

# 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:

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

$\lambda$  = wavelength of light in a vacuum

$\lambda_n$  = 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:

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

## Fiber Optics

(Insert images from lecture slides)

## Practice Problem 1

A small light is placed at the bottom of a 3.25 m deep swimming pool. What is the diameter of the circle of light seen on the water's surface from above?

## Practice Problem 2

A ray of light travels through air parallel to the base of the prism to the right