

Light ▪ *Guided Reading and Study*

Refraction and Lenses

This section explains why light rays bend when they enter a medium at an angle. It also describes how images are formed when light is refracted by convex and concave lenses.

Use Target Reading Skills

Before you read, preview the red headings. In the graphic organizer below, write a what, when, where, or how question for each heading. As you read, write the answers to your questions.

Refraction and Lenses

Question	Answer
When does refraction occur?	Refraction occurs . . .

Refraction of Light

- When light rays enter a new medium at an angle, what does the change in speed cause the rays to do?

- Rank the following mediums according to how fast light travels through them. Rank the fastest as 1.

_____ a. water _____ b. glass _____ c. air

- What is a material's index of refraction?

- Glass causes light to bend more than air does. Which material has a higher index of refraction? _____

- Explain why a rainbow can form when light shines through tiny water droplets.



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Refraction and Lenses *(continued)*

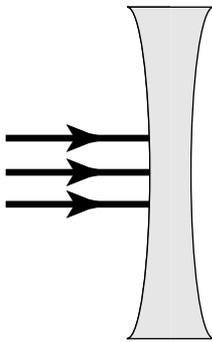
6. An image of a distant object caused by the refraction of light is called a(n) _____.

Lenses

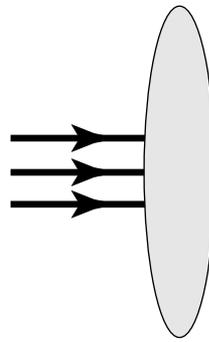
7. A curved piece of glass or other transparent material that is used to refract light is called a(n) _____.

8. How does a lens form an image?

9. Label each lens as either a convex lens or a concave lens. Then draw light rays to show how light is refracted as it passes through each lens.



a. _____



b. _____

10. Complete the following table about lenses.

Kinds of Lenses		
Kind of Lens	Description of Lens	Image Formed—Real or Virtual?
a.	Thinner at the center than at the edges	b.
Convex	c.	Real or Virtual

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11. What two factors determine the type of image formed by a lens?

12. Is the following sentence true or false? The less curved a lens is, the more it refracts light. _____

13. An object's position relative to the _____ determines whether a convex lens forms a real or virtual image.

14. Why can a concave lens produce only virtual images?

15. Is the following sentence true or false? The image formed by a concave lens is always upright and smaller than the object. _____