Color in Landscaping

By C. Kohn
Agricultural Sciences
Waterford WI

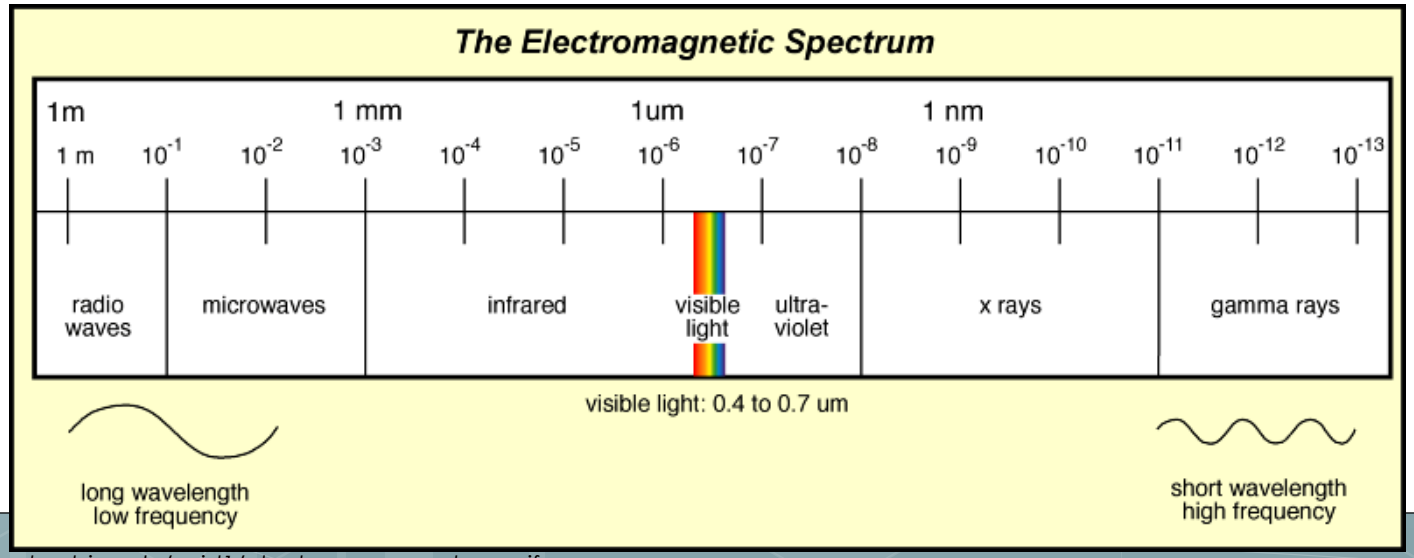
Color

- **Color is the difference in the visual appearance of objects due to how they reflect light into a person's eyes.**
  - Different objects appear to have different colors because of the wavelengths of the light they reflect.

- **In order to be seen, an object must reflect visible light.**
  - Light is actually one of many kinds of electromagnetic radiation.
  - Radiation is any kind of moving energy.
  - There are many kinds of electromagnetic radiation, ranging from visible light to AM and FM radios waves, to X-rays and microwaves.

Electromagnetic Radiation

- **Electromagnetic radiation consists of two properties – the size of the wavelengths and intensity.**
- **The wavelength of radiation (or frequency) is a measure of how are apart the peak of each wave of energy is from the peak o the next wave.**
  - The human eye can detect electromagnetic radiation whose waves are 390-700 nanometers apart.
    - *A nanometer is one billionth of a meter.*



Source: http://www.columbia.edu/~vjd1/electromag_spectrum.gif

Electromagnetic Intensity

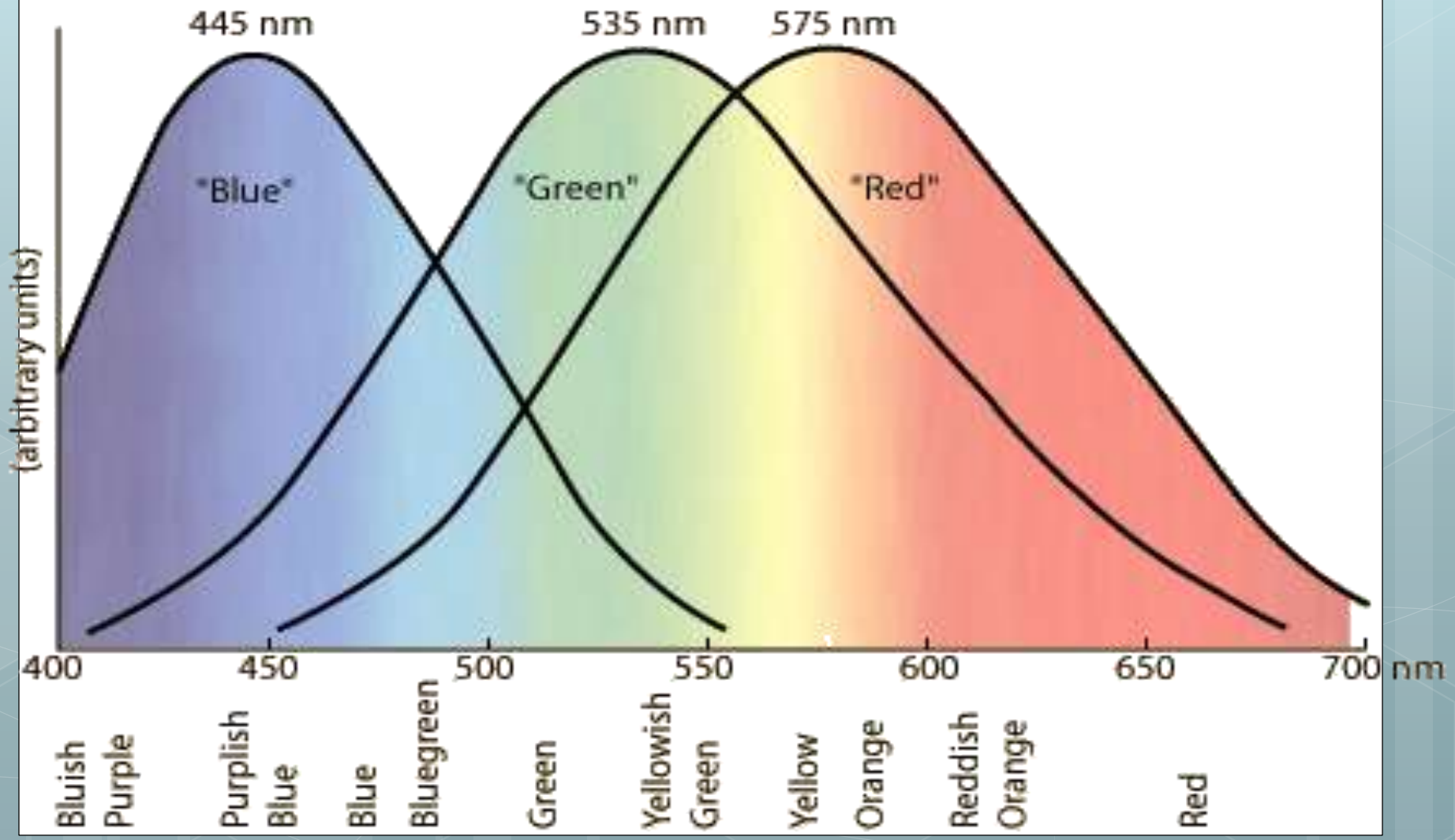
- **Electromagnetic intensity is a measure of how much radiation is being emitted from a source.**
  - For example, a 100 watt incandescent light bulb and a 100 watt black light will each emit the same intensity of light.
  - However, the 100 watt incandescent bulb will appear brighter because it is detectable by our eyes (even though both bulbs are emitting the same intensity of radiation).

