

Optics - The Study of Light

Refraction

Light refracts when passing between two substances at an angle.

Light does not bend as glass that is not yet within water. Bending begins at boundary between air and water.



Light travels faster in water than in air, so it bends towards the normal as it enters the water.

The refractive index (n) is a measure of how much the speed of light is reduced inside a medium.



Reflection

Light reflects off a surface. Angle of incidence equals angle of reflection.

Normal - an imaginary line 90° perpendicular to a surface.

Angle of Incidence - the angle between the incident ray and the normal.

Angle of Reflection - the angle between the reflected ray and the normal.



Focus

Point at which light rays converge after reflection or refraction. Distance from optical center to focus.



Concave Mirrors

Concave mirrors focus light rays to a point. They are used in telescopes, headlights, and satellite dishes.



Convex Mirrors

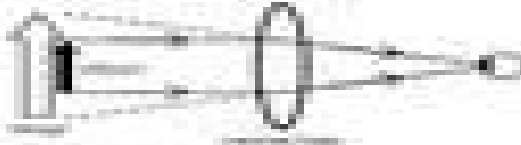
Convex mirrors diverge light rays. They are used in security and side-view mirrors.

The image is virtual, upright, and smaller than the object.

Lenses

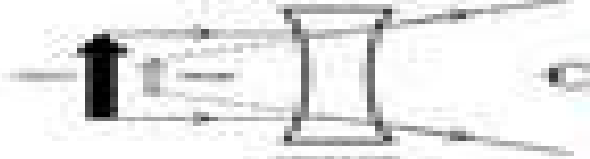
Lenses refract light. They are used in eyeglasses, cameras, and microscopes.

A converging lens focuses light.



A diverging lens spreads light.

A concave lens diverges light.



A concave lens is divergent. The light rays spread apart.

Image is virtual and upright.

Concave and convex lenses depend on their shape. If a lens is thicker in the middle, it's concave. If it's thinner, it's convex.

Concave Lenses



Optical Systems



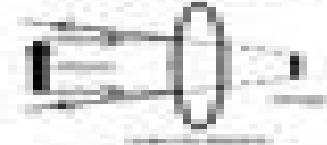
Optical systems use lenses and mirrors to focus light. They are used in cameras, telescopes, and microscopes.

Images

Images are formed by light rays. They can be real or virtual, upright or inverted.

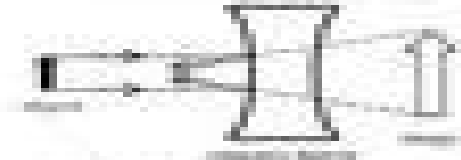
Real images can be projected on a screen. Virtual images cannot.

A virtual image is upright.



A virtual image is upright.

A virtual image is magnified.



A virtual image is upright.

Image is virtual and upright.

Optics The Study Of Light Worksheet Answer Key

ML Yell



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