LIGHT

Additive Colour Theory

The process of adding colours of LIGHT together

* Helps us understand human vision

Light directly from sources + reflected light off objects will enter our eyes + help us see colour.

* See hand-out for primary colours + secondary

PIGMENT

Subtractive Colour Theory

subtractive Theory Explains how PIGMENTS mix together to obtain new colours.

A pigment is a chemical that absorbs certain colours of light + reflect others.

* All objects/ Matter will have different pigment properties.

* see handout for primary + secondary colours

Additive Colour Theory (Light)

Visible white light is made of a spectrum of colours; however colours can be perceived in other ways. The adding of colours to create a second colour is called the *additive colour theory*.

The primary additive light colours are blue, red, and green. The secondary (or resulting) light colours produced when two of the primary light colours are mixed are magenta, cyan, and yellow. When all three primary colours of light are combined, they produce white light.

Primary Additive Light Colours	Secondary or Resulting Additive Colours
Blue + Red + Green	White
Blue + Red	Magenta
Blue + Green	Cyan
Green + Red	Yellow

Colour televisions and stage lighting use the additive colour theory. The retina of the human eye contains both rods and cones. The rods detect the presence of light while the cone cells perceive colour. There are three types of conecells.:some cells are sensitive to red, some to green, and some to blue. Signals from the cones and rods travel along the optic nerve to the brain. Your brain then interprets the shape and colour of what you see. It is important to remember that the amount of light present in a room will affect our

perception of colour. If you have some defective cones, you will have trouble detecting certain colours- this condition is called colour blindness.

PIGMENT

Subtractive Colour Theory

If an object does not give off their own light, they are seen because light reflects off them. White light is actually made up of a spectrum of colours. Some substances only allow certain colors to be absorbed and whatever is not absorbed is reflected, thusm determining the perceived colour of the object. The colour of the object is thus determined by subtracing all the colours that have been absorbed. This is referred to as the subtractive theory of colour. The chemical that absorbs certain colours of light, but reflects others, is a pigment. The primary pigment colours are- yellow, cyan, and magenta. The secondary pigment colours are red, green, and blue.

Subtractive colour theory is used when manufacturing things such as ski goggles. The goggles are amber to prevent the blue in the bright sunlight from reflecting off the snow into your eyes.

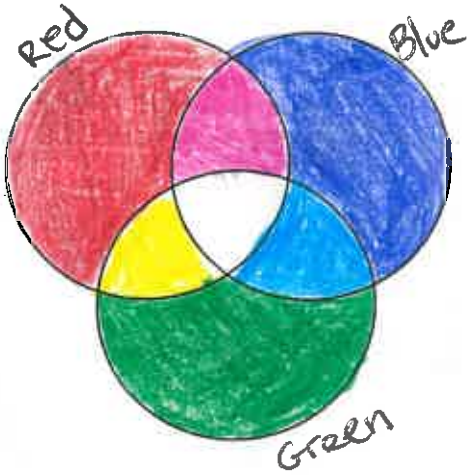
Additive and Subtractive Theory of Color

Background:
The process of adding colors of light together to produce other colors is called **additive color mixing**. This type of mixing helps us to understand human vision. Our eyes can detect the three **primary colors of light**. When any two primary light colors are combined the result is a **secondary light color**. **Complementary light colors** are any two colors of light that produce white light when added together.
The **subtractive color theory** explains how pigments mix to obtain new colors. A **pigment** is a chemical that absorbs certain colors of light, but reflects others.
The additive color theory applies to the mixing of colored lights and the subtractive color theory applies to the mixing of pigments.

Questions:

1. Complete the circle diagram for the additive color theory

LIGHT



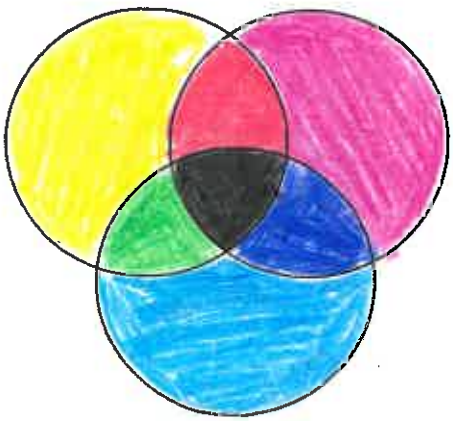
a) Primary colors – RED, Blue, GREEN

b) Secondary colors – Magenta Yellow Cyan

c) [illegible]

2. Complete the circle diagram for the subtractive color theory

PIGMENT



a) Primary pigments – Yellow MaGenta cyan

b) Secondary pigments – RED GREEN BLUE

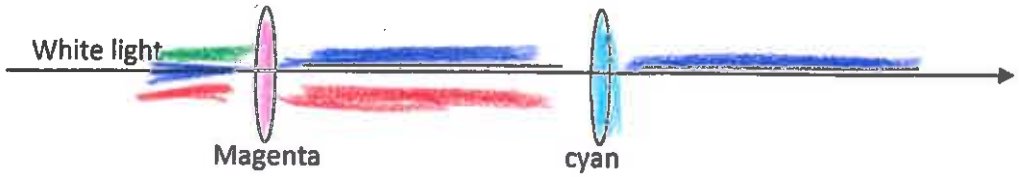
3. Larry wants to produce white light but only makes cyan light. What color of light did he forget to include?

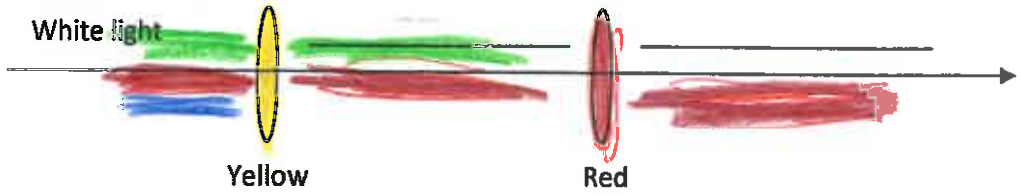
4. If yellow light is produced, what light color is missing to produce white light?

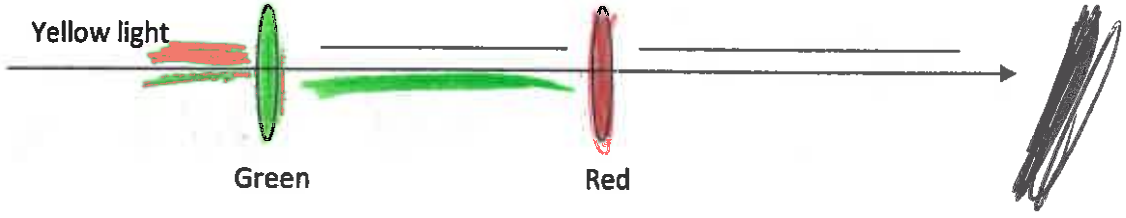
5. Explain why red and cyan are complimentary colors.

6. Filters contain pigments. As light is transmitted through the filter, these pigments absorb some light colors, but not all. Determine the resulting color of light that will pass through the following filter combinations.

a)







7. Draw light rays to show what colors are absorbed and reflected by the following pigments.