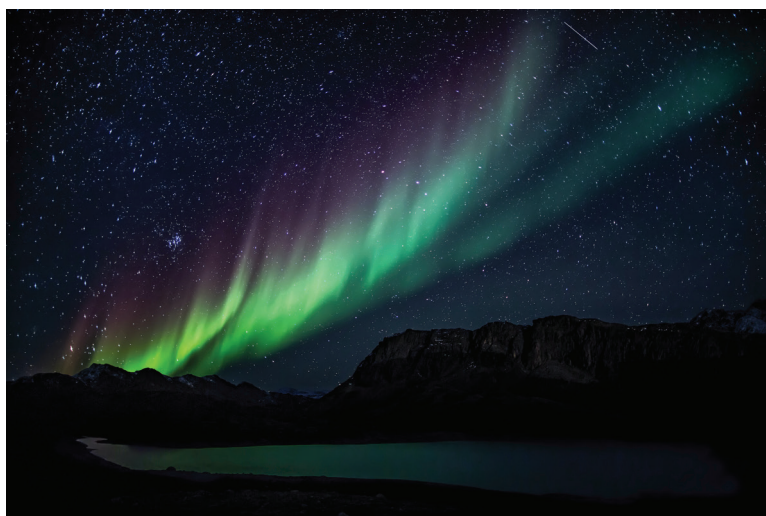


STEM from Home

Refractive Photography

Have you ever wondered when we see through a glass filled with water why the object on the other side appears distorted? When we start looking around for natural patterns, we find a lot of interesting phenomena like **Twinkling of stars, Mirage, Looming**, colourful lights in the sky called **“Northern Lights”**.



Refraction is bending of light when it travels from one medium to another. The amount of bending depends upon the speed of light in the two media and the relative refractive indices of the two media. Bending of light is governed by the two laws of refraction.

Main Activity: **Playing with Patterns**

Introduction

A glass filled with water acts as a lens. The reason for this behaviour is that water has a different refractive index for different colours of light (VIBGYOR) than air. Also, the varied curvatures of the glasses used change the shape of the lens. This gives rise to interesting patterns. In this activity you will be composing a scene and capturing the photograph. You will be presenting the refractive patterns captured by you using an online presentation tool called **Adobe Spark**.

What You Will Need

1. You will be able to explore and appreciate beautiful patterns to stimulate your design thinking.
2. You will be able to apply the concept of refraction of light in your day-to-day life.

What you will learn

- A camera (mobile phone camera also works)
- Few glass tumblers
- Water
- Plain white sheet
- Printed sheets with patterns
- Black marker to draw patterns (multiple colours can also be tried)
- Adobe Spark (<https://spark.adobe.com/sp/>)

Getting Started

[Access the activity from here.](#)

Bonus Activities

Activity 1: Make Me Invisible

Introduction

Believe me or not, you too can become a magician and make people wonder how you make things invisible! Refraction and Total Internal Reflection will do this for you. What we see after the refraction depends on the choice of pair of media (their optical densities) and our point of observation.

The angle of incidence in a denser medium for which angle of refraction in the rarer medium is 90° is called Critical Angle (i_c). When a ray of light travelling from a denser medium towards a rarer medium fall on the interface at an angle more than the critical angle ($i > i_c$) it gets reflected back into the same medium. The phenomenon is called as Total internal reflection (T.I.R). The same phenomena explains the formation of a rainbow.

What You Will Learn

1. How changing the observation point changes the visual pattern.
2. You will be able to understand the concept of refraction and total Internal refraction
3. You will be able to apply the knowledge in understanding the natural phenomena like Rainbow formation

What You Will Need

1. A camera (mobile phone camera also works)
2. Few glass tumblers
3. Water
4. Plane white sheet
5. Permanent marker
6. Scissors
7. Adobe Spark (<https://spark.adobe.com/sp/>)

Getting Started

[Let's Get Started](#)

Challenge Activity: Adding New Dimension

Holograms are one of the most fascinating and eye-catching technology applications. It has varied industrial applications which includes computer graphics, animation, gaming, light and sound show, virtual tours, interior designing to create massive 3D visual effect.

Your challenge is to design and create a structure compatible of creating a Hologram. Bigger the picture, better is the view. Ensure the proper orientation of sheets in hologram device in order to produce magnified, clear and proportionate hologram.

What You Will Need

- 1–4 transparency sheets/ acrylic sheet
- Scissors
- Transparent tape
- Tablet or smart phone
- Compatible videos such as <https://youtu.be/wDf6vOCehGE>

Once you complete the challenge, upload a video of your final product explaining the working. Your project needs to be handmade but your final submission can be presented digitally using Adobe Spark or any other video editor.