Radiation & Color

- **Color is detectable by our eyes because we have specialized nerves in our eyes called cones.**
  - Cones detect light within specific wavelength ranges.

- **Most people have three kinds of cones.**
  - Blue cones have maximum stimulation by light with a wavelength of 420 nm, Green cones by light with 530 nm, and Red cones by light with a wavelength of 560 nm.
  - The color of an object depends on the size of the wavelength it reflects back into the viewer's eyes.

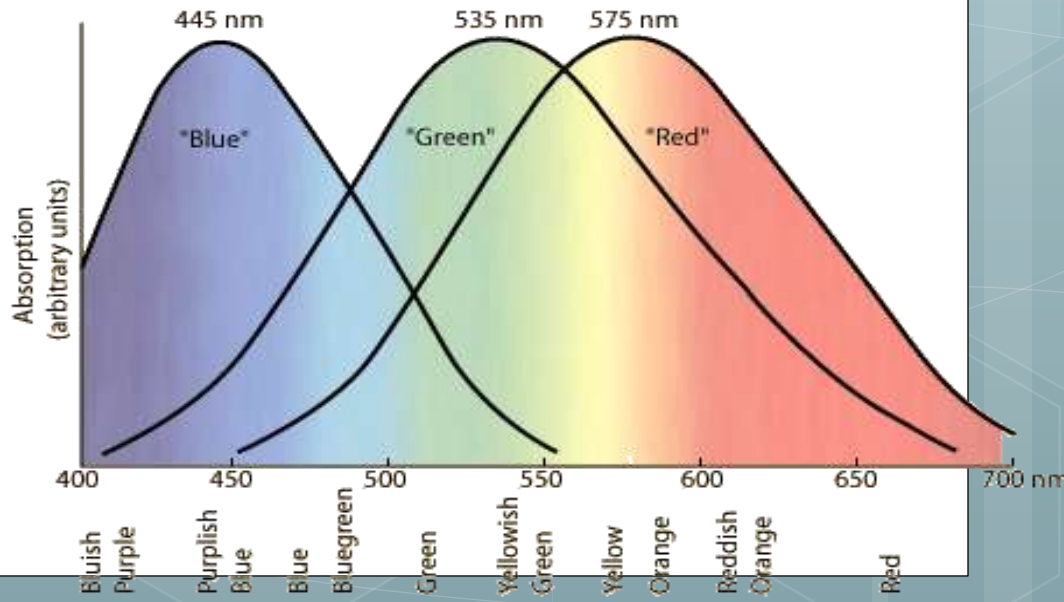
- **The three kinds of cones in our eyes are each stimulated by different wavelengths of light.**



Source: http://hyperphysics.phy-astr.gsu.edu/hbase/vision/colcon.html#c1

Beyond blue, green, and red.

- **We obviously see more than just blue, green, and red colors.**
  - The wide range of colors that people can detect is a result of which cones are stimulated, and to what extent they are stimulated.
  - For example, the color yellow is created when both green and red cones are stimulated to almost an equal extent.



Source: http://hyperphysics.phy-astr.gsu.edu/hbase/vision/colcon.html#c1

Undetectable Colors

- **When the wavelength of electromagnetic radiation is greater than 700 nm or less than 390 nm, our eyes are unable to detect this radiation.**
  - That radiation is still occurring, but our eyes are not able to detect it.
  - This is similar to a dog whistle – we cannot hear this whistle when it is blowing, but sound is still being produced (as evidenced by the fact that a dog can hear it).
    - *Similarly, if we play the lowest key on a piano, we can hear it but a dog cannot.*

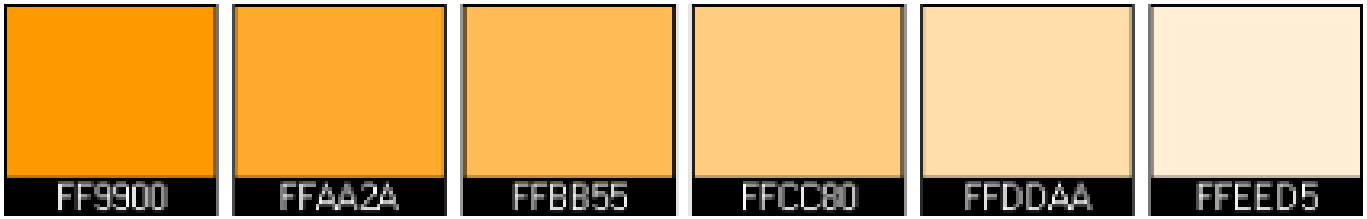
Color, Summarized

- **Color is the result of the different kinds of cones in our eyes becoming stimulated in varying ways by a very specific and narrow band of radiation, resulting in our brain "painting" what we see so as to create the sensation that each of these objects has a different appearance.**
  - In reality, it is our brains that create the color of an object (not the object itself) based on the wavelength of light it reflects.
  - Things that appear "blue" to us do so because the light reflected from that object stimulated more of our blue cones than our red and green cones.

