



# Color

paint • digital • production



# To start....a few vocabulary items:

**Hues** – the names of the colors (red, blue, green, yellow)

**Value** – the degree of lightness or darkness  
each hue has it's own value scale  
ex. Yellow appears lighter than purple

**Intensity or Saturation** – the measure of purity or brightness  
a color's intensity can be lowered or decreased by mixing it  
with gray OR it's compliment

All color is affected by the surrounding colors and lighting.

# The color wheel that you grew up with

Consists of the three primary colors:


- red, yellow and blue

which mix to create the secondary colors:

- orange, green and purple

which, in turn, mix to create the tertiary colors, that can be further mixed to create any number of colors (A LOT of them)





# These colors can be mixed to create color schemes:

**Monochromatic** – using differing values of one hue

**Analogous** – colors next to each other on the color wheel

**Complimentary** – colors that are directly across from each other on the color wheel

**Split complimentary** – any color plus the two colors adjacent to its compliment



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So....what about digital?

# Well...on screen we use RGB

or red, green and blue which ADD to make white...or ADDITIVE

This is the color that works most like our eyes when it comes to perceiving color. It is created from projected red, green and blue lights that combine to create white light

So...when all of the lights are shining at their brightest, the result is as bright as you can get, or white

It can not be used for printing

Printing reflects light off a surface and can not be made completely with light

This color scheme is measured on a scale of 0-255

the higher the number, the brighter it is:

255, 255, 255 = white

0, 0, 0 = black



# RGB

On screen: additive color wheel

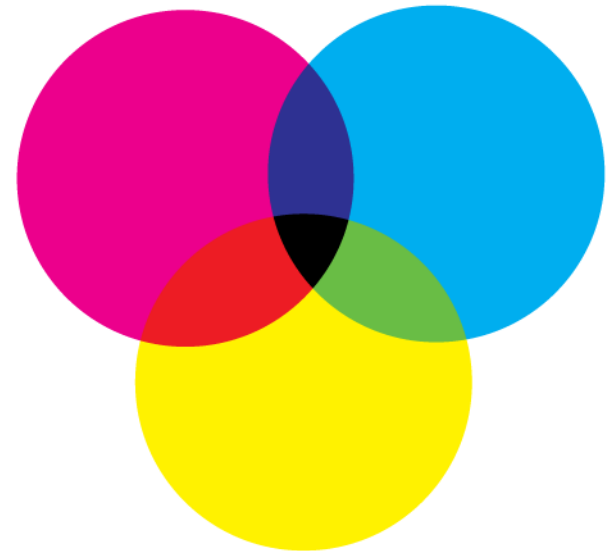
# But RGB needs to be converted to CMYK in production

cyan, magenta, yellow and black....or subtractive because the hue blocks light wavelegnth from reflecting

This color mode is considered  
**SUBTRACTIVE**

The primary colors are cyan, magenta and yellow. Because the result of mixing all of them tends to be muddy, black is added in.

This color mode can not produce as many colors as RGB, which is why colors shift when printing



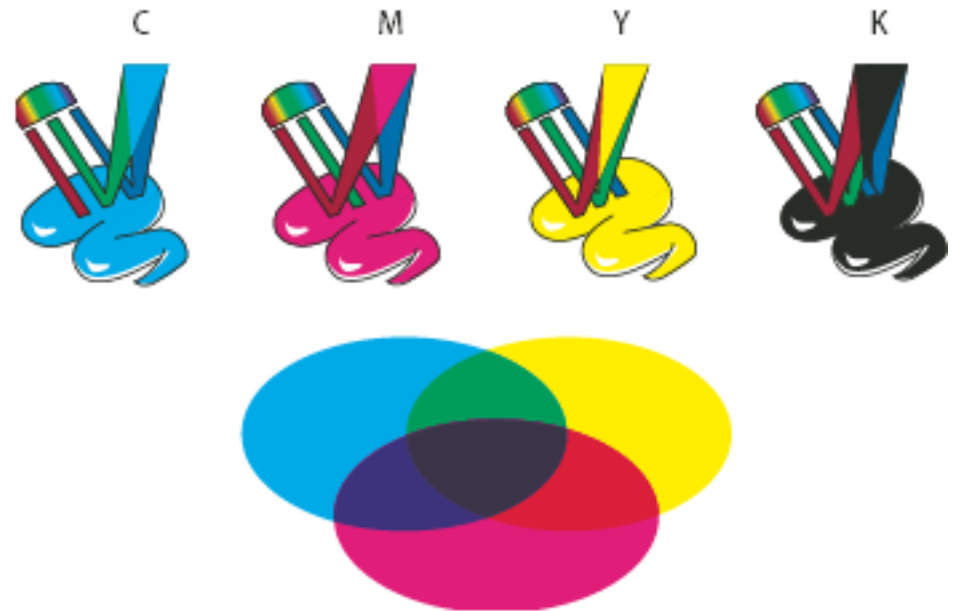
**CMYK**  
In print: subtractive color wheel



# How it works:

layers of transparent, overlapping and varied percentages of ink are applied to a **substrate**, or surface

light then reflects through the inks and bounces off the substrate behind it while blocking some of the wavelengths. What we see is the remaining white light that has not been blocked reflecting off the surface to produce color.



# Sometimes....

screen printers and commercial printers use **halftone** screens as transparent layers. These are DOTS of color that mix optically and are printed one color at a time, starting with the lightest

So the yellow is first, then red, then blue, then black



These halftone dots are varied in size and sprayed at different angles to allow the colors to mix with a wide range. This creates a pattern called a **Moiré pattern** and the separated colors are called **color separations**

Take a magnifying glass to a magazine and you will be able to see the pattern (or if the separations were mis-registered it is even easier to see)

# And finally....Gamut

Gamut is the color range of a particular color wheel

CMYK produces fewer colors than RGB which has a smaller gamut than what your eye can perceive. They also fail, in full to represent each other...sadface

This is why you can see colors on a computer that look different when printed and you can see some colors that you are not able to create either on a computer or on paper.

