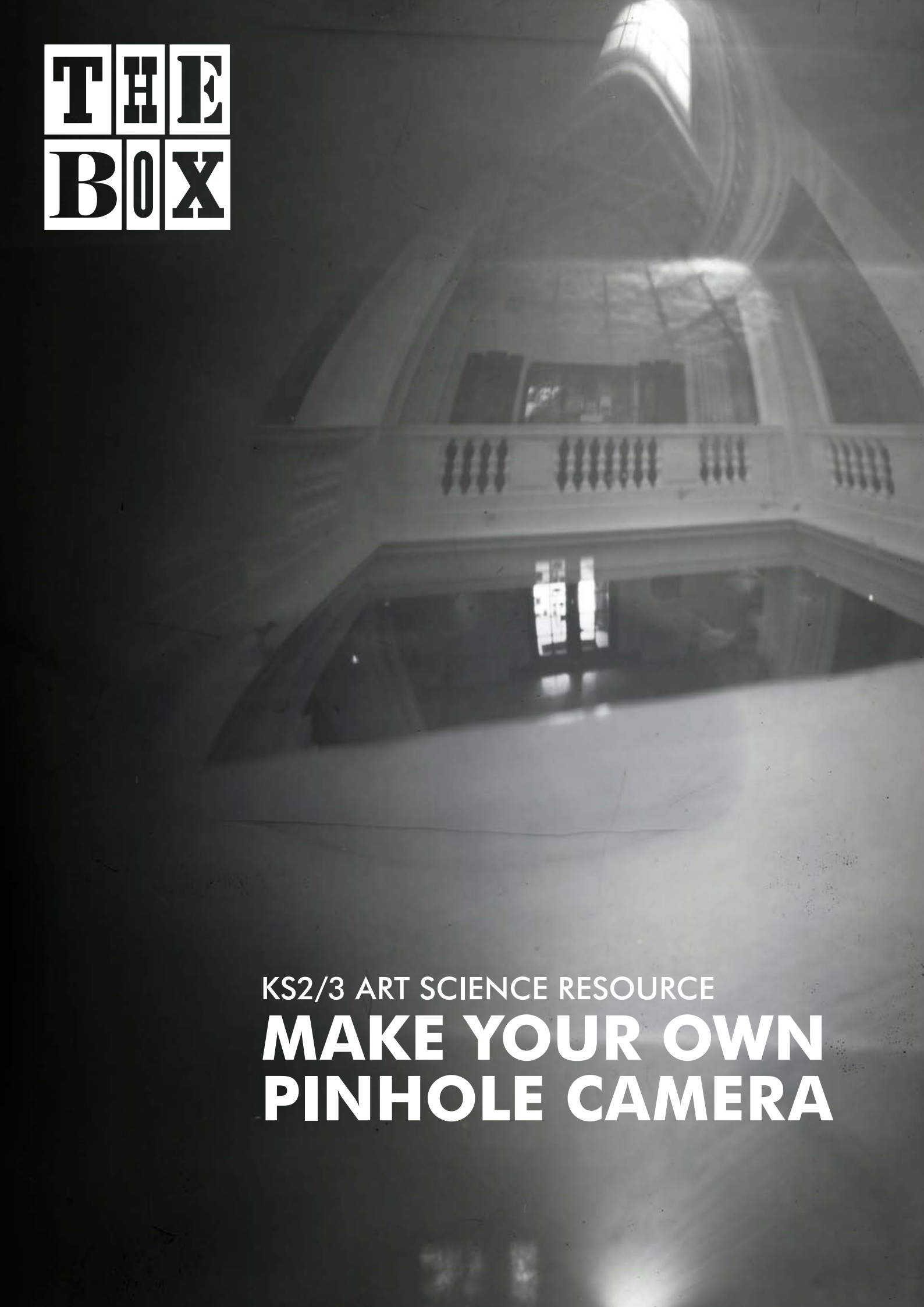
THE BOX



KS2/3 ART SCIENCE RESOURCE

MAKE YOUR OWN PINHOLE CAMERA

INTRODUCTION

Photography is everywhere – magazines, gift cards, mugs, key rings, books, school pictures – and we're very used to seeing photographic reproductions everywhere we look. We're used to the instant results of digital cameras, whether they are fancy digital SLR's, easy to use 'point-and-clicks', or even those on our mobile phones or tablets. This technology means that we can instantly see the photos we have taken.

