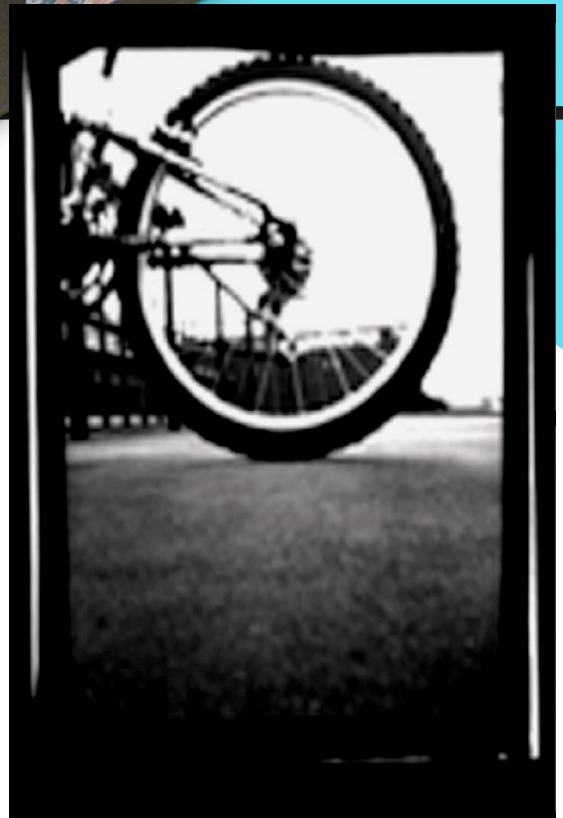
Demonstrate how to make the pinhole camera, and give different examples of how to make the body. Distribute the supplies and have students spend 1-2 days measuring and laying out the camera on foam board. This illustration is for a rectangular box, but the camera can take on a variety of shapes and sizes.

1. Cut out and score the body as shown in the illustration. Fold on the scored lines.
2. Cut a hole in one side of the body for the aperture as shown in the illustration.
3. Have students tape joints with black duct tape or another black tape that blocks out light.
4. Make the lid in the same fashion as the body. Be sure to measure the body accurately for the lid's dimensions.

5. Cut a piece of aluminum into a square big enough to cover the hole cut out of one side of the camera body. Drill a small pinhole in the center of the aluminum. Sand the hole smooth with fine-grit sandpaper. Make sure the hole is a pinhole. You can always make it larger if exposure is too long.
6. Tape the aluminum over the center of the cutout on the camera body.
7. Place a piece of duct tape over the pinhole as your shutter.
8. Have students spend 1 to 2 days decorating their cameras.



9. Place the camera on a light table or window and look into it to see if any light is coming through. Test to see if the lid is tight on the body.
10. Test all the cameras for light leaks by taking them in a darkroom, placing a piece of photo paper on the back of each camera, and taking them outside. DO NOT open or remove the tape.
11. Develop the paper. If it is white, the camera is good to go. If it is black, the camera is leaking too much light. Go back and make sure the lid fits and that there are no corners leaking.
12. When the camera is light-tight, place another piece of photo paper in the back, close the lid, and take it outside to get a picture. Open the shutter (tape) for around 8 seconds and then place the tape back over the hole.
13. Develop the photo paper and see how the picture looks. If it's too light, add more time to exposure. If it's too dark, do a shorter exposure. Typical exposure in full sun is 8–15 seconds, depending on focal length. Longer cameras require longer exposures.



Advanced, adaptations, modifications

- **Advanced:** Students may try double exposure. Students may also experiment with different cameras, like oatmeal cans, etc.
- **Adaptation:** Material used to create cameras can be changed; however, the assessment criteria remain the same.
- **Modification:** The material used to create the cameras can be changed to an alternate material that is easier to manipulate, such as an oatmeal can, coffee tin, or anything that can be made light-tight. Assessment criteria are modified according to the ability of the student.

Assessment

- Daily grade – working on cameras
- Major grade – completed camera and successful photo
 1. Correctly measured lines to create camera.
 2. Light-tight camera.
 3. Creative design on outside of camera body.
 4. Correct exposure.
 5. Interesting composition.



Materials list

- X-ACTO™ Knives (9701147), X-ACTO Blades (1100589)
- Dixon® No. 2 Pencils, Pkg. of 144 (9733471) or Pkg. of 12 (9718707)
- Foam board, black on black, 20" x 30" x 3/16" (9715347)
- Duck® Black Duct Tape [9730034 (J)]
- Sandpaper, fine-grit [9714789(A)]
- Dahle® Blue Self-Healing Cutting Mat, 9" x 12" (9721524)
- Yardstick, 36" (9704372)

The following should be brought in by students (*) or purchased from a photography supplier:

- | | | |
|---------------|---------|-----------------|
| • Developer | • Fixer | • Water |
| • Photo paper | • CD* | • Aluminum can* |



Resources

- Renner, Eric. Pinhole Photography: Rediscovering a Historic Technique. Woburn, MA. Focal Press, 2000.
- Student photos
- Teacher examples
- Room-sized camera obscura

Vocabulary

- | | |
|---------------------|---------------|
| • Camera obscura | • Composition |
| • Value | • Perspective |
| • Negative/positive | • Proportion |
| • Rule of thirds | |