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CREATIVE SOLUTIONS & PRINT
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{CMYK vs RGB - CMYK vs RGB}

Basic Rules:

1. What you see on your monitor is not and will never be what is printed. No matter how calibrated it is, it is still projecting light at you and unless we come up with new technology to imbed a light source in paper, the results will never be the same.

General Information:

In grade school we learn that there are three primary colors - red, yellow and blue - that when combined produce secondary colors such as green, purple and orange, and all the various shades and variations on the primary and secondary colors. However, these are the primary colors of pigment and different systems apply to the colors that we see on computer screens and the colors that we see in printed media and photographs.

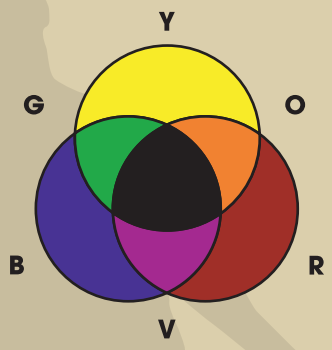
Colors would not be possible without light because color is, in essence, light either reflected off of objects we see or viewed directly from the light source. When light is passed through a prism, the light beam changes direction, and the wavelengths are separated, causing the prism to produce the colors of the electromagnetic spectrum. Rainbows are light refracted through water particles in the air. Humans can only perceive a small portion of the electromagnetic spectrum - from 4.3-7.5 x 1014 Hz in frequency - and it is the wavelength of the radiation that determines the color of light that we are seeing. Each color has its own wavelength. Infrared, microwave, radio, television and electrical power have lower frequencies than visible light, and ultraviolet, X-rays and gamma rays have higher frequencies.

Unlike the primary colors of pigment, the primary colors of light are red, green (not yellow) and blue, commonly referred to as RGB. The pigment color system does not apply to computer monitors because colors are created on monitors by adding light. RGB is an additive color system, which means that color is added to a black background. Black is the absence of light and therefore the absence of color. Secondary colors, such as cyan, magenta and yellow, are created by combining the primary colors. The color white is achieved by adding the three primary colors together in equal amounts.

There is, however, a third color system called subtractive, commonly referred to as CMYK. The primary colors of the subtractive system are cyan (C), magenta (M) and yellow (Y), the same colors that are the secondary colors of the RGB system. The letter "K" in CMYK stands for black. The subtractive color process is based on light reflected from an object and passed through pigments or dyes that absorb certain wavelengths, allowing others to be reflected. Unlike the additive system, which begins with black and adds color, the subtractive system begins with white and subtracts color. CMYK is commonly used in printing as most print begins with a white page that reflects white (RGB) light. To reproduce color on the paper, transparent pigments (cyan, magenta and yellow) are used to filter out the RGB wavelengths in various combinations. In theory, the combination of these three colors should produce black, but the fourth color black in CMYK is needed to produce true black. The secondary colors of the subtractive system are red, green and blue, the primary colors of the additive system.

Subtractive color adds all of the colors together to make black.
ex. White paper becomes darker as colors are mixed on it. If we dump every paint we have on the paper, we will get something resembling black.

The color mixtures are what you would expect.
ex. Yellow and red make orange.



Additive color adds all of the colors together to make white.
ex. Sunlight (white light) is broken into different colors when it passes through a prism. When the light is absent, darkness (black) is the result.

The color mixtures are not what you would expect.
ex. Green and red make yellow.