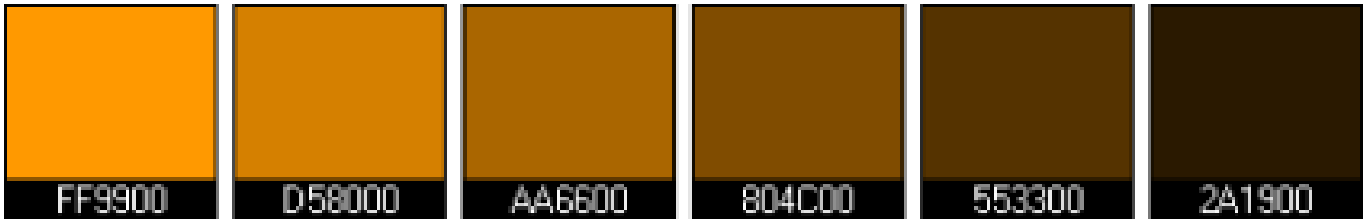
Properties of Color

- **Color has multiple properties, including…**
  - Hue – this is the actual color (e.g. green, blue, red, yellow, etc.).
  - Value – this is how light or dark the color is (e.g. dark green or light red). Value can have shade or tint.
    - *Shade is a hue that has been darkened; e.g. Navy is a shade of blue.*
    - *Tint is a hue that has been lightened; e.g. pink is a tint of red.*
    - *Tone is created by the addition of gray to create a "dusty appearance"; e.g. country blue is a tone of blue.*
  - Intensity – intensity is how 'strong' the color appears to us.
    - *E.g. if gray has been added to a color, it will appear muted and duller than if that hue exists in its purest form (such as 'fire engine red').*

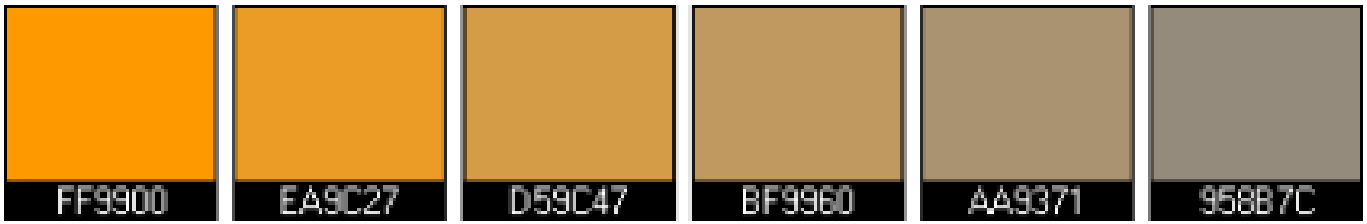
Tints - adding white to a pure hue:



Shades - adding black to a pure hue:



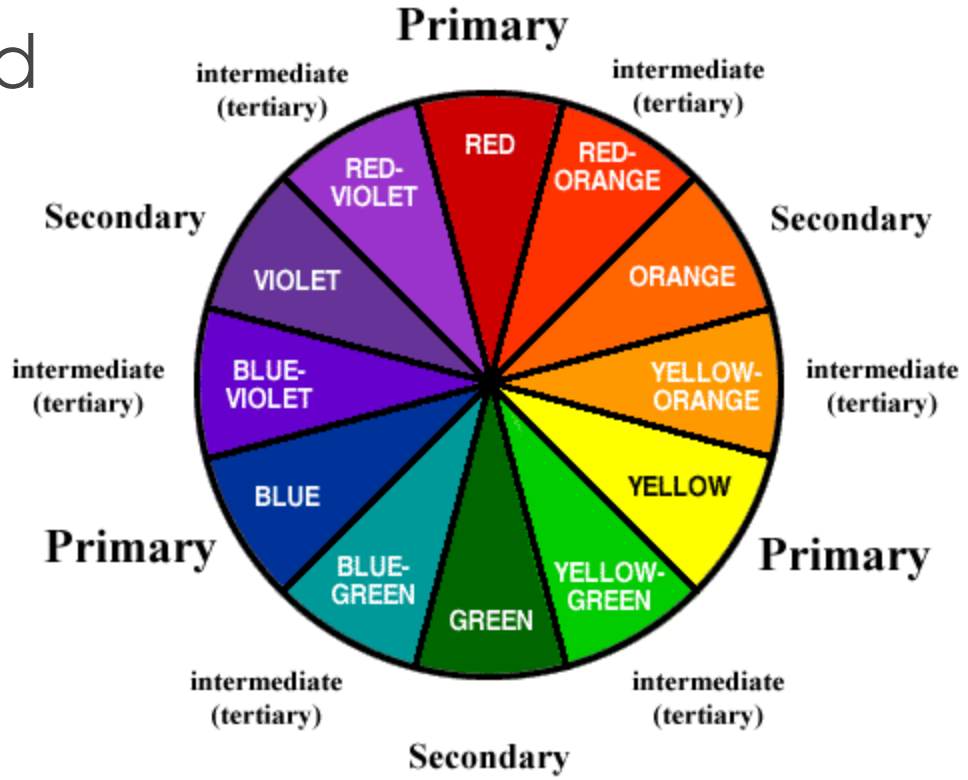
Tones - adding gray to a pure hue:



Originally found at http://www.tigercolor.com/color-lab/color-theory/color-theory-intro.htm#complementary

