

## Camera obscura

General information			
Respective blueprint	Camera obscura		
Description	In this lesson, pupils will build a camera obscura. Students will discover how it works and the historical background of its invention.		
Learning objectives	At the end of this sequence, pupils will be able to : <ul style="list-style-type: none"> <li>• Explain how a camera obscura works and how rays of light propagate.</li> <li>• Put the invention and development of the camera obscura into historical context.</li> </ul>		
Related curricular subjects	Mathematics – Sciences – History - Art		
Duration	3h		
Level of difficulty	Basic	Medium	Advanced
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Inclusivity guidelines			
How to integrate students with SLD	<ul style="list-style-type: none"> <li>• Formulate short, simple instructions that only require one action at a time. For example, cover the window with tracing paper.</li> <li>• When you give instructions (written), make sure to highlight the word of action so pupils know what they are expected to do → In this example, cover the window with tracing paper.</li> <li>• Here, it's really important to show the expected result of the manipulation.</li> <li>• When creating groups, try to place students who are having difficulties with students who are generally more advanced so that they can help each other (a dyspraxic student will have a lot of difficulty with cutting tasks).</li> </ul>		
How to integrate students who work faster	Ask students to research the different types of cameras used throughout history and place them in a timeline. They can present their findings to the class orally or with a poster.		

## Step-by-step description of the lesson

### Step 1: Introduction to photography

Estimated time: 1 hour

- **Group discussion – 15 min**

Start by asking the students when the last time they took a photo was, what they took a photo of and how they took it (phone, camera).

Start a conversation about why photos are important. What are they used for?

- **First activity – 20 min**

Form groups of 2 pupils and give them a document (pages 7-8) of old and recent photos. Ask them to find the differences and/or similarities.

- **History of photography - 25 minutes**

Certain processes useful to photography, such as the camera obscura, were already known to Aristotle (384-322 BC) 300 years BC. The work of the father of modern optics, Ibn al-Haytham (965-1038), contributed to the development of the first dark box. Leonardo da Vinci himself mentions this process. It was during the Renaissance that Italian painters began to use the camera obscura and discovered perspective.

#### **Disadvantage of the camera obscura :**

The main disadvantage of the pinhole camera is its lack of brightness. The hole through which the light passes must be very small for the image to be clear. However, the smaller the hole, the darker and less visible the image.

In the **16th century**, the image's sharpness improved with the lens's introduction. A glass lens, which could focus light rays, improved the pinhole's performance: as the diameter of the aperture was larger, more light was admitted and the image was clearer. Many artists used this accessory to render the perspective of scale more accurately.

It was not until the 19th century that obtaining a lasting image of support was possible. The first photograph was taken in 1816 by Nicéphore Niépce in France.

In **1839**, a Frenchman, Louis Daguerre, invented the first "camera" (a darkroom mounted on a tripod), the daguerreotype, a revolution. In March **1840**, John William Draper produced the first clear daguerreotype of the Moon.

**Disadvantage of the daguerreotype:**

The camera had to be left for at least 30 minutes (without moving and in clear weather), so portraits were not yet possible, and the photo could only exist in a single copy.

In **1884**, George Eastman developed flexible, sensitive surfaces, enabling several images to be stored in the camera, replacing the glass plate.

The **Kodak** was the first camera made by the Eastman company that could record around a hundred images on a flexible medium.

It was not until **1903** that **colour photography** appeared, thanks to the Lumière brothers.

The **21st century** saw the advent of **digital photography**. Digital photography offers infinite possibilities, including retouching, colour, black and white, videography, small cameras, lower costs and larger quantities of images.

- You can place the major events in the development of the photo on a timeline.

**Step 2: Construction of a camera obscura**

**Estimated time: 1 hour**

- **Preparation – 5 min**

Form groups of 2-3 students and distribute the materials and construction plan.

- **Construction – 50 min**

The pupils follow the construction plan, with the teacher moving between the different groups to help the pupils if necessary.

- **Testing – 5 min**

When the construction is complete, the pupils can stand near a window (in a brightly lit area) to see the inverted image in their camera obscura.

Step 3: How the camera obscura works

Estimated time: 30 min

- **Hypotheses – 15 min**

Ask the pupils to draw a diagram of what they have seen and how the camera obscura works (page 8).

Let the pupils make their hypotheses.

- **Explanation – 15 min**

The small hole concentrates the rays of light, and as the light propagates only in a straight line, the image appears on the support in reverse.

If the hole is large, the image will be blurred, but if the hole is too small, the image will be very dark.

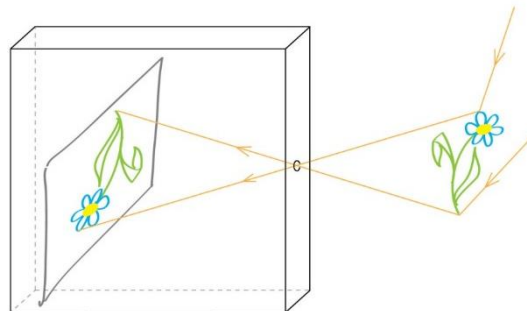


Figure 1 Alexis. (s. d.). Le sténopé, comment ça marche ? Consulté 23 août 2023, à l'adresse <https://www.la-photo-argentique.com/le-stenope-comment-ca-marche/>

Step 4: Extension

Estimated time: 2h +

- **The different camera parts – 30 min**

Show a camera (or an image of one) and explain its main parts: the lens, the shutter and the sensor.

Divide the students into small groups and give them drawings or diagrams of cameras. Ask them to identify the different parts of the camera.

- **Make a connection with our eyes.**

This sequence on photography can be a good way to start a science sequence on vision by drawing parallels between the camera obscura and our eye.

