From pinhole to print

Inspiration, instructions and insights in less than an hour

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Why pinhole?

One of the best things about pinhole photography is its simplicity. Almost any container that can be made 'light-tight' can be turned into a pinhole camera.

Building your own camera is not only a great way to learn the true basics of photography, it is also incredibly fun to create something from scratch, that can take a photo. The world may be going digital, and it is fun and spontaneous to take a picture with your phone, but there is a mystery in taking a photograph with a pinhole camera, and a thrill in developing your own print in the darkroom.

Depth of field

Pinhole photographs have many interesting qualities, including a virtually infinite depth of field. This means that everything in the image, no matter how close or distant, lies in the same focal plane.

If you place an apple in the foreground and a tree stands far away in the background, then both the apple and the tree will be in focus. With an ordinary camera, either the apple or the tree would be in focus, not both. This 'infinite look' is quite unique to pinhole cameras, and can help you create very startling images.

Long exposure times

It may be possible to adjust your ordinary camera to have long or short exposure times, but long exposure times are part and parcel of pinholing.

Exposure times can range from several seconds to several minutes. Taking advantage of this time allows you to produce a multitude of blur effects as the subjects of your photographs move, or as you move the camera.

Timeless quality

Pinholes have a 'timeless' quality, that makes you want to release your creative potential. It is sometimes hard to tell whether the image was taken yesterday or a hundred years ago. Imperfections such as reflections and light leaks become values in a pinhole image. Pinhole cameras simply see the world differently from the way our eyes see it.

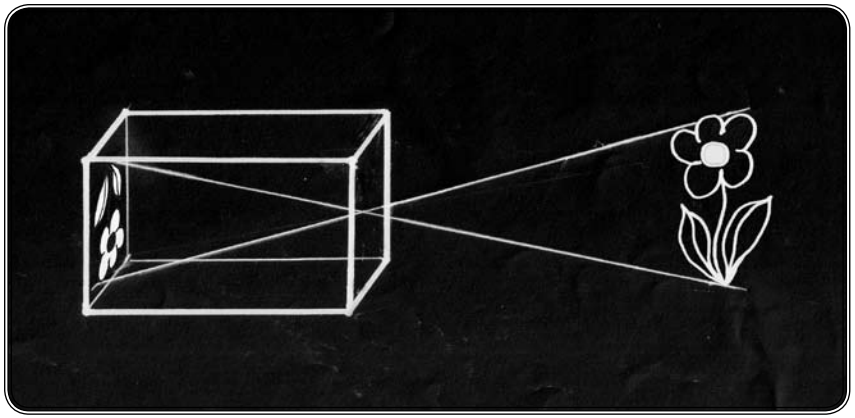
Limitations lead to freedom

At first glance the pinhole camera may seem too simple to offer versatility to an experienced photographer. But, as is often the case, limitations release creativity.

How a pinhole camera works

One thing that inspires many pinhole photographers is the craft of building their own cameras. Finding new materials or a perfect box can be like uncovering a hidden treasure.

The pinhole camera is amazing in its simplicity. It is, in its most basic form, a light proof container with light sensitive material at one end and a pinhole at the other.



Pinhole cameras are characterized by the fact that they do not have a lens. If a camera has a lens, it is NOT a pinhole camera.

When the shutter is opened, light shines through to imprint an image on photographic paper or film placed at the back of the camera.

Pinhole cameras rely on the fact that light travels in straight lines – a principle called the *rectilinear theory of light*. This makes the image appear upside down in the camera.

If the dimensions of your camera and the size of your pinhole are correct you can take a photograph that will compete on a technical level with a photograph from your digital SLR camera.

A small pinhole generally produces sharper images than a larger one. However, if the pinhole is too small, light waves may be scattered slightly at the edges of the pinhole and cause distortion or loss of focus.

Smaller holes also increase exposure times, since they will let less light into the camera.

Make a pinhole camera – from a can

A PINHOLE CAMERA can be made out of almost anything that you can make light tight. Cans, cookie jars and boxes have perfect pinhole potential. But other, more unusual items like a walnut, a red pepper and even someone's mouth have been transformed into pinhole cameras.

The most important feature is that it is possible to make the camera light tight. If you want to use a box, pick a sturdy one with a tight top. If you use a can, try finding one with an opaque lid, or take steps to make the lid light proof. Using a square container will give you a flat film plane, a curved one will result in a bent film plane. Creating your own camera will be a lot more fun if you start with a good container.

