Neutralizing Lens Set

P2-1400

INSTRUCTIONAL GUIDE

Contents

Neutralizing Lens Set:

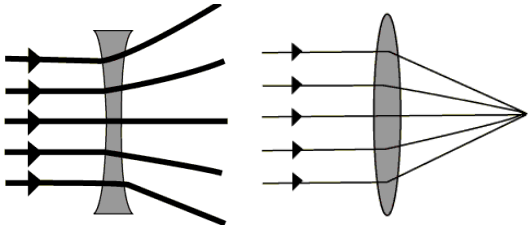
- Double Concave Lens (**f** = -150 mm, 38 mm dia.)
- Double Convex Lens (**f** = 150 mm, 38 mm dia.)
- Storage box

Required for Activity:

- Mirror and Lens Holders (P2-7147)
- Long, thin object (e.g. a pencil)

Background

When a convex and concave lens of the same focal length are positioned one in front of the other, the effects on the image produced will be neutralized so it will seem like there is only a flat pane of glass. A lens is an optical device typically cut or ground from glass or plastic to produce a shape which will refract light, converging or diverging a light ray. Most lenses are known as spherical lenses; their two surfaces as part of an imaginary sphere, with the radius of the sphere determining how "curved" the lens will be. The more curved the lens, the greater bending or refraction of the light ray occurs. For a convex lens, the center of the lens is thicker than the edges (The lens "bulges" outward in the center); conversely a concave lens, the center of the lens is thinner than the edges (The center of the lens is depressed into the lens). See diagram below.



Concave Lens *Convex Lens*

Parallel rays of light passing through a Convex Lens will be converged (focused) to a spot, at a certain distance behind the lens which is known as the focal length of the lens. In this case, the Focal Distance is a positive.

Parallel rays of light passing through a Concave Lens will be diverged (or spread apart) from a spot that appears to originate from the focal point on the side where the light rays entered the lens. In this case, the Focal Distance is a negative.

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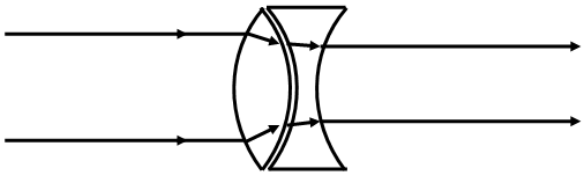
Activity

With the Neutralizing Lens set, students can see how the two lenses bend or refract the light. Since they have the same radius of curvature, the convex lens converges the light rays while the concave lens diverges the light rays to an equal extent. This results in zero magnification of any images where the lenses overlap.

Students can experiment in finding the focal length for the convex lens (positive focal length) and the focal length for the concave lens (negative focal length). After finding the focal lengths, students will understand that when these lenses are brought together, neither magnification nor reduction of images will occur. The diagram below illustrates the coupling of the two lenses in the “neutralizing” position. The concept of how focal lengths affect the diopter rating of eyeglasses in the Optometry field can be discussed through the use of this lens set.



Related Products

Introductory Optical System (92-7700) This simple but elegant Optical System is designed for basic optics experiments, and a great alternative to the traditional mounted optical benches. Students can now easily make the common measurements of image and focal distance with the included lenses, pinhole configurations, and 2-sided screen.

Concave Convex Lens Set (P2-1200) These crown glass lenses packed in lined storage box are perfect for optical benches or basic optics demonstrations. Each set includes double convex, plano-convex, concavo-convex, double concave, plano-concave, and convexo-concave lenses.

Concave Convex Mirror Set (P2-7145) Perfect for student explorations of mirror optics. Six different 50mm diameter spherical glass mirrors, each with a protected silver coating, packed in a lined plastic storage box.

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