

Refraction and Lenses

Do you, your friends, or any of your family members wear glasses? How do they work. Light travels at 300 million m/s (3×10^8 m/s) in empty space. Interactions with matter when light passes through substances slows light down. When light travels from one medium to another at an angle to the boundary between the media, it bends. This is because part of the light wave enters the medium first. The part that enters the medium first slows down before the rest of the wave causing it to bend. The bending of light waves as they pass through different media is called **refraction**. The lenses in glasses work by refraction. A lens is a transparent object with at least one curved side that both transmits and refracts light. The oldest lens in existence comes from ancient Assyria 2,700 years ago. The earliest written references to lenses describe using them to start fires. Lenses were used for vision correction in 13th century Europe. Microscopes and telescopes using lenses for magnification were invented at the end of the 16th century. There are two basic types of simple lenses—concave and convex. A concave lens is depressed or caved in. A planoconcave lens is concave on one side, while a biconcave lens is concave on both sides. A convex lens bulges out. A planoconvex lens is convex on one side, while a biconvex lens is convex on both sides. The lenses in glasses are somewhat more complex.



Answer the questions below based on the reading above and on your knowledge of physics.

1. What is refraction? _____

2. Refer to the table to the right. Which medium transition will cause the greatest refraction? Why? _____

3. What is a lens? _____

4. How do lenses work? _____

5. What are some uses for lenses? _____

| SPEED OF LIGHT IN DIFFERENT MEDIA (m/s) | |
|---|-------------|
| Air | 300,000,000 |
| Water | 227,000,000 |
| Glass | 197,000,000 |
| Diamond | 125,000,000 |