



Royal Academy
of Engineering

THIS IS
ENGINEERING

ENGINEERING IN THE MOVIES PINHOLE PHOTOGRAPHY

STEM

Science, Technology, Engineering and Maths Focus



INTRODUCTION

Before there were moving pictures, there were still pictures. The camera obscura, or pinhole camera as it is often referred to, was one of the earliest methods of capturing an image.

As the name suggests, it is a light-proof box with a small hole in one side. Light from a scene passes through the aperture and projects an inverted image onto the opposite side of the box. This is known as the camera obscura effect. In this challenge, you will build your own pinhole camera, take a picture and develop it – just as Thomas Edison did in 1887.

CHALLENGE

-  Teams of four
-  480 minutes
-  KS3
-  Expert



Science History Images / Alamy Stock Photo

OVERVIEW

Build your own pinhole camera and start creating your own photographs.

THE CHALLENGE

Did you know that you can make a working camera out of some basic materials and equipment?

While it seems complex, cameras are just dark boxes with a small hole for transferring light from an outside subject to a light-sensitive material. Follow the step-by-step guide to make your own pinhole camera and go back to the time when still photography was first invented.

MATERIALS

WHAT YOU WILL NEED TO CONSTRUCT YOUR CAMERA

- Shoebox or materials to build your own box
- Aluminium drink can
- Photo sensitive paper
- Black duct tape
- Black paper
- Black paint and brush
- Red translucent acetate

CONSTRUCTION STAGE

1. Start by building the body. The simplest way to do this is by using an already constructed box, such as a shoebox, and painting the inside and outside black. This is very important as the image may not capture otherwise.

If you like a challenge and a sturdier camera, then try constructing your own box from a more durable material such as MDF (medium density fibreboard). Either way, make sure that no light can get into the box.
2. Cut a 1x1 centimetre hole into the bottom of the box.
3. Cut a 4x4 centimetre piece of aluminium from a drink can and push the drawing pin (or needle) through the centre to create a pin hole.
4. Place the aluminium plate over the hole on the inside of the box. Secure with duct tape but do not cover the hole.
5. Use the duct tape to make a cover for the pinhole.



TOOLS

- Cutting knife
- Ruler
- Scissors
- Drawing pin
- Torch

DO THIS NEXT BIT IN THE DARKROOM

Loading photographic paper into the camera requires specific lighting conditions. Do this in a darkened room under safe light. Safe light is created by securing the red translucent acetate sheet over a torch. Use this to see in the darkroom as the paper is not sensitive to this type of light.

6. Use duct tape to attach the photo sensitive paper to the inside of the lid, emulsion side up and put the lid on the box to close your pinhole camera.
7. You are ready to take your picture. To do this, place the camera on a flat surface and take off the tape cover for 30 seconds to expose the photographic paper to the light.
8. Now you are ready to develop your picture.



DEVELOPING STAGE

Developing your own photos will require a darkroom and several chemicals and solutions. These have been supplied in the resource box.

Your darkroom must be completely black except for the safe light.

1. Film developing uses three solutions: developer, stop bath (water) and fixer. You will also need three plastic dish washing tubs. Fill one with two inches of developer, the second with two inches of water to stop the developing process and the third with fixer solution.
2. Take the film or photo paper out of the camera. Only do so once you are in a darkroom lit only by a safelight. White light will destroy your photo.
3. Place your photo paper into the developer using a pair of tongs. Watch as the image appears on the paper. Take the image out of the solution using tongs as soon as it is as dark as you want it to be.

Keep in mind that the image will appear a bit darker in white light once you are outside of the darkroom.
4. Transfer the photo paper to the stop bath for about 10 seconds, gently rocking the tray back and forth to spread the water over the photo paper. The stop bath should consist of room temperature water.
5. Using tongs, place the photo paper in the fixer for two minutes.
6. Remove the photo and rinse over running water for two minutes. Allow the photo to hang dry completely or dry with a hair dryer before taking it out of the darkroom to see what you have photographed.

MATERIALS

WHAT YOU WILL NEED TO DEVELOP YOUR PHOTO

- Developing solution
- Fixing solution
- 3 plastic dishes

TOOLS

- Pair of tongs
- Rubber gloves





Royal Academy of Engineering

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