

### Direction of Bending

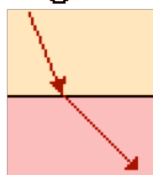
Read from **Lesson 1** of the **Refraction and Lenses** chapter at **The Physics Classroom**:

- <http://www.physicsclassroom.com/Class/refrn/u14l1d.html>
- <http://www.physicsclassroom.com/Class/refrn/u14l1e.html>
- <http://www.physicsclassroom.com/Class/refrn/u14l1f.html>

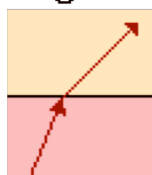
**MOP Connection:** Refraction and Lenses: sublevels 2 and 3

1. The **optical density** is the property of a medium that provides a relative measure of the speed at which light travels in that medium. Light travels \_\_\_\_\_ (fastest, slowest) in media with a greater optical density.
2. Every transparent material is characterized by a unique **index of refraction** value (**n**). The index of refraction value is a numerical value that provides a relative measure of the speed of light in that particular material. Light travels \_\_\_\_\_ (fastest, slowest) in media with a higher index of refraction value.
3. The speed of light (**v**) in a material is determined using the speed of light in a vacuum (**c**) and the index of refraction (**n**) of the material. Calculate the speed of light in the following materials.
 
$$v = \frac{c}{n} = \frac{3.00 \times 10^8 \text{ m/s}}{n}$$
  - a. water ( $n = 1.33$ ): \_\_\_\_\_
  - b. glass ( $n = 1.50$ ): \_\_\_\_\_
  - c. ice ( $n = 1.31$ ): \_\_\_\_\_
  - d. diamond ( $n = 2.42$ ): \_\_\_\_\_
4. When light passes into a medium in which it travels faster, the light will refract \_\_\_\_\_ the normal. When light passes into a medium in which it travels slower, light will refract \_\_\_\_\_ the normal.
  - a. towards, away from
  - b. away from, towards
5. When light passes into a medium that is more optically dense, the light will refract \_\_\_\_\_ the normal. When light passes into a medium that is less optically dense, the light will refract \_\_\_\_\_ the normal.
  - a. towards, away from
  - b. away from, towards
6. Consider the refraction of light in the five diagrams below. In which case is the light bending towards the normal line? Circle all that apply.

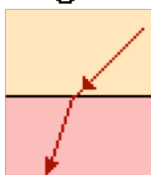
**Diagram A**



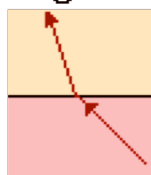
**Diagram B**



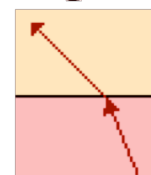
**Diagram C**



**Diagram D**



**Diagram E**



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

7. There are \_\_\_\_ (1, 2, 3, ...) media shown in the diagram.
8. There are \_\_\_\_ (1, 2, 3, ...) boundaries shown in the diagram.
9. Light must travel \_\_\_\_\_ in medium 1 compared to medium 2.
  - a. slower
  - b. faster
  - c. insufficient info
10. Light must travel \_\_\_\_\_ in medium 2 compared to medium 3.
  - a. slower
  - b. faster
  - c. insufficient info

