



DRAW PAINT ACADEMY

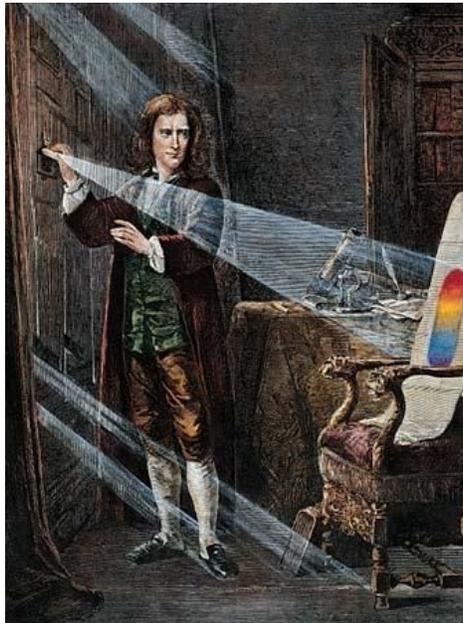
Subtractive Versus Additive Color

In color theory, we have **subtractive color** and **additive color**. These terms refer to the different ways we see color.

Subtractive Color

Subtractive color is how we see color in paints. **Pigmentation** allows for certain wavelengths of light to be reflected and others absorbed. You see, light is actually made up of all different kinds of wavelengths. The colors you see in objects are a result of certain light wavelengths being reflected to your eyes and your brain translating those wavelengths into color.

Additive color refers to the color of light. Our modern understanding of light and color begins with Sir Isaac Newton, who conducted experiments which involved passing white light through a prism to split it into the visible range of colors.



Sir Isaac Newton experimenting with a prism. Engraving after a picture by J.A. Houston, ca. 1870.
Courtesy of The Granger Collection, New York.

Objects do not have an inherent color. An apple is not red because it is inherently red. It is red because it is reflecting red wavelengths and absorbing the rest.



Paul Cezanne, Four Apples, 1881



The subtractive primary colors in art are red, blue and yellow. Primary colors are colors which, in theory, are able to mix all other colors in the visible spectrum. A common artist color wheel is below.

Primary Colors: Red, blue and yellow

Secondary Colors: Orange, green and violet

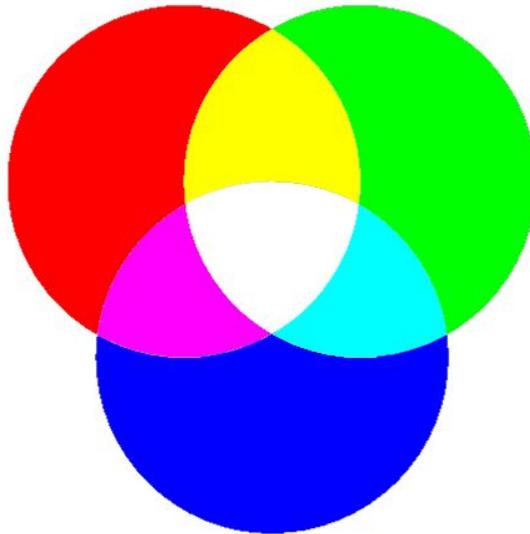


Additive color

Additive color refers to how we see color in light. The primary colors of light are different to the primary subtractive colors of your paints.

Primary Colors Of Light: Red, green and blue

Secondary Colors Of Light: Cyan, magenta and yellow



Sometimes I will refer to the light wavelengths as red, blue and yellow, but this is just to retain some consistency with the subtractive color model and to avoid any confusion. The primary colors of light are in fact red, green and blue. If you mix green with red light, you get yellow light. If you mix blue with green light, you get cyan light. If you mix blue with red light, you get magenta light.

When you mix (add) all the colors of light together, you get white light. This is why it is referred to as additive color. With subtractive colors, you see color because some wavelengths are being reflected and others are being absorbed (subtracted). **When you mix all the subtractive colors together, you do not get white light but rather a muddy, near black color.**

The Dilemma

In painting, you will be painting scenes which have both subtractive colors (reflected light) **and** additive colors (actual light sources).

For example, picture a traditional landscape. The colors of the trees, grass, rocks, land - these are subtractive colors (light is bouncing off these objects). The sky and sun - these are additive colors (light sources).

You are not able to use your paints (subtractive colors) to duplicate the effect of additive colors (a light source). This is a limitation of our paints.

Have you ever wondered why the sunset in your painting just does not seem to pack the same punch as the actual thing? Well, this is why. Our paints have limitations unfortunately.

Instead of painting with light, we are only able to paint the illusion of light. So instead of trying to paint the actual vibrancy and brightness of the sunset in your painting (which would be impossible), you should try and paint the relative brightness and temperature of the sunset to the rest of your scene. This may involve toning down the rest of the painting to show-off the sunset.



Sunset Study, Kingfisher Bay, 2017

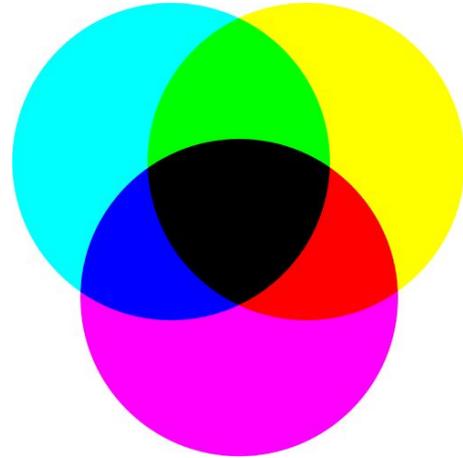
A Note About Cyan, Magenta And Yellow

In painting, it is widely considered that red, blue and yellow are *the* primary colors. But another version of the primary colors which is being adopted by many artists is cyan, magenta and yellow. These colors plus black are actually used in colored printing. Cyan, magenta and yellow are thought to produce a more complete range of colors.

For simplicity and the purpose of this course, I will be using the traditional color wheel and red, blue and yellow as the primary colors.

Primary Colors: Cyan, magenta and yellow

Secondary Colors: Red, blue and green



What Do Subtractive And Additive Colors Have In Common?

An interesting thing about subtractive and additive colors is that they both require **light**. With subtractive colors, light wavelengths are either being reflecting off objects or being absorbed via pigmentation. Additive color refers to light itself.

So without light, color would not exist. It is light that allows us to experience the sensation of color. In a sense, light does not reveal color, it produces color.