Chapter 10

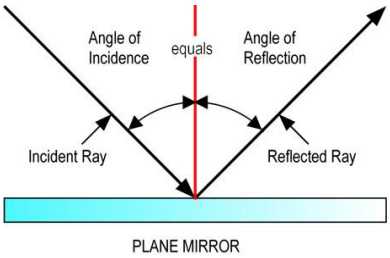
Light

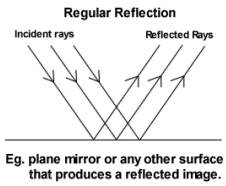
Reflection & Mirrors

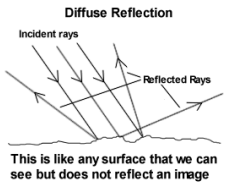
- When light strikes an object
- It is either reflected, absorbed or transmitted.
  - Opaque: a material that reflects or absorbs the light – can't see through it. -wood
  - Transparent: The material transmits light – allows light to pass through it– glass
  - Translucent: allows some light to pass through – can't see image clearly – wax paper, frosted glass.

Kinds of Reflections

- You see objects because light is reflected, bounced off of it.
- **Law of Reflection**: Angle of incidence equals the angle of reflection–
  - Angle coming in = angle going off
- **Regular Reflection**: reflection off smooth surface – a mirror
- **Diffuse Reflection**: Irregular or bumpy, uneven surface – wall

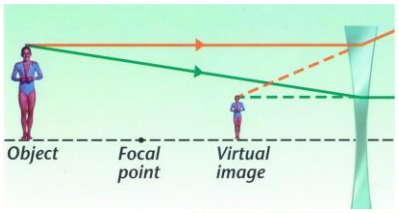


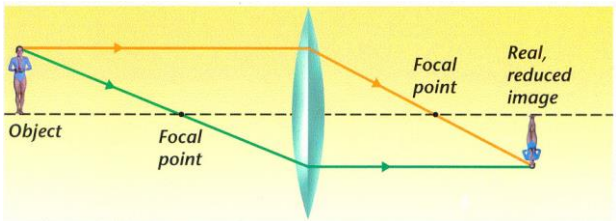




Real or Virtual?

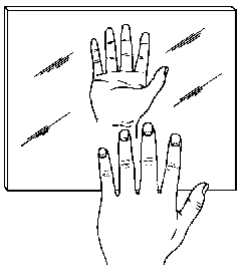
- **Image**: a copy of an object formed by reflected or refracted light
- **Virtual image**: right side up appears to be coming from behind the mirror.
- **Real Image**: is formed when reflected light rays actually meet at a point. The image is upside down (inverted),



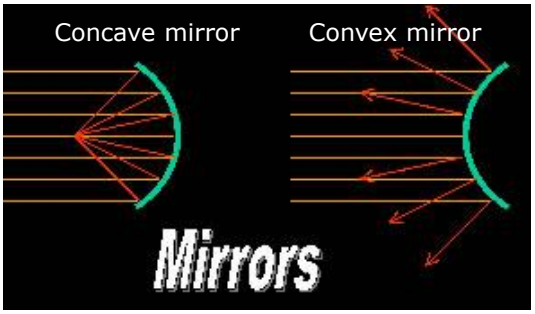


3 Types of Mirrors

- Plane Mirror: a flat mirror – produces an image that is right side up and the same size as the original object –
- Concave Mirror**:** a mirror with a surface curved inward like a "cave" or a bowl.
  - Light reflected comes together to meet at a **Focal Point**.
  - Can produce virtual or real images
- Convex Mirrors:
  - A mirror w/ a curved surface facing outward
  - Reflected rays appear to come from a focal point behind the mirror
  - Images formed are always Virtual



Plane mirror

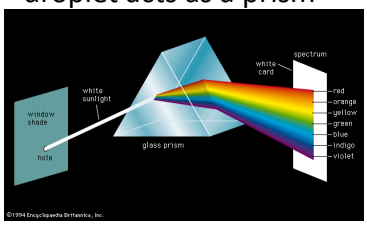


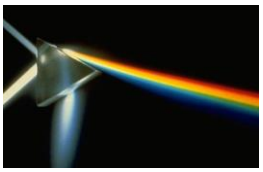
Refraction

- **Refraction** of Light: **Bend** or change direction
- 1. As light rays enter a new medium the cause light to bend
- 2. The **denser the medium** – the **slower** the light travels
- 3. **Index of Refraction**: a measure of how much a medium bends the light that travels through it.

