# BASIC COLOUR THEORY AND COLOUR MIXING

## PRIMARY COLOURS

The primaries are Yellow, Blue, and Red; they cannot be created by a mixture of other colours, but are themselves the base colours for mixing all other hues.

## SECONDARY COLOURS

The secondaries are Green, Violet, and Orange, and are produced when *equal* amounts of two primary colours are added together, e.g.

Yellow + Blue = Green  Blue + Red = Violet  Red + Yellow = Orange

If we mix the primaries in proportions other than 50/50, for e.g. 60/40 or 70/30, we produce colours that are between the primaries and secondaries—a yellow-green, a yellow yellow-green, a green yellow-green for instance—giving us a good range of hues as part of our painting palette.

## TERTIARY COLOURS

The tertiaries are those colours made by mixing the three primaries together, or a secondary with a secondary, e.g. a mix of Orange and Violet. They can be mixed in any proportion, creating an infinite range of colours on the palette. The tertiaries move towards a neutral grey and have a low chroma, thus approximating many colours within the natural environment.

## COMPLEMENTARY COLOURS

Complementary colours are 'pairs' that sit opposite each other on a typical colour wheel, for e.g. a primary (mid) Blue sits opposite a secondary Orange. The best-known complementary pairs are:

Yellow and Violet  Red and Green  Blue and Orange

## WARM AND COOL COLOURS

By simple definition:

Warm colours are Yellows, Oranges, and Reds  Cool colours are Blues, Greens and Violets

However, any colour can be relatively warm or cool, for e.g., a red can be warmer (a mid red with a hint of orange) or cooler (red with a hint of blue); a yellow-green might be warm, whilst a blue-green cool. Warm colours tend to advance (are salient) and cool colours tend to recede (are recessive).

## WHAT IS A HUE?

Hue is another word for colour. We differentiate hues from one another by using the terms yellow, blue, red, green, orange, violet, and there are all of those hues that can be mixed (and potentially named) in between: in this sense, a hue represents a segment of the colour spectrum.

## WHAT IS CHROMA or INTENSITY?

A hue's chroma or intensity is synonymous with brightness or dullness. A colour can be bright, or it can move to a more neutralizing grey. A Cadmium Light Red is more intense (has a higher chroma) than a Cadmium Dark Red. Primary and secondary colours are more intense than tertiary colours.

## WHAT IS VALUE or TONE?

Value is another word for tone, or the lightness and darkness of a colour. Amongst hues, Yellow is lighter (has a higher tone) than Orange or Yellow-Green; they in turn are lighter than Primary Green, Red, Violet and Blue, while Purple has the darkest tone.

Tone can be adjusted by adding White or Black: if you add White to any hue to lighten the tone it is called a TINT, and if you add Black to a hue to darken the tone it is called a SHADE.

