Chapter 22 Summary – Reflection and Refraction of Light

►The **index of refraction** of a material, n, is defined as

$$n = \frac{c}{v}$$

where c is the speed of light in a vacuum and v is the speed of light in the material. The index of refraction of a material is also

$$n = \frac{\lambda_0}{\lambda_n}$$

where λ_0 is the wavelength of the light in vacuum and λ_n is its wavelength in the material.

►The **law of reflection** states that a wave reflects from a surface so that the *angle of reflection* equals the *angle of incidence*.

►The **law of refraction**, or **Snell's law**, states that

$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$

►**Huygens' principle** states that all points on a wave front are point sources for the production of spherical secondary waves called wavelets. These wavelets propagate outward at a speed characteristic of waves in a particular medium. After some time has elapsed, the new position of the wave front is the surface tangent to the wavelets.

►Total internal reflection can occur when light attempts to move from a material with a high index of refraction to one with a lower index of refraction. The *maximum angle of incidence* θ_c for which light can move from a medium with index n_1 into a medium with index n_2, where n_1 is greater than n_2, is called the **critical angle** and is given by

$$\sin \theta_c = \frac{n_2}{n_1}$$