

EXPLORING

LIGHT and COLOR

Grades 3-6

Key idea:

Many aspects of the behavior of light – reflection, scattering, refraction, and colors – and our ability to see things, makes most sense when light is described as particles instead of waves.

Specific Learning Objectives

Unit 1: The Nature of Light

Exploration 1: Building the ARIES Light and Color Lab

- A simple device can be used to investigate some properties of light and color.

Exploration 2: Using the ARIES Light and Color Lab

- 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.

Unit 2: What Colors Do You See?

Exploration 3: Seeing Through Colored Glasses

- 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 color of objects may change when viewed in different colored light.

Exploration 5: Mixing Colored Liquids

- Different colors may be mixed by adding or combining pigments.

Unit 3: Investigating Reflections

Exploration 6: Looking at Shiny Surfaces

- 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

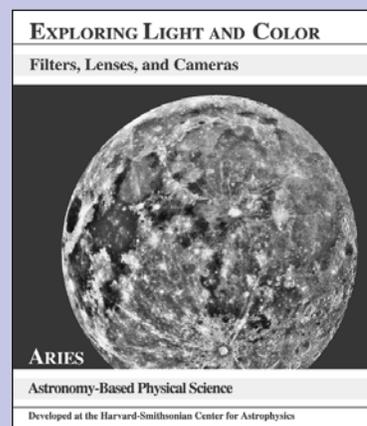
- The image of an object appears to be located as far behind a flat mirror as the object is in front of the mirror.
- When we view an object with a flat surface mirror, we perceive an image that is upright but reversed left to right.

Exploration 8: Mirror Magic

- A double image or multiple images may be obtained using a flat-surface mirror or mirrors.

Important content:

- Nature of light
- Effect of mirrors on light paths
- Effect of a prism on a beam of white light
- Effect of water on a light beam
- Observing scattered light
- Nature of lenses



Exploration 9: Mirrors and Light Beams

- 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.

Unit 4: Prisms, Light Beams, and the Visible Spectrum

Exploration 10: Properties of Prisms

- Prisms have reflective and spectra-producing properties.

Exploration 11: Light Beams and Prisms

- 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

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

Unit 5: Learning About Lenses and Cameras

Exploration 13: Following a Light Beam

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

Exploration 14: Investigating How a Water Lens Affects Light Beams

- A lens can change the direction of a light beam.
- Water in a glass, and the transparent, curved sides of the glass, cause the water-filled glass to act like a lens.
- When two colored light beams cross (meet) a color change occurs.

Exploration 15: Magnifying with Water

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

Exploration 16: The 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

- A lens can focus light to obtain a sharp image in a pinhole camera.