Before this technology was developed, there were a number of different ways of making photographic images. The most widespread technology from the last hundred years is that of photographic film, basically a sheet of plastic covered in a light sensitive emulsion covering that when exposed to light through a lens, can create a negative image on it's surface.

Very early photography was discovered by scientists. Joseph Nicéphore Niépce, created the first recognised photographic image, which took around 8 hours to expose. Louis Daguerre, who created the daguerreotype process of photography, was in competition with William Fox Talbot, who was creating the calotype process of photography at the same time. Most of these early processes needed to use a number of different chemicals to create the image, with silver iodine being the most common.

Photography as we know it today is a development of these early processes. It still relies on light and lenses, though photographic film is now being used less and less. Digital photography uses the lens of a camera to focus on light sensitive sensors, from which an image can be formed.

WHAT IS A PINHOLE CAMERA?

A pinhole camera is a very simple type of camera without a lens. It uses a small aperture (hole) to capture an image onto either a piece of photographic paper, or photographic film. The small pinhole lets light into a very dark box, which is then projected onto the surface of the inside of the box, on which you can add your paper or film to capture the image.

Pinhole cameras are very similar to something called a camera obscura, which is essentially a pinhole camera that isn't used to capture an image on paper or film. Artists have used camera obscuras for hundreds of years as a helpful tool when creating drawings.

The best thing about pinhole cameras is that they can be made out of almost anything that has a hollow inside – cardboard boxes, biscuit tins, aluminium drinks cans, rubbish bins – even camper vans!

After trying this resource for a cardboard box, do try and make a drinks or paint can camera - have a look at the front cover for the kind of photo you can take. **Awesome!**

WHAT DO WE NEED TO MAKE A PINHOLE CAMERA?

We're going to make a cardboard box pinhole camera. Once you've mastered the basics of building a camera, you can experiment with other shapes. The first thing you'll need is some **help from an adult**. There is some cutting, sanding and piercing to do – all of which could add up to a nasty accident.

Once you've asked for some help, you'll need to get these things:

- A cardboard box
- An aluminium drinks can
- Duct tape (or electrical tape) – black if possible
- Dark poster paint or acrylic paint – not gloss
- A craft knife
- Some spare cardboard/ cutting mat
- A ruler and pen/ pencil
- Scissors
- Fine sandpaper
- A pin or very small needle
- Black and white photographic paper
- A very dark room (with a red light if possible)
- Developing chemicals
- A scanner and photo editing software (not essential)

The most expensive thing to buy from this list will most probably be the photographic paper. Please don't buy photographic printer paper, as this does not have a coating of the photo emulsion needed to create an image.

Try a Google search for Ilford photographic paper. You should be able to find some black and white paper quite easily.

STEP 1:
BIG FISH, LITTLE FISH, CARDBOARD BOX

To make it easier for yourself, try and find a box with a side that will fit one full sheet of photographic paper.

It might be easier to find a slightly larger box and cut it down to fit your paper, rather than cut your paper to fit into a smaller box.

The size of your paper will be printed on its box – don't take the paper out of its box and expose it to light – it will ruin the paper, and you'll need to buy some more.

STEP 2:
BRUSHING UP ON YOUR SKILLS

Although you don't really need to do this, it is a good idea to paint the inside of your box with a dark colour. Try not to use any shiny paint – we want to stop any light that may creep in from small holes from bouncing around inside our camera. The only light we want to allow inside our camera is through the pinhole itself.

STEP 3:
PINNING OUR HOPES ON ALUMINIUM

At this stage, you'll need help from an **adult**. You need to cut a square-ish piece of aluminium from your drinks can – 5cm x 5cm should do it. Using the craft knife, take the top and bottom off the can and flatten it out onto either a pile of spare cardboard, or a cutting mat if you have one.

Cut the square from this flattened can, remembering all the time that the edges will be very sharp. Use the fine sandpaper to sand off any rough parts and the sharp corners.

Now you need to find the centre of the aluminium square. Use a ruler and pen to draw two diagonal lines from corner to corner – this should give you the centre point. Ask your adult to pierce a very small pinhole through the aluminium. It is always better to make a smaller hole at this stage, so if need be it can be made bigger later on. Where the pin has gone through the metal it will leave a raised edge inside, so sand that off too.