Prisms & Rainbows

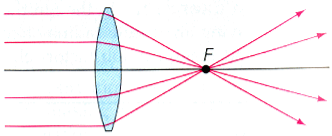
- **Prisms**: Separates white light into its component colors.
  - The longer the wavelength, the less it will be bent by the prism.
- **Rainbows**- light shining thru tiny droplets of water, each droplet acts as a prism



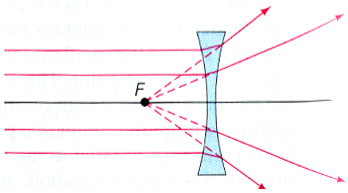


Lens – Concave & Convex

- Lenses – a curved piece of material used to bend light
  - **Concave lenses**: as light passes through, they are bent away from the center
    - Images produced are only virtual, not real
  - **Convex lenses**: cause light passing through to bend toward the focal point.
    - The images produced depends on the position of the object



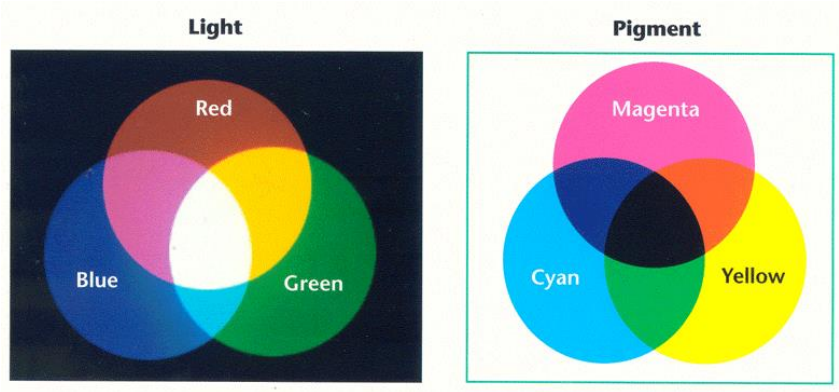
Convex Lens



Concave Lens

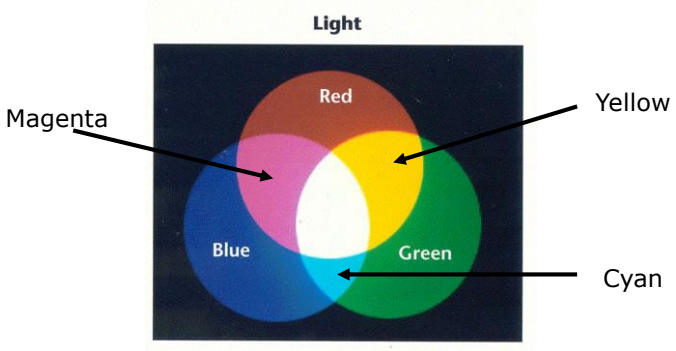
Color

- The color of the object you see is the light that is reflected from its surface. All other colors are absorbed by the object.