Hue

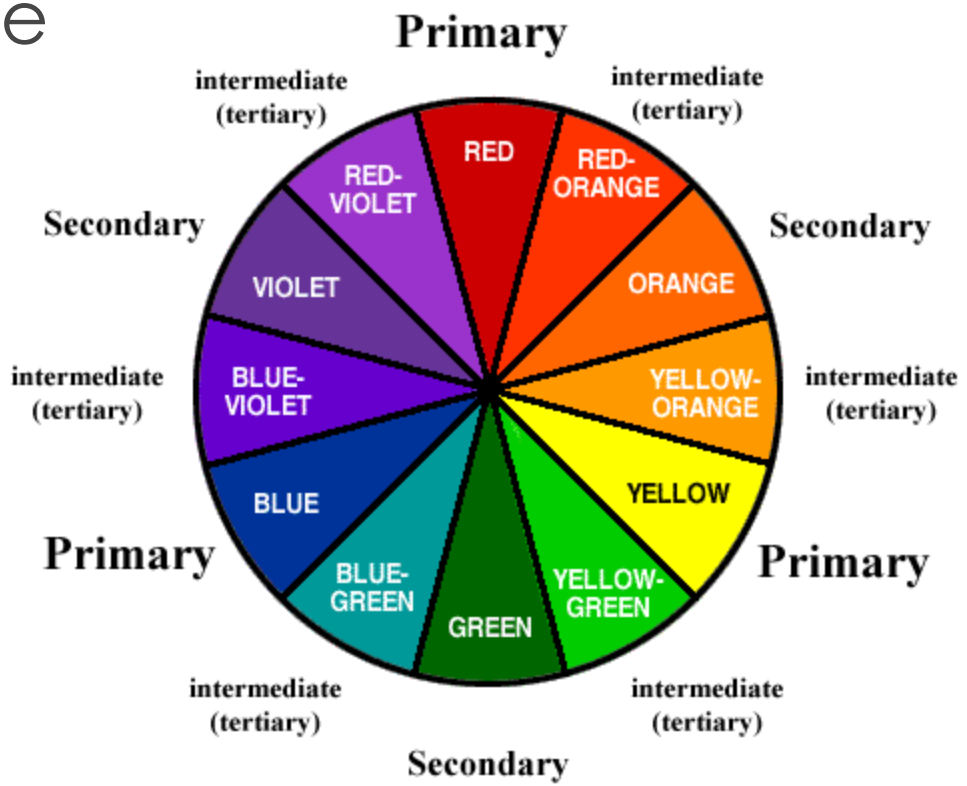
- **Hue is the descriptive name of the color (e.g. what you see as the name on the side of the crayon).**
  - Hues are organized by using a color wheel, which consists of twelve hues.



Source: http://cios233.community.uaf.edu/files/2011/10/color_wheel.gif

Color Wheels

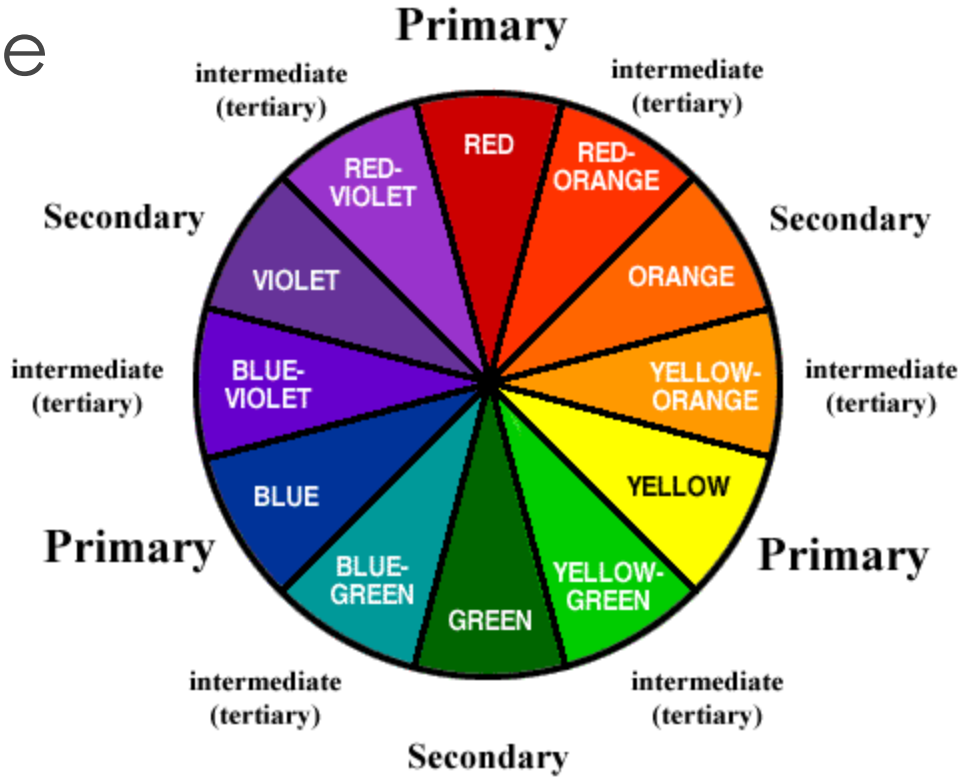
- **The primary colors on a color wheel are red, yellow, and blue.**
  - These colors are spaced equidistantly on the color wheel.
  - In design, they cannot be created by mixing any other colors.



