

**Lenses**

Read from **Lesson 5 of the Refraction and Lenses chapter** at **The Physics Classroom**:

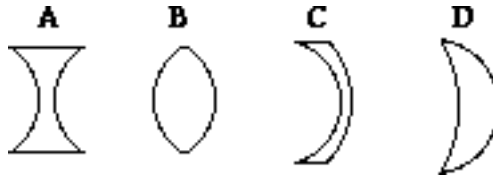
- <http://www.physicsclassroom.com/Class/refrn/u1415a.html>
- <http://www.physicsclassroom.com/Class/refrn/u1415b.html>
- <http://www.physicsclassroom.com/Class/refrn/u1415c.html>

**MOP Connection:** Refraction and Lenses: sublevel 7

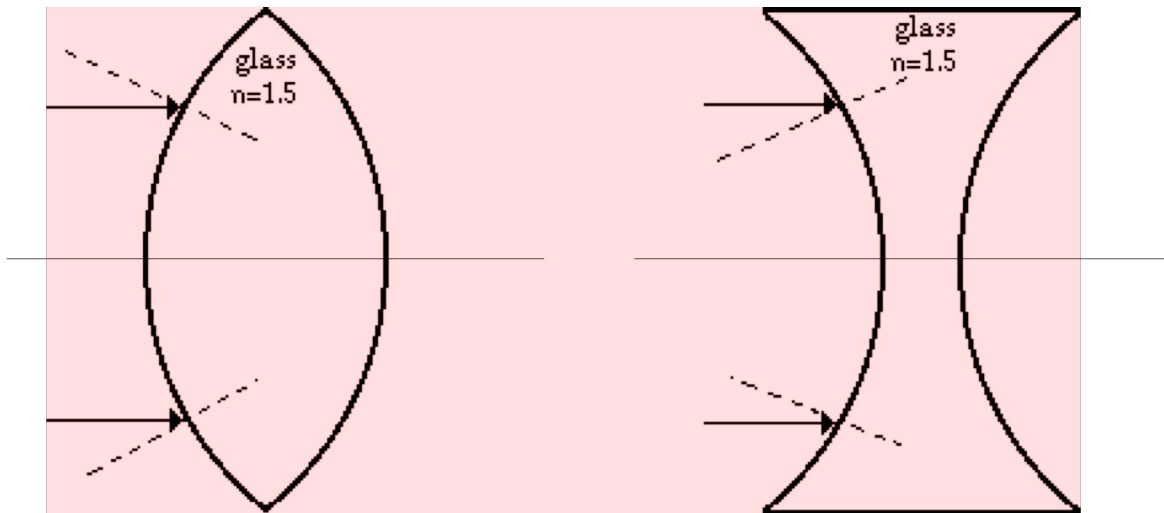
1. Converging lenses are \_\_\_\_\_ at the center and \_\_\_\_\_ at the edges.
  - a. thickest, thinnest
  - b. thinnest, thickest
2. Diverging lenses are \_\_\_\_\_ at the center and \_\_\_\_\_ at the edges.
  - a. thickest, thinnest
  - b. thinnest, thickest

Consider the diagram at the right in answering the next two questions.

3. List the letters of all the converging lenses.
4. List the letters of all the diverging lenses.



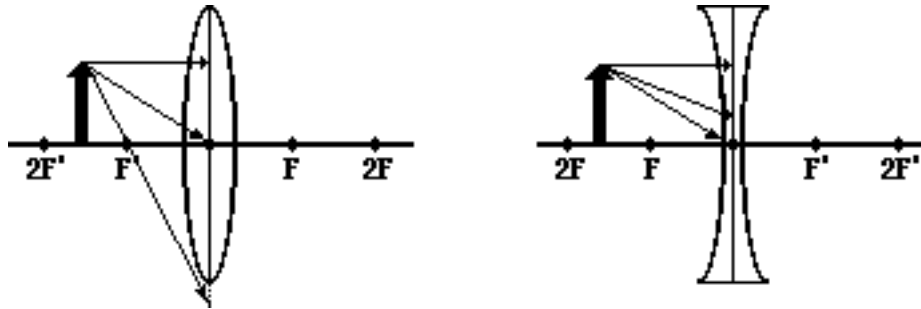
5. Use refraction principles to sketch an approximate path of light as it enters and exits the lens. Think FST and SFA. Trace the path of the rays into, through and out of the lens. Repeat the procedure for the light rays exiting the lens and trace the emerging light rays. Place arrowheads on all light rays.



6. Explain why lenses (like the one on the left above) are called "converging" lenses.
  
7. Converging lenses will have \_\_\_\_\_ (positive, negative) focal lengths. Diverging lenses will have \_\_\_\_\_ (positive, negative) focal lengths.

## Light, Refraction and Lenses

8. The diagram below shows an *arrow object* positioned in front of a converging and a diverging lens. Three incident rays are shown. Construct the corresponding refracted rays. Show arrowheads.



9. State the three *rules of refraction* for converging lenses:

#1: \_\_\_\_\_  
 \_\_\_\_\_  
 #2: \_\_\_\_\_  
 \_\_\_\_\_  
 #3: \_\_\_\_\_  
 \_\_\_\_\_

10. State the three *rules of refraction* for diverging lenses:

#1: \_\_\_\_\_  
 \_\_\_\_\_  
 #2: \_\_\_\_\_  
 \_\_\_\_\_  
 #3: \_\_\_\_\_  
 \_\_\_\_\_

11. The diagrams below depict the refraction of light through various lenses. List the diagrams that show the proper refraction of light. \_\_\_\_\_ For those which show the improper refraction of light, either correct the diagrams by showing the proper refracted rays or explain what is wrong with the refracted rays.