Phew – that's the hardest part over and done with!

STEP 4: HOLEY MOLEY!

We now need to attach our square of metal to our cardboard box. First of all, work out which wall of the box will be directly opposite the wall where your paper will be sitting. Once you've done that, draw two diagonal lines from corner to corner across the outside of the box. This will give you the exact middle point. You can either draw a square around that middle point that is smaller than your piece of metal, or draw around a 2p coin – the smaller the better. Ask your adult to cut the hole out of the box using your craft knife.

Once that has been cut out, we need to attach the aluminium square to the box. A very sensible tip is to place your aluminium square over the hole you have just cut, so that the pinhole lines up with the centre of the hole (as near to the centre as possible anyway). Draw around the square, remove it, and then stick strips of your duct or electrical tape to the box over the lines. Try and cover a slightly larger area than your metal square with the tape.

Now place the aluminium square back onto the box, lining up the pinhole with the centre of the hole, and stick down the edges with more duct tape. If you need to replace your pinhole in the future, this now means you don't need to rip the box apart.

STEP 5:
TAPE TO TAPE

Next step is to tape your box together. Close your box – if you think any of the flaps may hang down inside the box, remove them now, just leaving two so that the box can be closed. Tape around each join so that the box is sealed - pay special attention to the corners of your box.

We are going to cut a new access door into your box in a moment. Also, make a tape shutter to go over your pinhole. Stick a short strip of tape over the pinhole, and fold over one edge so that you can pull it back to expose the pinhole easily.

STEP 6:
THERE'S SOMEBODY AT THE DOOR

You need **help from an adult** for this part. We need to cut a door in the side of your box to get the photographic paper in and out. Hold the box with the pinhole facing away from you. You need to cut a door into the right- hand wall of the box. Using a ruler and pen, draw a rectangle towards the back of the box that will be around 10cm wide, and around 4cm from any edge. Stick some tape over these lines, and then redraw the rectangle over the top. Ask your adult to cut three sides only, leaving an uncut edge towards the back of the box. This will hinge so you can open and close the door to get your paper inside.

STEP 7:
READY, STEADY, SHOOT!

If you have access to a darkroom with red light – that's brilliant. If not, find a very dark room that you can use. You need help from an adult for this part. Open the door on your box, and place a sheet of the photographic paper inside the box. Stick it down with some blue tack or rolled over tape. Make sure the paper has the side covered in the photographic emulsion facing the pinhole. Tape the cut sides of the door shut with your duct tape. Do not open the shutter on your pinhole at this stage.

Pinhole cameras take a lot longer to expose a photograph on the paper than standard cameras. There will always be a little trial and error involved in these photos – that's what makes it so interesting.

Place the camera on a steady surface, and place something like a heavy book on top to steady the camera. Open the shutter for the length of time you've calculated using the guide, and then close the shutter again.

STEP 8:
IN REVERSE

Your photo is now ready to develop. You need help from and adult for this part. There are chemicals involved in this process, so it's really important that you don't try this on your own. Click here for a really **handy guide on developing** pinhole photographs.

Your photographs will be reversed on the paper, so either you can print from a paper negative as described on that website, or reverse the image using image software on your computer.

Either way, once you've developed the image and then placed it in a stop bath – you've made a photograph!

TEACHER AMBASSADORS

The Learning and Engagement Team at The Box, Plymouth are busy preparing a brand new schools service ready for when we open in 2020, and we'd love you to be involved. We're working to develop three main strands of our new service:

- A set of curriculum-linked **facilitated sessions** for all key stages, that use our new galleries to explore history, science and art topics
- Brand new **online resources** – including games, quizzes, films and activity ideas
- A set of **loan boxes** of artefacts and resources that you can use in your classroom

We want to ensure that this new schools service meets your needs as a teacher, so we are setting up a consultant group of Teacher Ambassadors for The Box.

Being a Teacher Ambassador will support your professional development through the chance to develop new skills in how to use objects to enhance curriculum learning, and you will also be proud in the knowledge that you've made a real difference to how school students experience The Box when it opens in 2020.

If you'd like to become one of our Ambassadors, please email:

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theboxplymouth.com

PLYMOUTH CITY COUNCIL

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