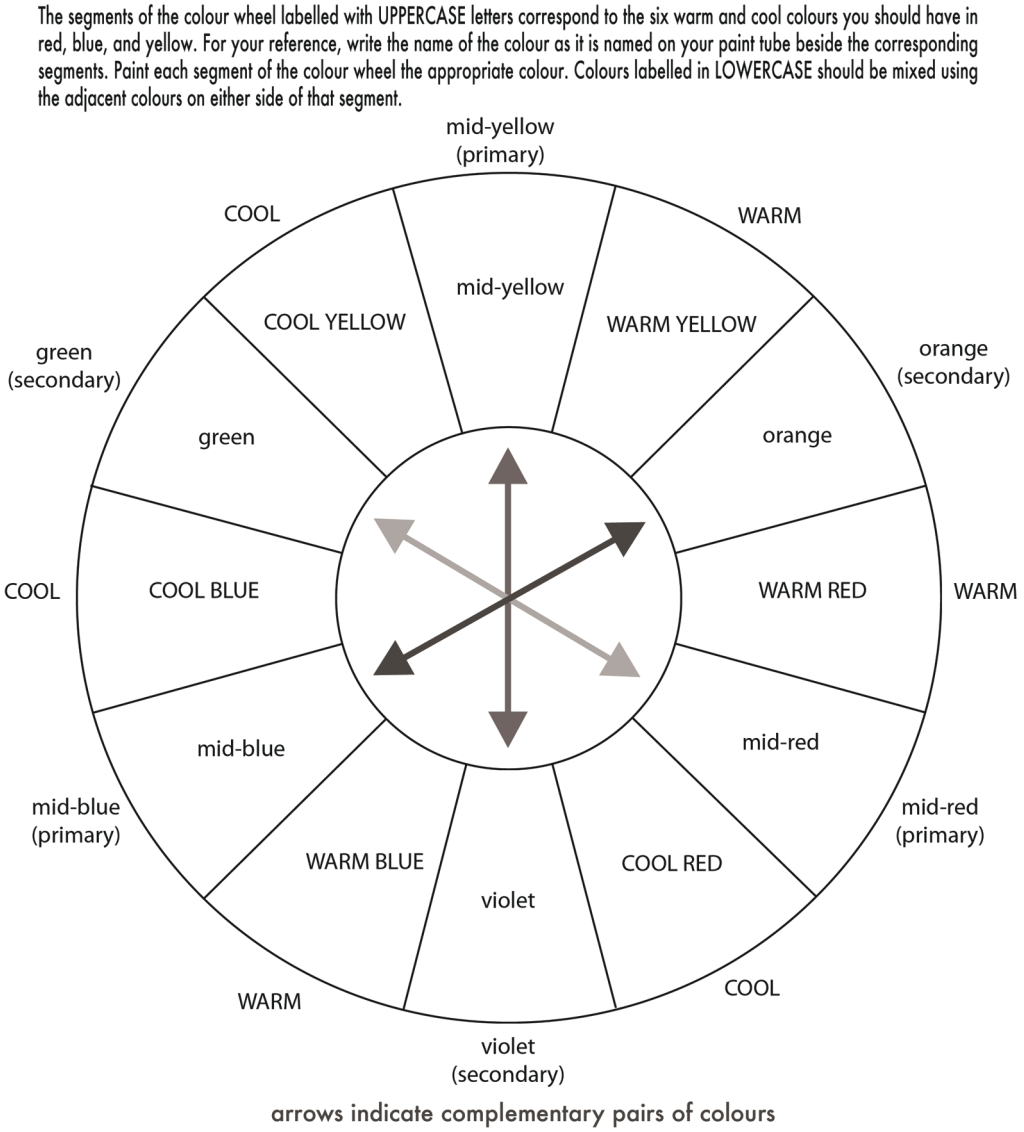
It is generally said that adding a tint or shade to a hue always makes the colour less intense (less bright), however, some authors argue against this: for instance, if you mix White into Red you change its tonal value but not its intensity: you simply lighten the Red to a bright Pink. Of course, if you mix Black into Red you change its value—it becomes a darker shade of Red—and you change its intensity; it becomes duller.

A MODIFIED COLOUR WHEEL - do this exercise on a sheet of canvas paper, using a compass (or plate!) and ruler.

To produce this modified colour wheel, use the warm and cool colours that are part of your palette:

| | | |
|---|---|---|
| ULTRAMARINE BLUE | (a warm Blue) | |
| PTHALO BLUE | (a cool Blue) | |
| CADMIUM SCARLET HUE | (a warm Red) | Possible substitute: Cadmium Red Light |
| ALIZARIN CRIMSON HUE | (a cool Red) | Possible substitute: Cadmium Red Deep |
| CADMIUM YELLOW MEDIUM HUE | (a warm Yellow) | Possible substitute: Cadmium Yellow Deep |
| CADMIUM YELLOW LIGHT HUE | (a cool Yellow) | |

Add another interior circle or outer ring for **tints** – where you would mix each of these colours with the **same** amount of white. This will show you the differences of pinks, for example.



## WHY KNOW ABOUT PRIMARIES, SECONDARIES, COMPLEMENTARIES, & WARM/COOL COLOURS?

1. When mixed together, various warm and cool colours produce hues that might better approximate a primary or secondary. Neither a warm Red like Cadmium, or a cool Red like Alizarin, are primary Reds, however, an equal mixture of the 2 comes close (see your modified colour wheel). A cool Yellow and a cool Blue mixed together creates a Green that better approximates a true secondary, opposed to a warm Yellow and warm Blue mix (this doesn't make the latter a less useful colour). A warm Blue like Ultramarine and a cool Red like Alizarin Crimson produce a purer secondary Violet, rather than a warm Blue and warm Red (which tends towards brown), or a cool Blue and a warm Red (which tends towards black).

