

**Refraction**

Light slows down in glass. Here the left side slows down first causing the light to bend to the left.



Light speeds up in air. Here the left side speeds up first causing the light to bend to the right.

Light refracts when passing between two substances at an angle.

The right side hits first and slows down. Bends to the right.



If the light does not cross at an angle, it does not bend.

**Reflection**

Normal – an imaginary line 90° (perpendicular) to a surface.

*Angle of Incidence* – the angle between the incoming ray and the normal.

*Angle of Reflection* – the angle between the outgoing ray and the normal.

Light reflects at shiny boundaries we call mirrors.



MIRROR

angle of incidence = angle of reflection

**Focus**

Every lens or mirror has a place where all of the parallel rays will meet. This is known as the *focal point or focus*.



**Straight Lines**

Mirrors and lenses can make things look bigger or smaller because our eyes always think that light comes from straight lines, even if they have been refracted or reflected.



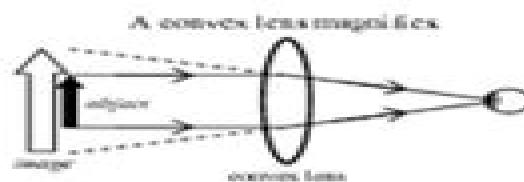
**Object vs. Image**

The *object* is what you are looking at: the actual thing.

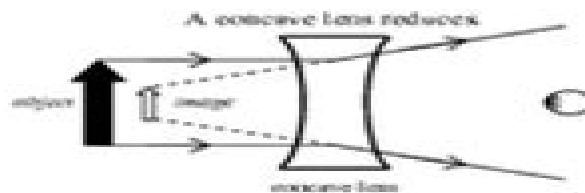
The *image* is what you think you see: the object enlarged, reduced, or moved.

**Lenses**

Lenses work by refraction, by the light bending when moving between two substances.



A convex lens **magnifies**.  
It **converges** light rays so they come together.



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

*Lenses and mirrors work opposite of each other. If a convex lens **reduces**, then a concave mirror **magnifies**.*

**Concave or Convex**



Concave – looks like the sides have curved in.

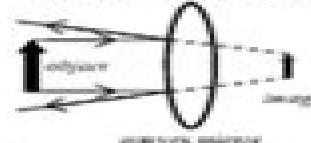


Convex – the middle is bigger than the ends.

Mirrors work by reflection, by the bending of light off of a shiny surface. *Images in mirrors always stand twice as far away as the object.*

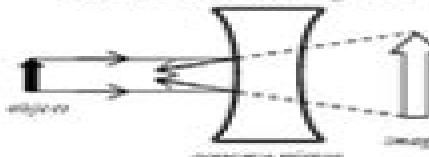
Ex. An image looks 20 m away in a mirror. How far away is the object?  
Answer: Half the distance: 10 meters.

A convex mirror **reduces**.



A convex mirror is **divergent**.

A concave mirror **magnifies**.



A concave mirror is **convergent**.

**Optical Systems**

Microscopes and telescopes are **optical systems** that use combinations of lenses and/or mirrors to magnify light. Combining optical devices allows us to see very distant or very small objects.

# Optics The Study Of Light Answers

**Rumi Michael Leigh**

## Optics The Study Of Light Answers:

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**Science** ,1925 Vols for 1911 13 contain the Proceedings of the Helminothological Society of Washington ISSN 0018 0120 1st 15th meeting

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who engages with and judges the worth of any creative effort and what it contributes to an understanding of the seen and the unseen The illustrations and the many coloured plates accompanying the text offer an overview of the subject **Optics**  
Rumi Michael Leigh,2023-05-24 Optics Things You Should Know Questions and Answers presents the study of light through a question and answer format The text covers reflection refraction mirrors lenses and prisms with explanations supported by worked examples Problems progress from simple calculations to more advanced exercises showing how formulas are applied across different optical situations Key topics include image formation focal length magnification prism deviation and the properties of converging and diverging lenses Additional sections illustrate how optics connects to vision instruments and physical principles in science This book will interest students physics learners and exam candidates who want to study optics and its applications in physics

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**The British Journal of Photography** William Crookes,T. A. Malone,George Shadbolt,J. Traill Taylor,William Blanchard Bolton,Thomas Bedding,1919

*North America Skyline* ,1961 New York Review of the Telegraph and Telephone and Electrical Journal ,1899 **The Optician and Scientific Instrument Maker** ,1930 English Mechanic and Mirror of Science ,1873 **The comprehensive English dictionary, the pronunciation adapted to the best modern usage by R. Cull** John Ogilvie,1893 **Transactions of the Optical Society** Optical Society (Great Britain),1929

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