Source: http://cios233.community.uaf.edu/files/2011/10/color_wheel.gif

Color Wheels

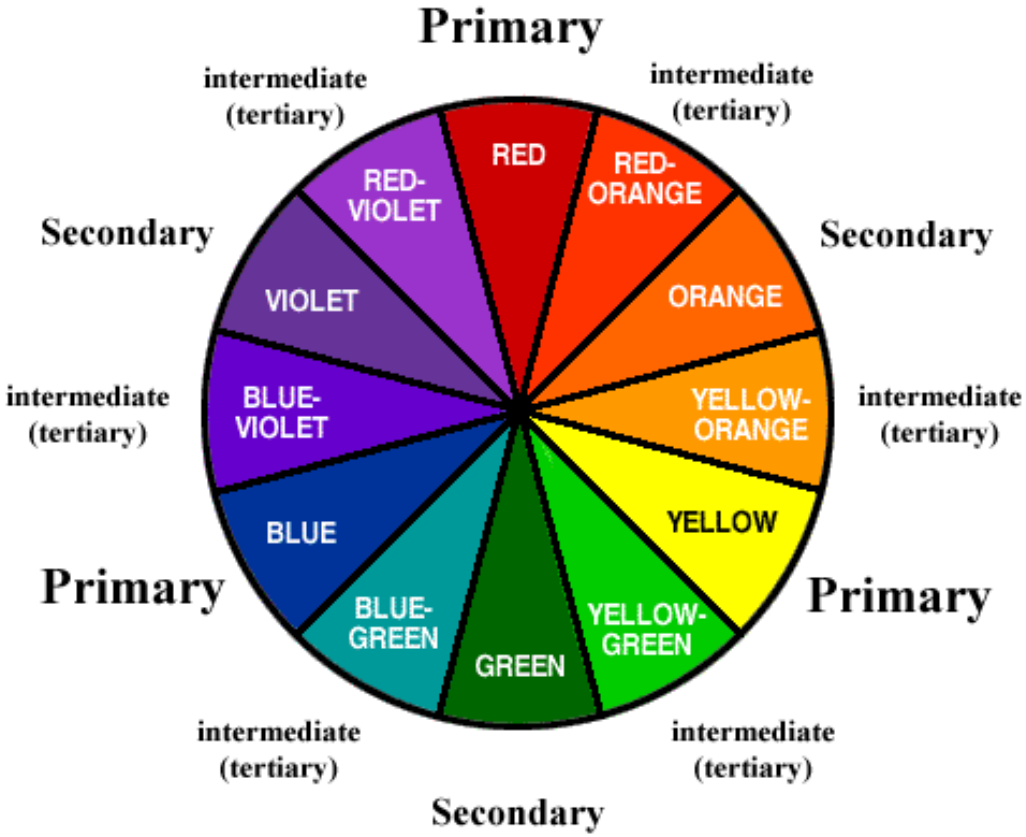
- **The secondary colors on a color wheel are orange, green, and violet.**
  - These colors are also spaced equidistantly on the color wheel.
  - These colors are created by mixing two primary colors.



Source: http://cios233.community.uaf.edu/files/2011/10/color_wheel.gif

Color Wheels

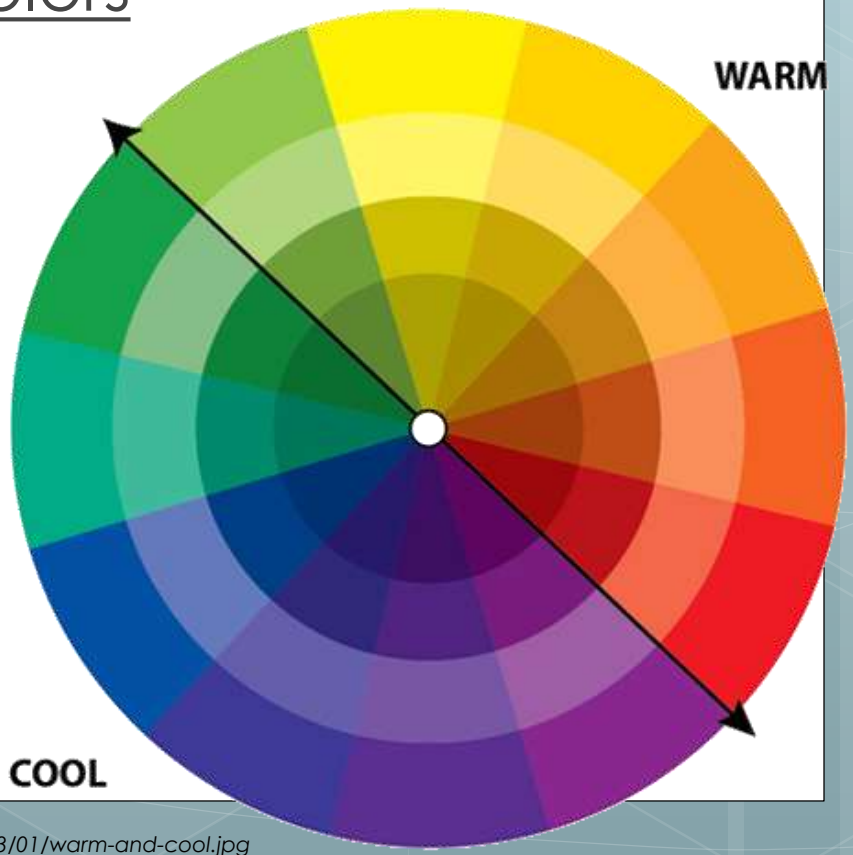
- **The tertiary colors on a color wheel are the colors created by mixing a primary and a secondary color.**
  - These colors are hyphenated and the primary color is always listed first.
  - E.g. Red-orange and blue-green are examples of tertiary colors.



Source: http://cios233.community.uaf.edu/files/2011/10/color_wheel.gif

Color wheel categories

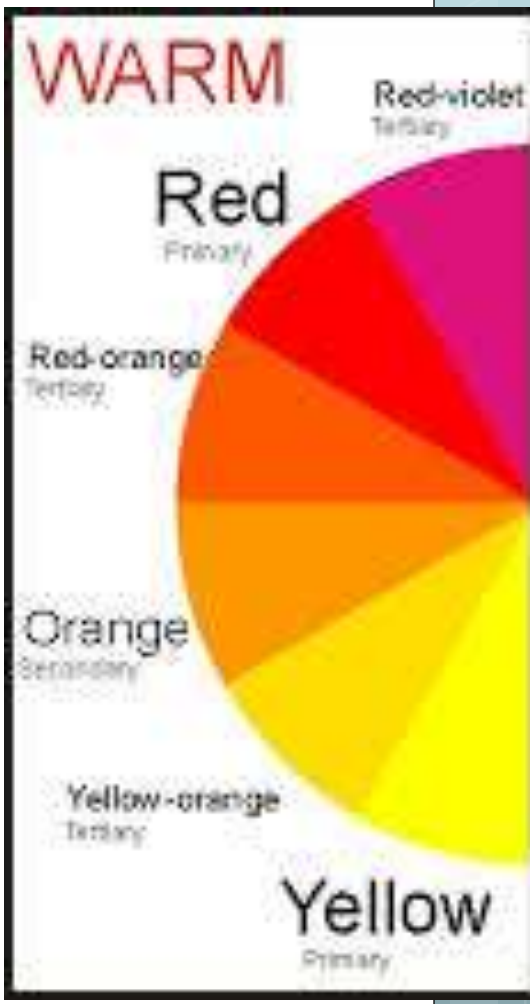
- **The color wheel can be broken into two kinds of categories.**
  - Advancing/Warm Colors are those between red-violet and yellow.
  - Receding/Cool Colors are those between yellow-green and violet.



