

# STEM from Home

## The Magic of Light (Reflection, Refraction, and Optical Illusions)

Imagine walking into a pitch dark room. What do you see? Nothing! This is because we can see different objects only in the presence of light. During the day, sunlight enables us to see objects. An object reflects light that falls on it. This reflected light, when received by our eyes, enables us to see the object. A transparent object enables us to see through it as the light is transmitted through it.

There are a number of wonderful phenomena associated with light such as image formation by mirrors, the twinkling of stars, the enchanting colours of a rainbow and mind boggling optical illusions.

In this STEM Pack, you will explore how light travels, how it bends and how it helps create the magic of illusions. You will explore reflection and refraction with the help of an online simulation, engage in experiential hand-on activities and finally design and create unique optical illusions.

## Main Activity: **Light Travels!**

### Introduction

You will use an online simulation tool to understand the phenomenon of Reflection and Refraction.

### What You Will Need

#### Hardware

A computer with internet connection

#### Software

A browser such as Microsoft Edge or Chrome

#### Additional resources

Web link: [Bending Light](#)

### What You Will Learn

#### Part 1 (Reflection)

1. Understand what happens to light when it hits a reflective surface.
2. How are the angles of reflection and incidence measured?
3. Prove that the angle of incidence and angle of reflection are equal.

#### Part 2 (Refraction)

1. Understand what happens when light travels from one medium to another.
2. How does the density of a medium affect the path of the light rays?

[Let's get started](#)

# Bonus Activities

## Activity 1: Light & Illusions

### Introduction

In this activity you will construct a device to experiment and prove the Law of Reflection.

### What You Will Need

- A sheet of white paper
- A piece of dark coloured paper
- Pencil, Scale, Protractor
- Scissors, Tape, and a Small Comb
- A small rectangular mirror, a small box, double sided tape
- Two Clothes Pins
- Torch

#### Procedure:

1. Before you begin, make sure that you stretch out the balloon to make it as easy as possible to inflate.
2. Pour the water into the soft drink bottle.
3. Add the baking soda and stir it around with the straw until it has dissolved.
4. Pour the lemon juice in and quickly put the stretched balloon over the mouth of the bottle.

## Activity 2: Optical Illusions

### Introduction

Optical illusions use colour, light or patterns to create a perceived image, which appears different from the real image. Optical illusions occur because our brain is trying to interpret what we see and make sense of it. Optical illusions simply trick our brains into seeing things which may or may not be real.

In these set of activities, you will engage in and explore a series of optical illusions and understand how they work.

### What You Will Need

#### Activity 1:

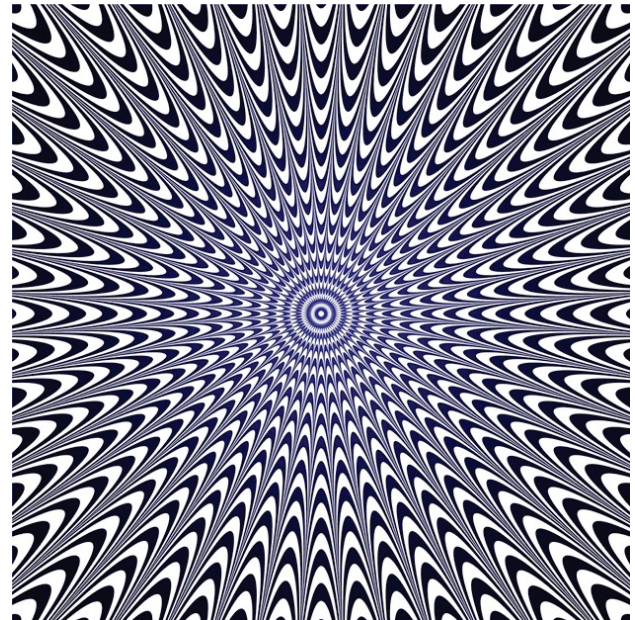
- One Cardboard Tube (use the inner tube of a paper towel or cling film roll)

OR

### What You Will Learn

The angles of incidence and reflection are equal.

[Access the activity here](#)



- Roll a newspaper into a tube

#### ACTIVITY 2:

- One 3" x 5" thick card paper
- Black Bold Marker
- One Ruler

**For activities 3 & 4 you could print out the images if you wish.**

### What You Will Learn

How optical illusions occur and the role of our eyes and brain.

[Let's get started!](#)

# Challenge Activity: Real or Illusion?

The refraction (bending) of light as it passes from air into water causes optical illusions:

[Straws in the glass of water appear broken or bent at the water's surface.](#)

[Images appear reversed.](#)

[Rainbows also result from refraction.](#)

(Check out the links above and be amazed!)

## Your Challenge:

You are hosting a party and wish to astound your friends with some unique optical illusions.

Put on your thinking hats and using the knowledge you have gained in this STEM Pack, design at least two amazing optical illusions.

Your final submission can be presented digitally using [Docs](#) or [Presentation](#) software.