## Assessment activities

### Activity 1: Self-assessment activity

Ask the students to self-assess their performance during the group activity using the grid on page 6.

### Activity 2: Assessment of knowledge acquired

After a long sequence (of several sessions), it may be useful to carry out a formative (or summative) assessment of the knowledge acquired. Here are some examples of questions you could ask.

1. Briefly explain why the image is reversed on the support.
2. How long has the camera obscura process been known?
3. What year did colour photography arrive?
4. Before the discovery of flexible media, on what medium were photographs "printed"?
5. List the disadvantages of the camera obscura

## Attachments

- Self-assessment grid
- Camera obscura

## References

- Histoire de la photographie. (2023). In Wikipédia.  
[https://fr.wikipedia.org/w/index.php?title=Histoire\\_de\\_la\\_photographie&oldid=206729220](https://fr.wikipedia.org/w/index.php?title=Histoire_de_la_photographie&oldid=206729220)
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# Camera obscura

## Introduction

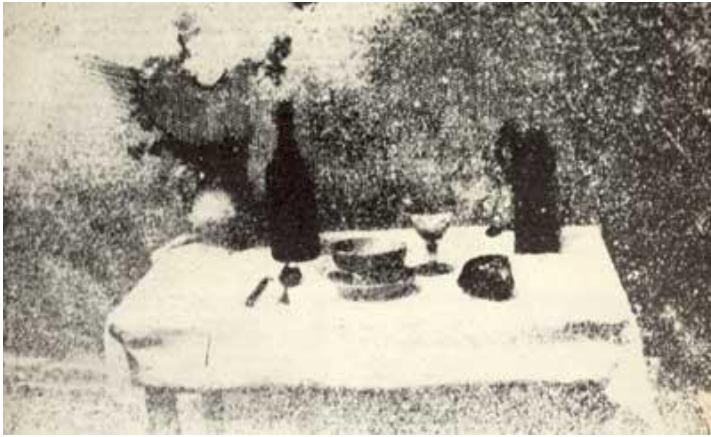


Figure 1 Niépce, J. N. (1832). Still life of a set table. Wikipedia. [https://commons.wikimedia.org/wiki/File:Niepce\\_table.jpg](https://commons.wikimedia.org/wiki/File:Niepce_table.jpg)



Figure 2 Unsplash



Figure 3 Unsplash



Figure 4 Unsplash



Figure 5 Unsplash

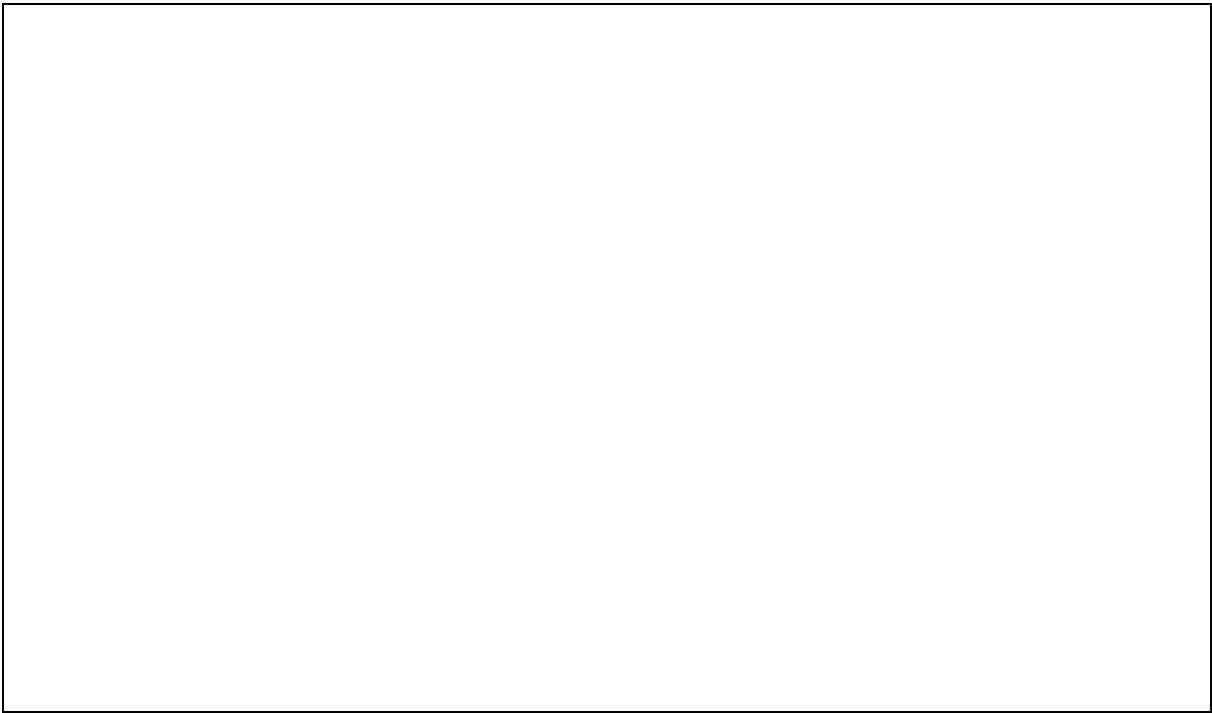


Figure 6 Unsplash

Differences	Similarities
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**Camera obscura**

Draw a diagram of a camera obscura





How do you think a camera obscura works?

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**Complete the sentences with the following words (you may have to conjugate them):**

- **Straight - dark – concentrate – reverse- blurry -**

The rays of light are .....by the small hole, and as the light propagates only in a ..... line, the image appears on the support in .....

If the hole is large, the image will be ....., but if the hole is too small, the image will be very .....



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