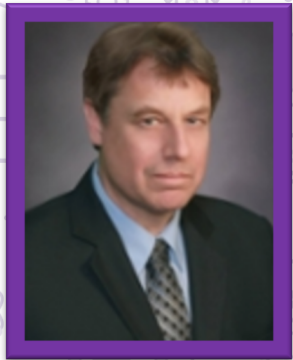


Western Engineering Outreach

Homemade Magnifying Glass

SK- Grade 2

Meet Today's ENG HERO!



G.K. Knopf - Professor with Western Engineering

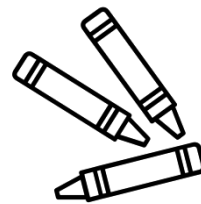
Dr. Knopf runs the Optomechatronics Research Laboratory at Western University. This group explores new materials and techniques to create mechanically flexible optical devices, light-driven micromachines and wearable sensor systems. In recent years, his research has expanded into laser microfabrication and micro-optics. To learn more about Dr. Knopf's research, visit: https://www.eng.uwo.ca/research/institutes_and_centres/orl/

Learning Goal:

- Students will learn about scientific exploration
- Students will learn about the scientific method
- Students will be introduced to the concept of light refraction
- Curriculum Connections: Grade 1 - Needs and Characteristics of Living Things and Materials, Objects and Everyday Structures

Materials Needed:

- Small honey or jam jar
- Water
- White paper
- Leaves
- Crayons
 - With the wrapping removed. Multiple colours



Engineering and Science Connections:

Today we will be talking about lenses and scientific exploration!

Do you know any common examples of lenses?

Lenses

What is a lens?

A lens is a piece of glass or another see-through material that is curved on one or both sides. Usually, it will be shaped as a circle. Lenses are used to bend light, which makes objects look bigger or smaller than they actually are. Lenses are seen in telescopes, eyeglasses, binoculars, microscopes, and cameras!

Types of Lenses



A **concave** lens curves inwards (think “concave” = making a little cave in the curve of the lens) and is thinner in the middle than the edges. This type of lens bends the light rays so that they are spread apart. Concave lenses makes objects look **smaller** than they actually are.

A **convex** lens curves outwards. It will be thicker in the middle than the edges. Light rays will bend towards each other with this type of lens. Convex lenses magnify objects, or make them look **larger**.



The Scientific Method

The scientific method is a process or method of research. A problem is identified, information about the problem is gathered, a hypothesis or question is created from the information, and the hypothesis is tested with an experiment to prove or disprove it. But it's not as intense as it sounds. The scientific method is mostly about studying and learning about the things around you.

Connection to Engineering

Engineers and scientists use lenses all the time! Biologists will use them in microscopes, astrophysicists will use them in telescopes, and engineers will build devices that use lenses (ie cameras, the Hubble telescope, etc). There is even an entire field of engineering called optical engineering that deals with lenses and optics.

Video Recommendation: Bill Nye- Lenses <https://www.youtube.com/watch?v=MvUIsetjVck>

Activity:

Before you start, think about the following question:

- Which kind of lens will we be using for our magnifying glass?
- Create your own question/hypothesis to answer during the activity. (ie: Will I notice any new veins in my leaf when looking through the magnifying glass? Will I be able to see bug bites on the leaves with the magnifying glass?)

A New Species of Tree

A couple local scientists think they have discovered a new species of tree, but need to conduct a series of experiments to test their hypothesis using the scientific method. They heard you were quite the scientist and have tasked you with investigating some of your local trees so they can compare them to their new tree to make sure it hasn't already been discovered. They have asked that you analyze the leaves with a magnifying glass and create a leaf rubbing.

Making the Magnifying Glass

Take your small honey or jam jar and fill it with water. Put the cap back on it after you're done. Now, look at an object through the side of the jar. What do you notice?

The jar should act as a convex lens and magnify the object, that is make it look larger than it really is. This jar will now act as your homemade magnifying glass!



Now it's time to go on an adventure! Bring your magnifying glass outside and start exploring! Pick at least 3 trees or plants to look at. First observe them with your naked eye, then look through the magnifying glass

- What changes? What do you see that you couldn't see without the magnifying glass?

Pick 1-3 leaves to bring home for your leaf rubbings.

Making the Leaf Rubbings

Place your leaf under a sheet of white paper. Then, using your peeled crayons, rub the crayon sideways against the paper. You should see the veins of the leaf appear on the paper.

What Did You Learn?



- What are the different types of lenses?
- Where are lenses used in the world?
- What is the scientific method?
- How do magnifying glasses help you notice things you can't usually see?

Future Learning



- Go back out and look at some other types of objects with the magnifying glass, like wood, flowers, or hair. What do you notice on these items with the magnifying glass?
- How do engineers decide what kind of lenses to use in their designs?

Share your creations!

We would love to see what you made. Email us at discover@uwo.ca or tag us on social media.

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Twitter: @westernueng

Facebook: @westernueng

Thanks for discovering with us!