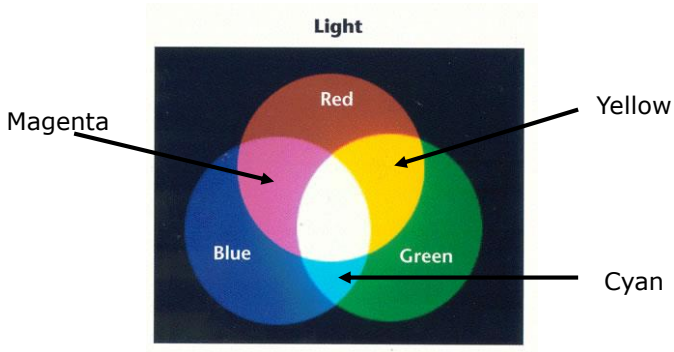
Primary & Secondary Light Colors

- The 3 colors of light that can combine to form all other colors are **primary colors** –
- a. Red, Blue, Green
- i. Equal **Red** + Equal **Blue** = **Magenta** (**secondary color)**
- ii. Equal **Red** + Equal **Green** = **Yellow** (**secondary color**)
- iii. Equal **Green** + Equal **Blue** = **Cyan** (**secondary color**)
- iv. Equal **Red** + Equal **Green** + **Equal Blue** = **White**



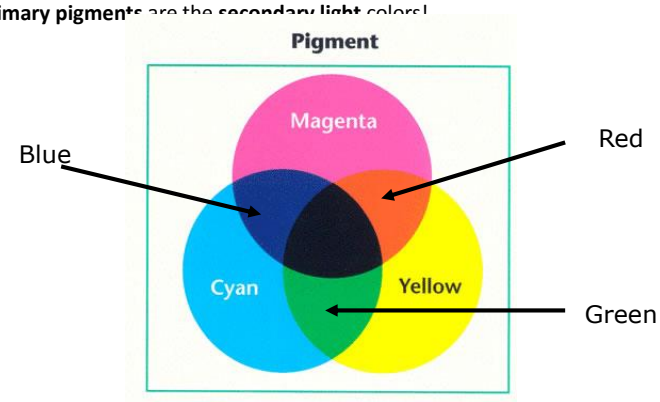
Primary + Secondary = White

- Any 2 colors that combine to form white are complementary colors
- **Secondary color + remaining Primary Color = White**
- **Magenta + Green = White**
- **Cyan + Red = White**
- **Yellow + Blue = White**



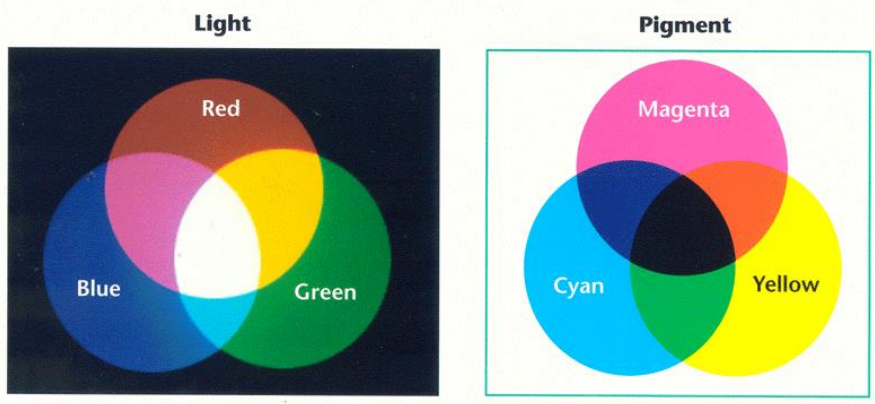
Pigments

- Pigment – substance that color other materials like paints, inks, etc
- a. Primary Pigments are **Cyan**, **Yellow** & **Magenta**
- b. **Cyan** + **Yellow** + **Magenta** = **Black**
- c. **Cyan** + **Yellow** = **Red**
- d. **Yellow** + **Magenta** = **Red**
- e. **Cyan** + **Magenta** = **Blue**
- f. The **primary pigments** are the **secondary light** colors!