Source: http://operationwritehome.org/wp-content/uploads/2013/01/warm-and-cool.jpg

Warm Colors

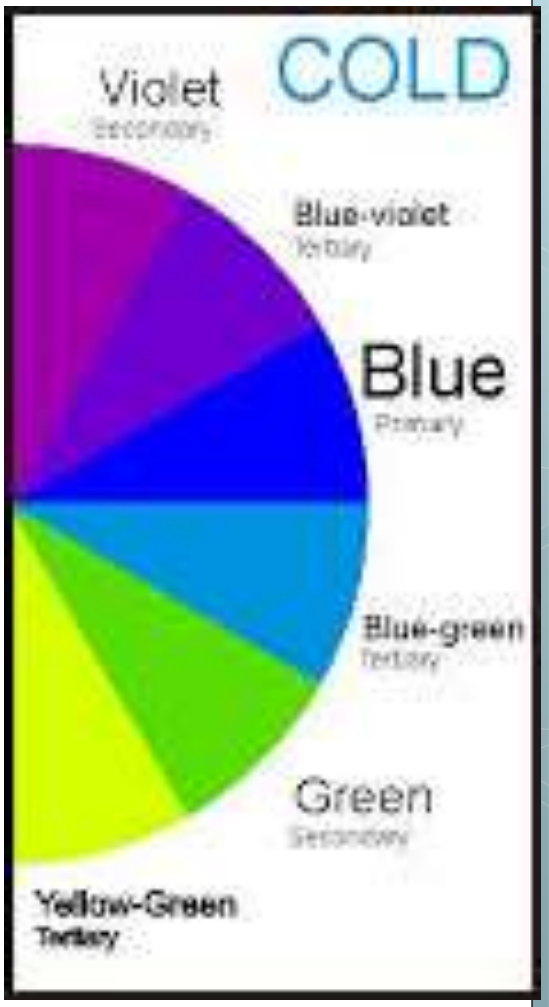
- **Advancing/Warm colors appear to move toward the viewer.**
  - A viewer's brain will associate these colors with warmth, aggression, or excitement.
  - They can also seem cheerful or happy.
  - They tend to create a more informal look for a landscape.
  - Warm colors tend to make an object look larger.
  - If overused, warm colors can evoke a sense of irritation.



Source: http://www.beautyhows.com/wp-content/uploads/2013/03/How-to-Choose-Eyeshadow-Colors-%E2%80%93-Warm-and-Cool-Colors.jpg

Warm Colors

- **Receding/Cool colors appear to move toward the viewer.**
  - A viewer's brain will associate these colors with a sense of passive coolness.
  - They can also seem restful, peaceful, soothing, and sometimes even melancholy and depressing if overdone.
  - Cool colors tend to make an object look smaller.
  - They tend to create a more formal look for a landscape.



Source: http://www.beautyhows.com/wp-content/uploads/2013/03/How-to-Choose-Eyeshadow-Colors-%E2%80%93-Warm-and-Cool-Colors.jpg

Warm Color Scheme

Source: http://ebepp.com/wp-content/uploads/2014/01/small-backyard-landscaping-165.jpg

Cool Color Scheme

Source: http://procutlandscaping.com/blog/wp-content/uploads/2012/06/landscape-design-rockland-county.jpg

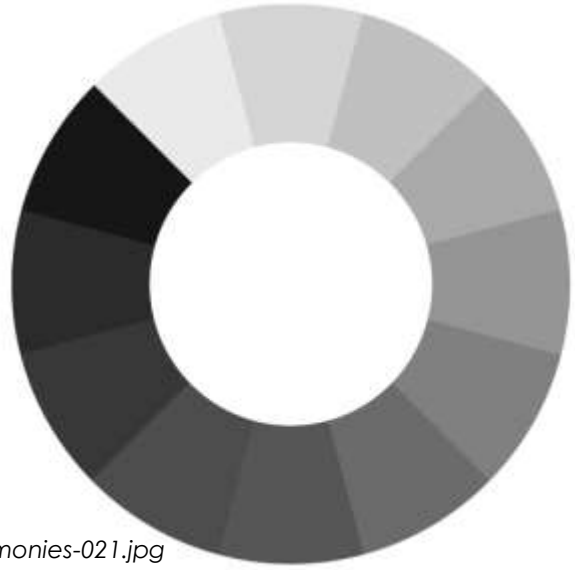
Harmony of Color

- **A color wheel can be used to determine which colors can be grouped together to create a sense of unity and harmony.**
  - Colors that harmonize with each other do not "clash".
  - Imagine a well-selected clothing outfit – if you would wear a combination of colors, those are probably colors that harmonize with each other.
  - Clothing that appears gaudy to a viewer may likely consist of colors that do not harmonize with each other or with the person's skin tone or hair color.

Color Harmony Groupings

- **There are multiple kinds of color harmonies:**

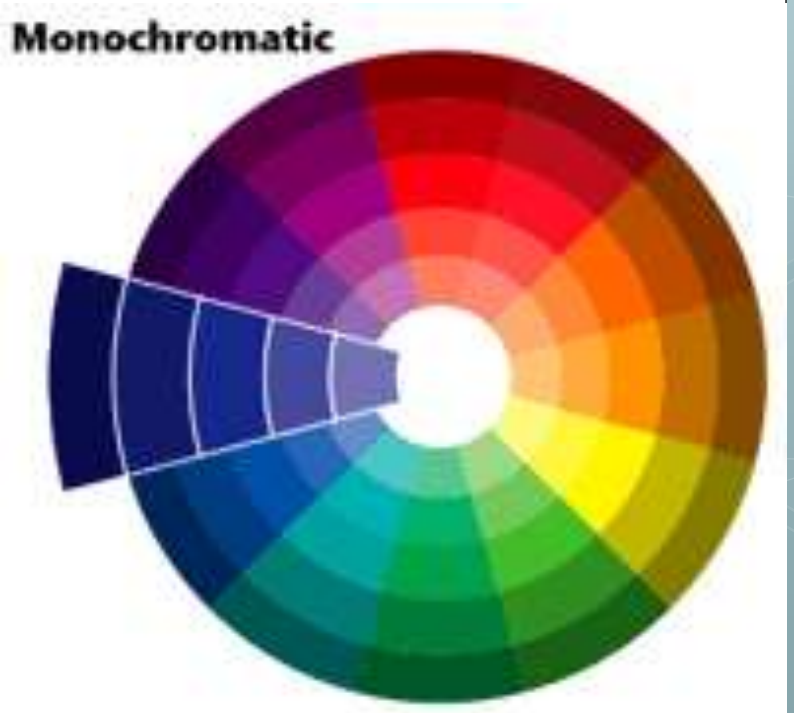
- **Achromatic Color Harmony consists of grouping neutral colors without any hues.**
  - This would include black, gray, white, and any colors that do not appear on the color wheel.



