

## How the Eyes See Color

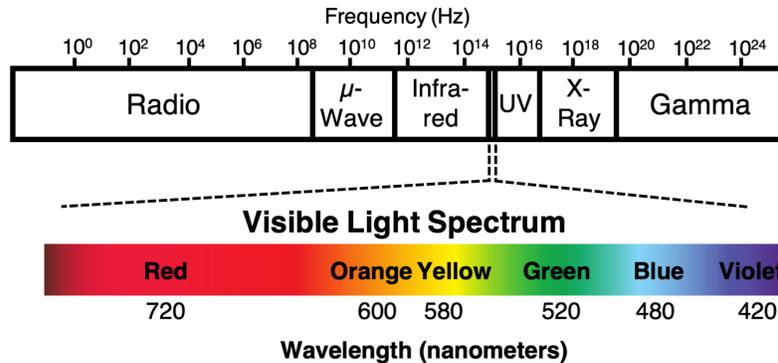
### Lesson Notes

#### Learning Outcome

- What are the mechanisms that allow the human eye to see color?

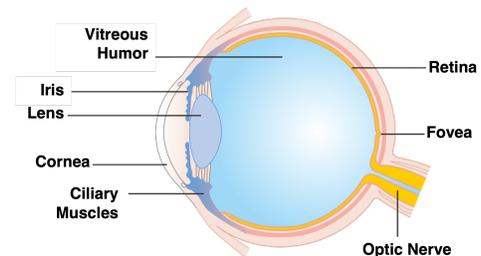
#### ROYGBIV Spectrum – A Review

The ability to see color is attributed to the fact that the eye is sensitive to a narrow range of wavelengths of the electromagnetic spectrum.



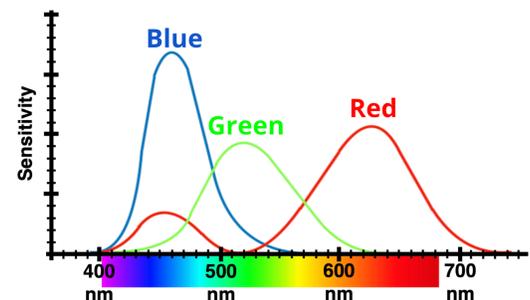
#### The Eye's Color Receptors

- There's a large concentration of photoreceptors on the back of the eye.
- There are three types of color-sensing cells, known as **cones**.
- Each type of cone is sensitive to a narrow band of wavelengths of visible light.
- Collectively, these cones give us the ability to see color.



#### How We See Color

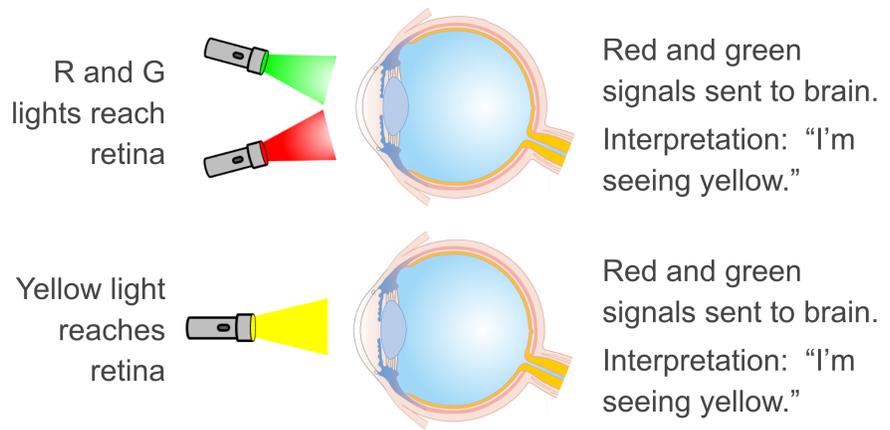
Color is a **physiological** and **psychological** response to the **wavelengths** of light that land on the retina of our eye.



- Blue light ( $\lambda = 470$  nm)  $\Rightarrow$  Blue cone sends a strong signal
- Red light ( $\lambda = 650$  nm)  $\Rightarrow$  Red cone sends a strong signal
- Green light ( $\lambda = 520$  nm)  $\Rightarrow$  Green cone sends the strongest signal
- Yellow light ( $\lambda = 575$  nm)  $\Rightarrow$  Red and Green cones send signals
- White light (ROYGBIV)  $\Rightarrow$  All cones send signals to brain

## The Color Yellow

To the eye-brain system, there is no difference between yellow light and a combination of equal intensity red + green light.

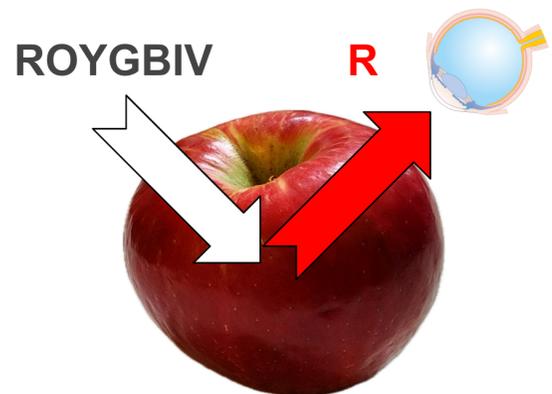


## Incident-Absorbed-Reflected Model

- What color(s) of light shine on an object?
- What color(s) of light are absorbed by the object?
- What color(s) of light are reflected to the eye?

## Red Apples

- **ROYGBIV** is incident on the apple.
- The apple absorbs **OYGBIV**.
- **Red** light reflects to the eye.
- The apple appears **red**.



## Yellow Bananas

- **ROYGBIV** is incident on the banana.
- The banana absorbs **ROGBIV**.
- **Yellow** light reflects to the eye.
- The banana appears **yellow**.