Compare Lights & Pigments

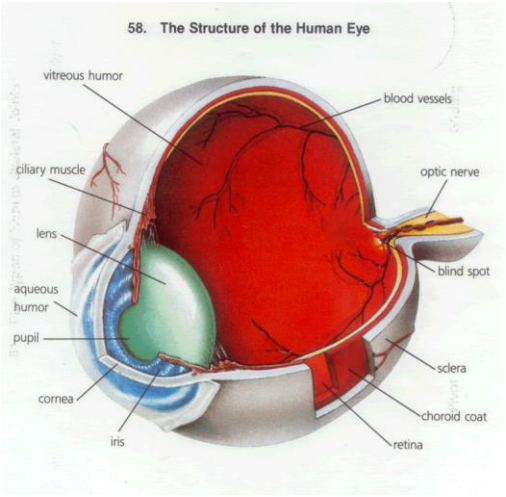
- **Three primary colors = three secondary pigments**
- **Three primary pigments = Three secondary colors**



Vision - Structure

Need to know these structures & their function:

- Cornea: begins to focus light
- Aqueous humor: fluid between inside of cornea & the outside of the lens
- Iris: the color of the eye. A muscle that opens & closes to regulate pupil size
- Pupil: hole through which light passes
- Lens: flexible structure that focuses image on the retina



Vision - Structure

Need to know these structures & their function:

- Ciliary muscle: ligaments attach the lens to these, they contract & stretch the lens allowing near & far focus
- Vitreous humor: fluid inside eyeball maintains size & shape of the eye
- Retina: contains the rods & cones that are sensitive to light
- Choroid coat: middle layer of the eyeball
- Sclera: the outer "whites of the eye"
- Optic nerve: takes rod & cone impulse back to the occipital lobe for processing

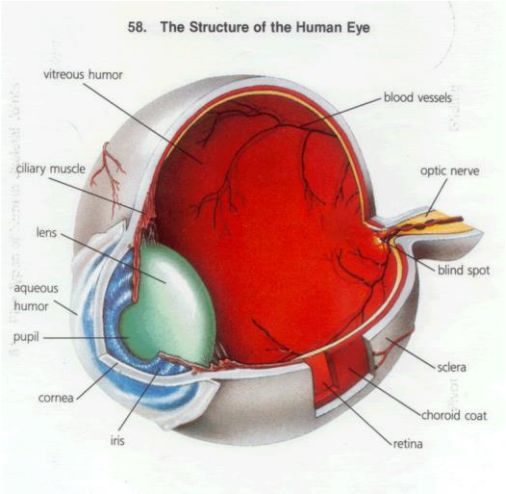
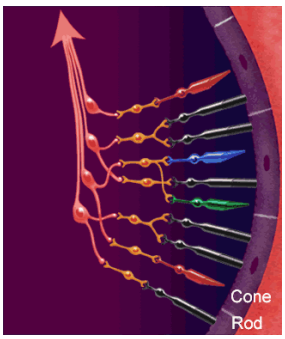
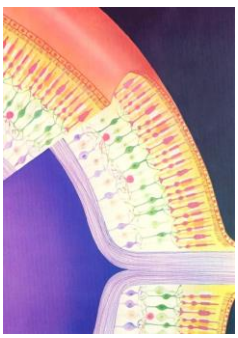
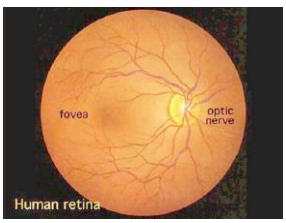


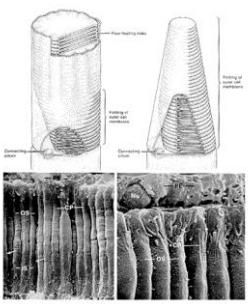
Image Processing

- Fovea – The central region where images focused is the **fovea**.
- Rods – about 1 billion, sensitive to brightness, light and dark & movement
- Cones – detect color, about 3 million. 3 types of cones, sensitive to red, blue & green wavelengths of light.
- All rods & cones have nerve fiber attached, these collect at the back of the eye and form the optic nerve which carries the signal back to the eye.









That’s All for Chapter 10!!

CYA
Later