Reading Strategy (page 574)

**Building Vocabulary** As you read the section, define in your own words each vocabulary word listed in the table.

<table>
<thead>
<tr>
<th>Vocabulary Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index of Refraction</td>
<td>The ratio of the speed of light in a vacuum to the speed of light in the material.</td>
</tr>
<tr>
<td>Critical Angle</td>
<td>The angle of incidence that produces an angle of refraction of 90 degrees. (The last angle before total internal reflection.)</td>
</tr>
<tr>
<td>Total Internal Reflection</td>
<td>100% reflection of a light ray back to its original medium.</td>
</tr>
</tbody>
</table>

**Index of Refraction of Light (pages 574–575)**

1. Circle the letter of the sentence about the speed of light through media that is true.
   a. Once light passes from a vacuum into any medium, it speeds up.
   B. Compared to other media, air slows the speed of light only slightly. **Compared to a vacuum.**
   c. The speed of light is greater in water than in air.
   d. The speed of light in a new medium depends on the size of the new medium.

2. What determines how much a light ray bends when it passes from one medium to another? **How much the light changes speed. (It also depends on the angle that it enters.)**

3. The ratio of the speed of light in a vacuum to the speed of light in a particular material is known as the **index of refraction** of that material.

**Concave and Convex Lenses** (pages 576–577)

4. An object made of transparent material that has one or two curved surfaces that can refract light is called a(n) **lens**.

5. Two properties of a lens that affect the way it refracts light are **curvature** and **thickness**.

6. A lens that is curved inward at the center and is thickest at the outside edges is called a(n) **concave** lens.
7. Concave lenses always cause light rays to **diverge (spread out)**.

8. Circle the letter of each sentence that is true about convex lenses.
   a. Convex lenses are diverging lenses.  
   B. Fly eyes have many facets shaped like the surface of convex lenses.  
   C. Convex lenses can form either real or virtual images.  
   d. Convex lenses are shaped somewhat like the inside of a bowl.

9. What determines whether a convex lens will form a real image or a virtual image?
   **How far the object is from the lens.**

For questions 10 and 11, refer to the diagrams below.

10. In each diagram identify the labeled items as the object, focal point, or image. Also, identify the image as virtual or real.

   A. **Object**  
   B. **Focal Point**  
   C. **Focal Point**  
   D. **Real Image**  
   E. **Virtual Image**  
   F. **Focal Point**  
   G. **Object**  
   H. **Focal Point**

11. Which diagram shows the formation of a virtual image?  
   **Diagram “A”**

**Total Internal Reflection** (page 578)

12. Circle each letter of a sentence that is true about the critical angle.
   A. At the critical angle, light refracts along the surface between two media.  
   b. All the light is reflected back into the first medium at the critical angle.  
   c. Only concave lenses have critical angles.  
   D. All the light is reflected back into the second, denser medium when the critical angle is exceeded.

   **TRUE**  
   **False**

13. Materials that have small critical angles, such as the glass used in fiber optics, cause most of the light entering them to be totally internally reflected.