PHYS-B4C: Chapter 34 Lecture - Dispersion, Total Internal Reflection

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Dispersion

- Index of refraction considering ratios between different speeds:

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

- Index of refraction considering ratio between wavelengths:

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

λ = wavelength of light in a vacuum

λ_n = wavelength of light in other material

Rainbows

- Rainbows work through reflection and refraction of visible light on water drops. (insert image here)
- When the light refracts into the water drops, it reflects back and emerges out of the water drops, dispersing the light in the process.

- What about double rainbows? These are due to the secondary reflection from the light going into the water drops.
- If you're high up enough, sometimes you can see a circle rainbow

Total Internal Reflection

- Snell's Law (again):

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

- Critical angle of total internal reflection ray:

$$\theta_c = \sin^{-1}\left(\frac{n_2}{n_1}\right)$$

- The critical angle for total internal reflection is the angle the light needs to travel at in order for it to be trapped by a material.
- **Fiber optics** are a great example of an application of total internal reflection. Light is put through the cables at a specific angle so that it keeps on internally reflecting through the cable to reach the other end.