COLOR!

PRIMARY COLORS OF LIGHT

- The dots on your TV screen:
- **RED**
- **GREEN**
- **BLUE**
- **RGB**
- **When all primary colors are mixed together they create white light.**

SECONDARY COLORS OF LIGHT

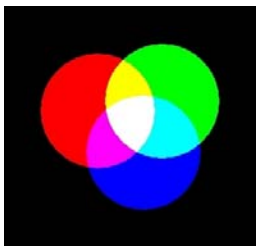
- Occur when two primary colors of light combine
- The secondary colors of light are the PRIMARY COLORS OF PIGMENTS (what your color printer uses)
- blue + red = **MAGENTA**
- red + green = **YELLOW**
- blue + green = **CYAN**

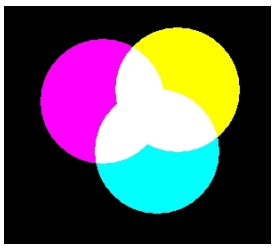
COMPLIMENTARY COLORS OF LIGHT

- Primary and secondary colors of light that form **WHITE** when seen together

- **Magenta + Green = White**
- **Yellow + Blue = White**
- **Cyan + Red = White**

Light





Pigments

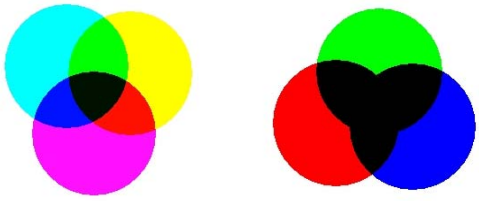
- **Primary colors of pigments are:**
- **Cyan, Magenta, and Yellow.**
- **When all primary colors of pigments are mixed together they create black light.**
- **Secondary colors of pigments are:**
- **Red, Green, and Blue.**

Pigments

- Cyan + Magenta = Blue
- Cyan + Yellow = Green
- Yellow + Magenta = Red
- Yellow + Magenta + Cyan = Black

- Red + Green = Black
- Green + Blue = Black
- Blue + Red = Black

Pigments



COLOR ADDITION AND SUBTRACTION

- The color of your shirt (or a piece of paper, or paint etc.) is due to the PIGMENTS used.
- **The color seen is only the frequency that can be *REFLECTED* by the pigments, all other frequencies are absorbed** (subtracted).
- For the sake of clarity only examples using the primary colors, secondary colors, white and black will be used.

COLOR ADDITION AND SUBTRACTION

- A white shirt under white light looks white because
  - RED + GREEN + BLUE = white is reflected to our eyes.
- A black shirt under white light looks black because
  - no frequency is reflected; the pigments absorb everything.
- A blue shirt looks blue because
  - BLUE is reflected; RED and GREEN are absorbed by the pigment.
- A yellow shirt looks yellow because
  - RED + GREEN is reflected; BLUE is absorbed by the pigment.
- Darker colors are warmer simply because they absorb more frequencies and therefore more energy.

More Examples

- A yellow shirt under red light will look. . .
  - RED. . .because yellow can reflect the one and only frequency available
- The yellow shirt under green light will look. . .
  - GREEN. . .because yellow can reflect it.
- The yellow shirt under blue light will look. . .
  - BLACK. . .yellow pigments absorb the blue frequency and there is nothing left to reflect to our eyes

Still More Examples

- A cyan shirt under magenta light will look. . .
  - BLUE. . .cyan CAN reflect blue and green, magenta light only has red and blue in it. . .the red is absorbed and the blue is reflected.
- What color will you see when you mix magenta and yellow paint?
  - RED. . .the only common color that will be reflected by both pigments.

Why is the sky blue?

- White light (Red + Green + Blue) coming from the sun passes through the Nitrogen in our atmosphere.
- Since Nitrogen is a small molecule it has a high natural frequency.
- The high frequency blue light from the sun causes the Nitrogen molecules to resonate which in turn scatters the blue light into the sky.

Why is the sun yellow?

- Since the blue light has been scattered only red and green remain.
- We see red and green as yellow.
- At sunrise and sunset the light from the sun travels through our atmosphere for a longer distance which means that most of the higher frequencies (green) ultimately get scattered leaving only RED to reach our eyes.
- What if our atmosphere was made up of larger molecules?
  - The lower frequencies would be scattered instead so the sky would appear red and the sun would look cyan.

Why is water greenish blue?

- Water molecules absorb red light somewhat, allowing blue and green to pass through it.
- We see blue and green as CYAN.
- The deeper the water the deeper the blue green color because more red has been absorbed.