

## AP PHYSICS – OPTICS

### LIGHT: (reflection, refraction, mirrors, lenses, diffraction/interference)

**Topics:** Plane mirrors, spherical mirrors (concave and convex), refraction, lenses (converging and diverging), multiple lens systems, diffraction, interference patterns through slits

#### **Worksheets/Labs/Quizzes:**

- |                                   |   |                              |
|-----------------------------------|---|------------------------------|
| 1. Mirror Lab                     | 2. Mirrors – Ray Diagram Practice                   | 3. Index of refraction table |
| 4. Refraction diagrams wksht      | 5. Mini labs (2) law of refraction / critical angle |                              |
| 6. Refraction Review              | 7. Concepts review – mirrors/refraction             |                              |
| 8. Optics QUIZ mirrors/refraction | 9. Multiple lenses 1                                |                              |
| 10. Multiple Lenses 2             | 11. Lenses wksht 3                                  |                              |
| 12. Geo optics review             | 13. Unit Review sheet                               |                              |

#### **Introduction:**

Light has both wave and particle properties. We are going to look at the wave properties in this unit.

Another example of a wave is sound. If I talk, turned around, you still hear me. If I face one side of the room and talk, the other side still hears me. This is because waves naturally spread out as they propagate (travel).

Light is no different. For example, a light bulb, light propagates from the bulb in all directions.

If one follows a part of the wave, we can draw an arrow following its path. The line will be parallel to the wave front. This is called a Ray



**Ray** - An arrow drawn perpendicular to the wave front. The arrow points toward the direction of propagation of the wave.

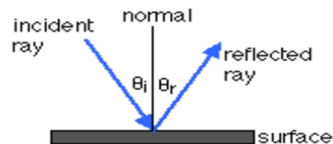
**Ray Diagram** – An easy way to visualize how waves reflect and refract.

Waves (Light waves in this case) can do three things:

Reflect, Refract, and Diffract

**Reflection:** The ray bounces off an object.

Law of Reflection: The angle of incidence = the angle of reflection.  $\theta_i = \theta_r$ .



law of reflection :  $\theta_r = \theta_i$