

# Lens based camera obscuras

Camera obscuras made with a hole create an image which is quite dim. Lens based obscuras give a far brighter image enabling them to be used indoors and out.

The following obscuras are designed around the focal length of an inexpensive lens. The focal length being the distance a lens focusses at infinity.

There are two lens based obscuras I regularly use in the classroom. The hand held cereal box (Actual Reality Obscura) and the Room Obscura. Many other designs can be [found here](#)

## Hand held cereal box obscura (Actual Reality Obscura)

Outdoor and Indoor, Age - 8-16. Cost per student in £- 1.00

Curriculum areas – Science, Optics, Biology, Art, History

[Worksheet and video here](#)

The hand held cereal box obscura can be made for virtually nothing and shows how lenses focus an inverted image. With sufficient resources and preparation every student can make their own and take it home. One drawback, apart from having to find a lens for each student, is the need to store 60 cereal boxes in your shed! (Get them to bring two boxes in during the previous week).



Many glass magnifying lenses work well, however they can be a bit pricey. Cheap plastic 'Fresnel' wallet magnifiers are good quality, cost around 30p each and can be reused. They also give you the chance of going on and on about lighthouses (look it up). If they don't focus close enough, you can use one lens in front of the other.



Many other lens based obscura designs make use of cheap lenses obtained from dismantling budget reading glasses.

These obscuras can also be part of cross curriculum projects incorporating: Art, Design and Technology, Recycling, Science, (even PE!) Below are some examples from the very wonderful Trinity Catholic High School in Essex.



Crocodile



Penguin



Pig



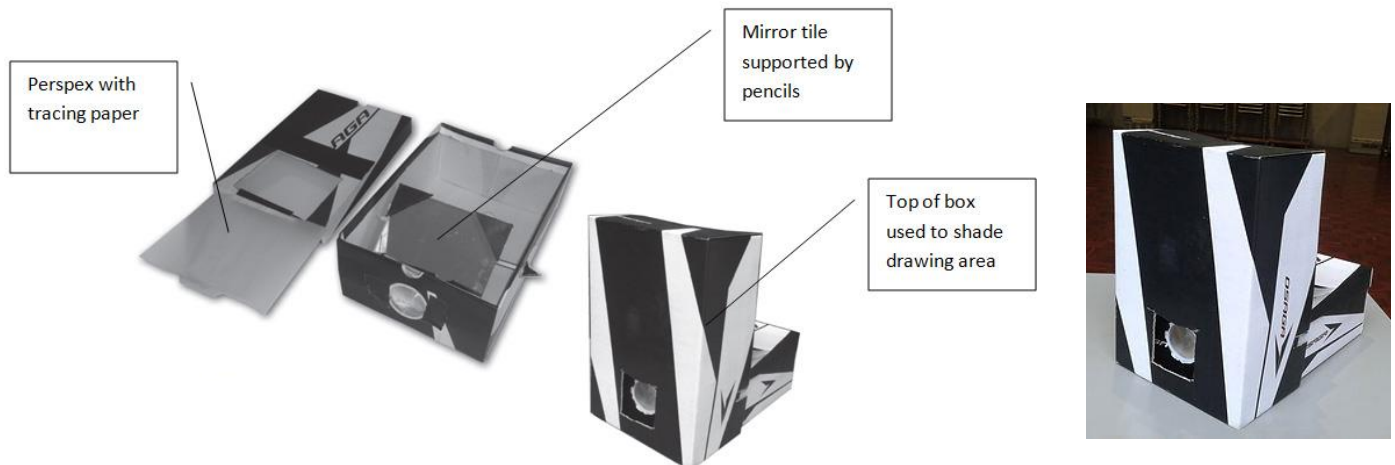
Spongebob

## Drawing obscura

Outdoor and Indoor, Age - 11-16. Cost per student in £– 2.00

Curriculum areas – Science, Optics, Biology, Art, History,

This obscura is a bit more complex but makes a good art project. It is constructed from a shoe box, a small mirror and a strong magnifying glass. A 3.5 dioptre reading glass is good and will focus infinity at around 27cm



The lens can be positioned on the end of a toilet roll or Pringles tube which will enable it to be accurately focussed.

## The Room Obscura

Indoor, Age - 4-16. Cost per student in £– 0.50

Curriculum areas – Science, Optics, Biology, Art, History,

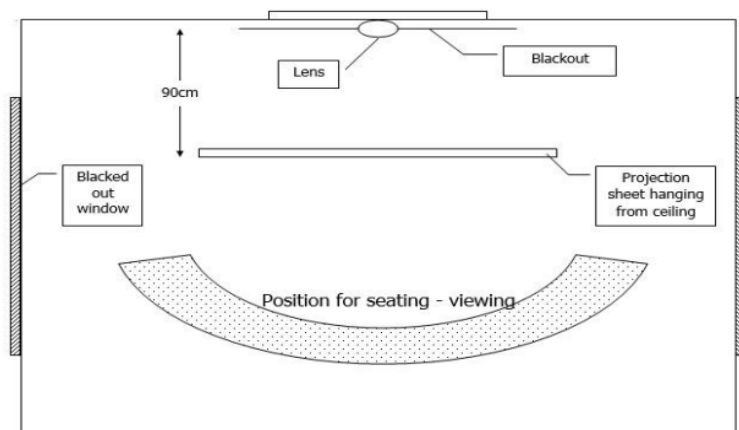
Something every science, art class needs to create! Once you have a dark space you can experiment with light, not only with a lens but also with holes etc. [Full instructions here](#)

You will need:

- Blackout material (silver foil) See [blackout instructions here](#):
- A cheap (Tesco's) shower curtain
- A +1 dioptre lens.



## Plan View of lens room obscura set up.



## Adjusting a hand held obscura to become a digital projector.

The screen of the hand held obscura can focus on a subject a few feet away. Amazingly, this can be inverted to project rather than view an image. It doesn't work very well and needs complete darkness but it helps to teach about lenses and focussing as well as giving the opportunity for using a phone in class!



1. Make a Hand held obscura out of a couple of cereal boxes (see instructions above)
2. Cut a phone sized slot in front of the screen.
3. Go to 'settings' and disable 'auto- rotate screen'.
4. Set up your phone to show a video or photos on 'slide show' mode.
5. Position the phone in the slot upside down (the image is inverted).
6. Point the projector a few feet away from a white sheet of paper till you get a 'sharp' image.

Whilst it may not cope with family games of Grand Theft Auto, it's a fun way to merge 2500 years of technology whilst whiling away rainy nights under canvas, camping far from an electrical socket!