Let's make a simple pinhole camera starting with a can. Search your cupboards, you will most likely have one at home already.

Materials list

Need to have - without these it will be hard to make a camera:

- Can or box
- Scissors and a hobby knife
- Ruler
- Flat black paint & brushes, paint in a spray can, or black paper
- Black tape (preferably photographic tape, lots of it!)
- Glue
- Thin metal, like an aluminium can
- Fine sandpaper or abrasive cloth
- Thin needles
- Cork or eraser to hold needle
- Photo paper, RC paper

Nice to have - extra bits that will make life easier:

- Scanner, projector or micrometer for measuring needles and holes
- Backing paper from 120-film, great for covering light leaks
- Light meter, for determining the right exposure time
- Darkroom bag, or light proof bags for changing paper outside the darkroom

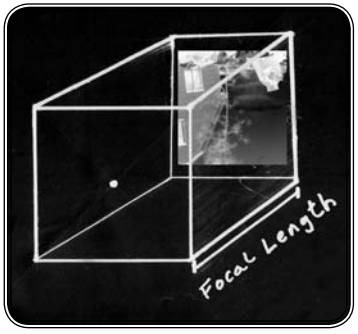
Taking the picture

Your camera is ready, loaded with photographic paper and you have found the perfect scene. You have got a light tight shutter, but how long do you open it?

There is a perfect exposure time and it depends on your camera, the film you are using, the size of your pinhole and the amount of light available. If you don't expose it long enough your negative will be too light and if you leave it too long your negative will turn too dark.

There are two basic methods you can use to determine exposure – use a light meter and do a calculation, or test your way to good results. You will find that it is probably the latter or a combination of these two that will work for you.

Keep notes of your exposure times and the results you get. Learn from your experiences.



The focal length of your pinhole camera is the distance between the pinhole and the paper or film you have loaded the camera with.

Doing the math

$$\frac{\text{focal length}}{\text{diameter of pinhole}} = \text{f-stop}$$

F-stops

If you know the size of the pinhole and the focal length you can work out the f-stop of your camera. The f-stop will help you work out the right exposure time.

The formula for calculating the f-stop of your camera is the focal length divided by the size of diameter of the pinhole.

F-stops have a 'standard sequence'. If you have an ordinary camera, you can see the f-numbers on the lens.

The f-stop sequence

Ordinary lenses rarely go beyond f/22. The sequence is:

f/16	f/180
f/22	f/256
f/32	f/360
f/45	f/512
f/64	f/720
f/90	f/1024
f/128	

Setting up a darkroom

The skills needed to develop a photograph are easy to learn. And you don't need a lot of equipment to create your own darkroom.

Any room that can be made light tight, such as a bathroom or cupboard, can be used as a darkroom. It is ideal to have a sink with running water, but not essential. Final washing can be done in daylight.



From pinhole to print will guide you from drilling your first pinhole to printing your first pinhole photograph. It is an easy to read, step-by-step guide to making a pinhole camera and creating images.

Today – when most cameras are brimming with digital functionality – many seek relief in the simplicity of a basic pinhole camera. Pinholing is a very pure form of photography.

The pinhole camera that you will build is simple, but pinholing has few limitations.

Pinholing is a fantastic way to discover photography. Building the camera, loading the paper and taking a first picture gives the beginner an understanding of the basic skills used in photography. Developing your first print can be a thrilling experience.

The artists' gallery will inspire you to experiment and see how you can take your pinholing further. Once you get started you may even become a dedicated pinhead!

"From pinhole to print is an excellent book. Short, succinct and yet filled with all the information that the beginning pinhole photographer needs to know to get started."- Tom Miller, Coordinating Team Leader, Worldwide Pinhole Photography Day, and pinhole photographer

"A quick read and perfect for teaching the wonders of pinhole to any age from grade schoolers to college students and beyond. It is an excellent resource for the photographic library as well as a good text for teaching the process." - Christina Z. Anderson, Author, and Assistant Professor, Montana State University

"Written in clear, direct language, and illustrated with drawings, diagrams and photographs that speak volumes. If you are the least bit intrigued by pinhole photography, you'll find this little book an indispensable aid." - Anthony Mournian, The Photographers' Formulary

"A well-designed, inviting introduction to pinhole photography. If I were learning pinhole photography I'd have this slender manual on my person at all times." - Sarah Van Keuren, Adjunct Professor, University of the Arts, Philadelphia, PA

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