

Learning Objectives and Concepts

Exploration 1: Building the ARIES Light and Color Lab

The purpose of this exploration is to have students discuss their ideas of light and color and to build the ARIES Light and Color Lab. The lab is used by students to investigate some properties of light and color.

Exploration 2: Using the ARIES Light and Color Lab

The purpose of this exploration is to show that one's eyes are simply detectors.

- Nonluminous objects are visible only if illuminated by a light source.
- We see an object only if light from the object (either emitted, scattered, or reflected) enters our eyes.

Exploration 3: Seeing Through Colored Glasses

The purpose of this exploration is to observe the colors of various objects through colored filters.

- The color of objects when viewed through filters may appear different than when viewed in direct white light.

Exploration 4: Looking at Things in a New Light

The purpose of this exploration is to investigate how the color of light affects the colors of objects.

Exploration 5: Mixing Colored Liquids

The purpose of this exploration is to compare the colors obtained by mixing pigments to the colors obtained by mixing lights.

Exploration 6: Looking at Shiny Surfaces

The purpose of this exploration is to investigate a variety of objects, materials, and surfaces to see which ones provide the sharpest or brightest reflected images.

- Most nonluminous objects reflect or scatter light.
- The appearance and location of an object's image seen in a concave mirror (such as the inner surface of a spoon's bowl) depend upon the distance between the object and the mirror.

Exploration 7: Mirror Reflections

The purpose of this exploration is to investigate reflections in flat mirrors.

- The image of an object appears to be located as far behind a flat mirror as the object is in front of the mirror.
- When we view an object with a flat surface mirror, we perceive an image that is upright but reversed left to right.

Exploration 8: Mirror Magic

The purpose of this exploration is to investigate ways to produce double and multiple images using a flat surface mirror or mirrors.

Exploration 9: Mirrors and Light Beams

The purpose of this exploration is to investigate the reflection of a beam of light off the surface of a flat mirror.

- The angle between a line perpendicular to a flat mirror and an incoming beam of light is the same as the angle between the same perpendicular and the outgoing, or reflected, beam.

Exploration 10: Properties of Prisms

The purpose of this exploration is to investigate the reflective and spectra-producing properties of prisms.

Exploration 11: Light Beams and Prisms

The purpose of this exploration is to investigate ways that prisms affect light.

- When a light beam passes from one substance into another at an angle non-perpendicular to the surface between the substances, the direction of the light's path in the second material is different from its direction in the first material.

Exploration 12: Using a Prism to Produce a Spectrum

The purpose of this exploration is to investigate the spectrum that results when a beam of light passes through a prism.

- When a beam of white light passes through a prism, the different colors of light are refracted by different amounts, producing the visible spectrum.

Exploration 13: Following a Light Beam

The purpose of this exploration is to investigate the properties of a light beam as it passes through air, plastic, and water.

- Light can change direction when it passes through a transparent material.

Exploration 14: Investigating How a Water Lens Affects Light Beams

The purpose of this exploration is to investigate how the directions of two different colored light beams are changed by a lens made of water, and what color change occurs when the two beams cross (meet).

Exploration 15: Magnifying with Water

The purpose of this exploration is to compare the results obtained when using a magnifier made of water and a small magnifying glass.

- A water drop acts like a lens with one side (the top) convex-shaped.

Exploration 16: The Pinhole Camera

The purpose of this exploration is to demonstrate the way light forms images in a pinhole camera.

- Light coming through a pinhole can form images.
- Images formed in a pinhole camera are inverted and reversed.

Exploration 17: Improving the Pinhole Camera

The purpose of this exploration is to demonstrate how a lens can focus light to obtain a sharp image in a pinhole camera.