

## Teacher and Technician Sheet

In this practical students will:

- Carefully observe how the size of objects alters when water drops are placed over them.
- Test how altering the distance between the object and the lens changes the object's appearance.
- Using my scientific knowledge and understanding of shape of lenses, how we see objects, explain my observations of the water droplets.

### Introduction for teachers:

(This topic could start with a group discussion about magnifying glasses during which the teachers introduce the following ideas especially the words in bold.)

Small things can be **magnified** to appear larger than they really are. This can be done using a **magnifying glass**, lens or a combination of lenses in a **microscope**. A water droplet can act as a simple lens and magnify an object.

Pupils will make their own magnifiers out of a drop of water and learn how a magnifier works by exploring some properties of water, such as its ability to **bend (or refract) rays of light**, and form **spherical** droplets under **surface tension**.

Pupils can work individually then come together in groups to discuss results and ideas.

### Curriculum range:

All ages can take part in this activity since the aim is to gain some understanding of the thinking of the scientist when investigating artefacts in close detail. It links with:

- setting up simple practical enquiries, comparative and fair tests;
- reporting on findings from enquiries and observations, including oral and written explanations, displays or presentations of results and conclusions;
- using straightforward scientific evidence to answer questions or to support their findings;
- building a more systematic understanding of light by exploring and comparing the properties of light as it interacts with a transparent material;
- asking questions and developing a line of enquiry based on observations of the real world, alongside prior knowledge and experience;
- using appropriate techniques, apparatus, and materials during laboratory work, paying attention to health and safety;



- making and recording observations and measurements using a range of methods for different investigations; and evaluating the reliability of methods and suggesting possible improvements;
- presenting observations and data using appropriate methods;
- interpreting observations and identify patterns using those observations to draw conclusions;
- presenting reasoned explanations, including explaining data in relation to predictions and hypotheses; and
- learning about the concept of magnification by a lens and the way surface tension helps to form a lens.

**Hazard warnings:**

Always be careful when handling glass and sharp objects. You can get a magnification using a clear transparent plastic ruler.

It might also be prudent to remind pupils they should never look directly at the Sun (with or without a lens).

**Equipment:**

- Microscope slide or clear plastic ruler
- 1 sheet of newspaper
- 1 crayon or non-permanent marker pen
- Petroleum jelly
- 1 eyedropper or plastic pipette
- A small amount of water
- Diagram of the eye

**Technical notes:**

It might be useful to have some petroleum jelly available so the pupils can create a circle of jelly and place the water drop inside the circle. This is because sometimes the slide still has soap on it and this causes the water droplet to spread out and wet the glass surface rather than forming a spherical drop.



Magnification increases as the slide/ ruler is lifted up to a maximum of approximately 4x.

A clear plastic ruler can be substituted for a microscope slide if they aren't available.

The newspaper should have some small print text on it.

The colour of the crayon is not important.

**Results:**

The pupils should see the newsprint magnified something like 2–5x original size.

**Going further:**

As an extension activity, pupils can use their lens to examine salt, sugar, leaves, etc.

It may be easier to use a straw to place a few grains of salt or sugar onto the microscope slide or ruler. To do this, dip the end of the straw into the salt or sugar and scrape along the salt or sugar to get a few grains into it. Then carefully place the end of the straw onto the slide or ruler and tip them very gently onto it.

They could also experiment with different sized water drops, see if the magnification changes and try. Using a larger water drop results in needing to lift the microscope or ruler higher from the print but this still achieves 4 x magnifications visible.

Pupils and students can be asked to explain what they think is happening.

Alternatively they could research the life of the scientists Anton van Leeuwenhoek and Robert Hooke.





*Anton van Leeuwenhoek.*

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