Source: http://myworldofcolour.files.wordpress.com/2010/04/all_harmonies-021.jpg

Monochromatic Color

- **Monochromatic color harmony consists of grouping different values of one hue.**
  - For example, if a color scheme consisted of pink, mauve, red, burgundy, black, white, and gray.
  - Monochromatic color harmony evokes a sense of formality and professionalism.



Source: http://taylors2ddagnes.files.wordpress.com/2013/05/how-to-choose-eyeshadow-colors-e28093-monochromatic-colors.gif

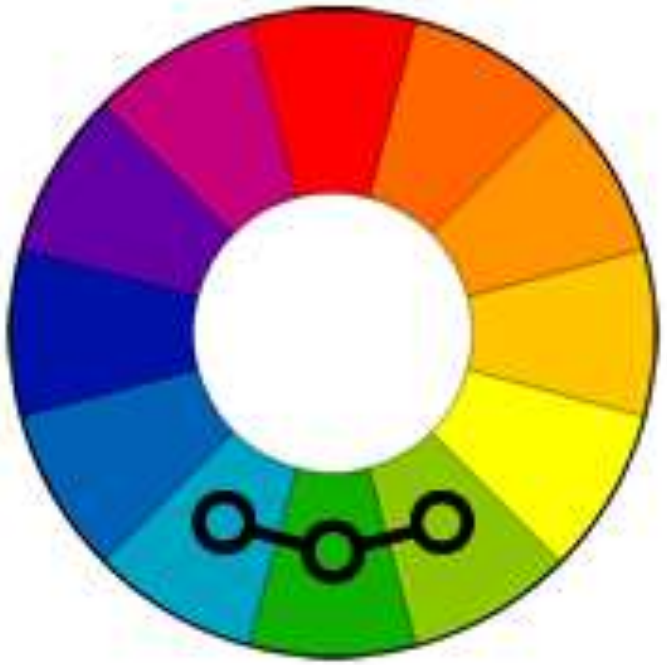
Monochromatic Color Harmony

- **This landscape consists primarily of values of green hue and neutral colors.**

Source: http://www.caes.uga.edu/applications/publications/files/html/B1396/images/Figure%206.JPG

Analogous Color

- **Analogous color harmony is created when adjacent hues on the color wheel are used.**
  - Analogous color harmony involves only one primary color which dominates the selection.
  - Analogous color creates a sense of serenity and comfort.
  - Analogous color schemes require a strong level of contrast and need a third achromatic color (black, white, or gray) to accent the selection.



Source: http://www.tigercolor.com/color-lab/color-theory/color-theory-intro.htm#complementary

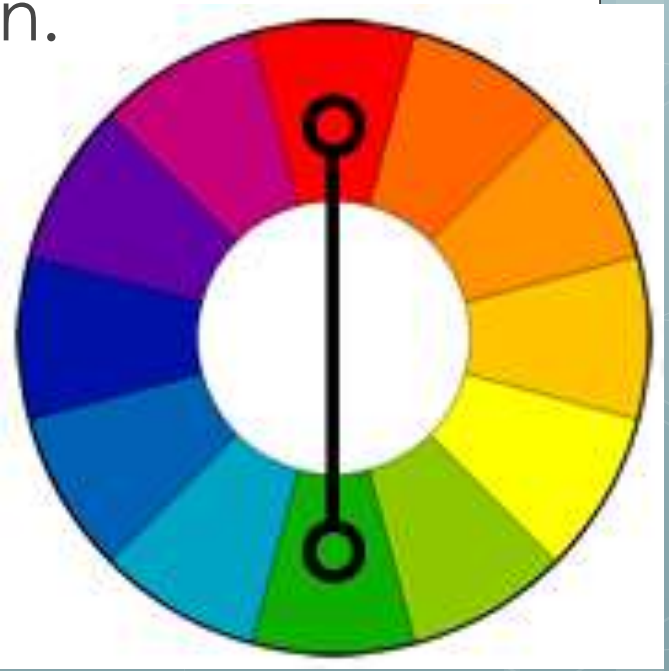
Analogous Color

- **The colors used in the flowers are all red, pink, or red-violet.**

Source: http://3.bp.blogspot.com/-PfFpZ6f4bTc/Tar5abRUbJI/AAAAAAAAAE0/Rh5gyAbbhJw/s1600/curb-appeal-1.jpg

Complementary Color

- **Complementary Color Harmony is created when hues are used that are opposite from each other on the color wheel.**
  - This could include blue and orange, purple and yellow, or red and green.
  - Complementary colors create a sense of vibrancy and enthusiasm (which is why they are so often used as collegiate colors and for pro-sports teams).



Source: http://www.tigercolor.com/color-lab/color-theory/color-theory-intro.htm#complementary

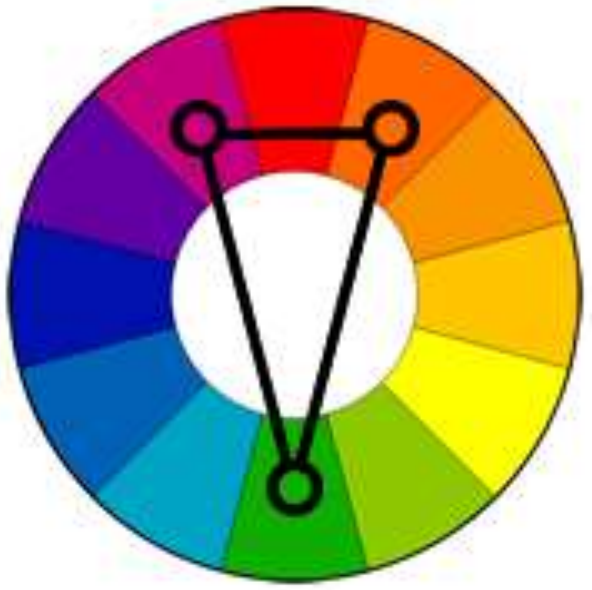
Complementary Color Harmony

- **This landscape is dominated by yellow and purple hues.**

Source: http://www.simplebynaturelandscape.com/wp-content/gallery/residential-landscape-design/flower-landscape-design.jpg

Split-Complementary Color

- **Split-Complementary Color Harmony consists of a hue and the two hues on either side of the hue opposite this first hue.**
  - For example, red would be paired with yellow-green and blue green.
  - This harmony creates a strong sense of visual contrast, allowing the colors to stand out.
    - *However, this does not create the same sense of 'tension' as the standard complementary color harmony.*
    - *This makes it ideal for situations in which a business needs to stand out but appear professional, such as a restaurant.*
    - *Split-complementary is a good beginner's choice because it is difficult to get wrong.*



Source: http://www.tigercolor.com/color-lab/color-theory/color-theory-intro.htm#complementary

Split-Complementary Color

- **This landscape is dominated by red, yellow-green, and blue-green values.**

Source: cordinglandscape.com

Triadic Color

- **Triadic color harmony consists of group three hues that are equidistant from each other on the color wheel.**
  - This could be as simple as red, blue, and yellow or more complicated, such as yellow-orange, red-violet, and blue-green.
  - Triadic color harmonies also create a sense of vibrancy even if pale or unsaturated colors are used.

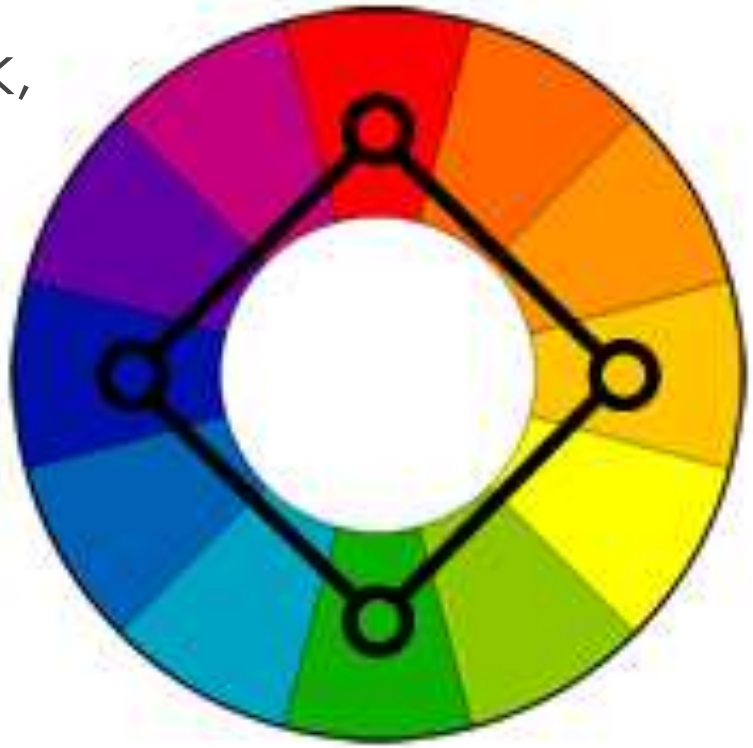
Source: http://www.tigercolor.com/color-lab/color-theory/color-theory-intro.htm#complementary

Triadic Color Harmony

Source: http://www.pwconsole.com/content/images/complimentary%20orange%20and%20blue.jpg

Square Color Harmony

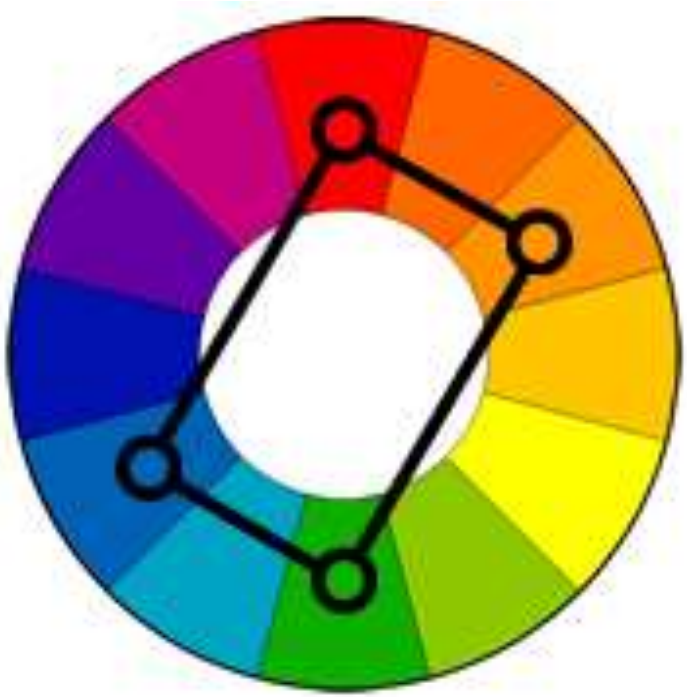
- **Square color harmony consists of four colors, all equidistant from each other on the color wheel.**
  - For this scheme to work, one color must be dominant over the other three.
  - Close attention must be used when balancing warm and cool colors.



Source: http://www.tigercolor.com/color-lab/color-theory/color-theory-intro.htm#complementary

Rectangular Color Harmony

- **Rectangular color harmony consists of four colors separated by two different distances (e.g. two sets of hues each one color apart separated from the other set by three colors).**
  - This scheme requires more skill and works best if one color is dominant over the other three.
  - The balance between warm and cool colors must be kept in consideration.
  - This scheme offers possibility for wide variation.



Source: http://www.tigercolor.com/color-lab/color-theory/color-theory-intro.htm#complementary

Rectangular Color Harmony

- **This landscape is dominated by yellow, green, red, and violet.**

Source: http://qualitylandscapedesign.com/wp-content/uploads/2013/01/Front-Yard-Landscape-Designs.jpg