******* NEATLY DRAW THESE SQUARES ON YOUR CANVAS PAPER (you could use tape if you'd like it extra neat), in this order and roughly this size, and make a note of the ratios and colours used.**

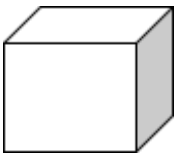
| 50% cool Yellow<br>50% cool Blue | 50% warm Yellow<br>50% warm Blue |
|---|---|
| cool Yellow+cool Blue | warm Yellow+warm Blue |

| 50% warm Blue<br>50% cool Red | 50% warm Blue<br>50% warm Red | 50% cool Blue<br>50% warm Red | 50% cool Blue<br>50% cool Red |
|---|---|---|---|
| warm Blue+cool Red | warm Blue+warm Red | cool Blue+warm Red | cool Blue+cool Red |

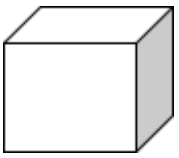
Mix various warm and cool colours together to see the different hues that result. Judge how different the 'real' secondary colours (Green and Violet) are. Add a tint of White to the mixes—you can do this above the squares as a further experiment—to make the colour biases even more obvious.

2. Understanding colour and tone assists us to satisfactorily 'model' objects, i.e. to create a sense of light, shadow, and volume. One way to produce high tones (to represent those areas of an object in light) and low tones (shadow areas facing away from a light source) is to use a method of SATURATION MODELLING, which adds White to lighten or Black to darken a colour. This method was developed in the C15th and is a useful method for artists today, though some artists prefer to avoid using black altogether.

Of course, if you have a red object and part of that object has a higher tone because light is hitting its surface, adding a lot of White to your Red simply turns it Pink (now you have a pink and red cube!). Using a warmer Red for the 'light' areas and a cooler Red (with more Blue) in the darker shadow areas is a second option.



Mix Red with a 'touch' of White for the top face,
Red for the front face, and
Red with a 'touch' of black for the side face



Use a warm Red for the top face,
a cool Red for the front face, and
a cool Red with a 'touch' of blue for the side face

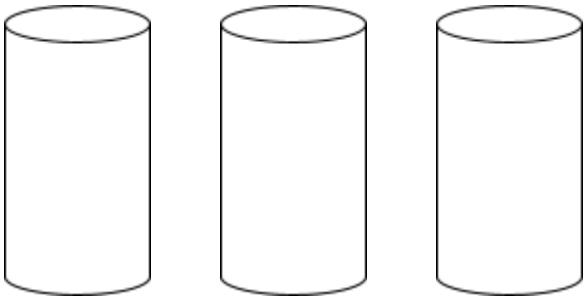
A comparison of using White & Black added to Red, or warm and cool Reds to create tonal variation /modelling

******* LIGHTLY DRAW UP THESE CUBES ON YOUR CANVAS PAPER, and make a note of the ratios and colours used - if you don't have black, try instead a mix of burnt umber and a little ultramarine blue**

Neatness, opacity and crisp edges will help make your cube look more 3D

Likewise, if you have a yellow or orange object and model it by adding Black, the colour progressively changes to an Olive-green. You could, instead, use a Brown (Raw Sienna if using a glaze, Raw Umber or Burnt Umber if using paint opaquely) to create a darker tone. *Or*, you could mix the COMPLEMENTARY of the colour into the shadow area. For instance, on a yellow vase, its shadow might be Yellow mixed with Violet. On a green object you could mix Green with some Red, producing a brown-black rather than green-black shadow; for an orange object you could mix Orange and Blue in appropriate proportions. For darker colours like Blue or Purple you can also mix Umber into the darker toned shadow area.

**NEATLY DRAW UP THESE CYLINDERS ON YOUR CANVAS PAPER, and make a note of the colours used**



Imagine that each of these **yellow cylinders** is illuminated by a light source on its left, so the LHS side is in light (stays yellow), and the RHS becomes progressively darker as it moves into shadow.
On the first cylinder, progressively mix **Black (or a mix of burnt umber and ultramarine blue)** into your Yellow as it moves into a mid-tone shadow (i.e. the shadow gets darker but never gets to be a full black).
On the middle cylinder, progressively mix **Burnt Umber** into your Yellow as it moves into a mid-tone shadow.
Finally, progressively mix **Violet** into the Yellow.
Which result do you find most effective or pleasing?

Artists always select and finetune their own system of mixing colours and tones for light and shadow areas appropriate to their subject, aesthetic, and stylistic needs, but the 'pointers' above are a good start.

3. If you understand warm, cool, primary and secondary colours you can produce Greys and Blacks without the need for black paint, as well as various Browns. We've already explored this when we made our word contrast painting

In theory, if the three PRIMARY colours are *equally* mixed together Grey is produced. (If you shift the balance and the proportions are *unequal*, your colour might be brown-grey, blue-grey, red-grey, etc.)

Greys and Browns result when COMPLEMENTARY colours are mixed together in equal amounts—e.g. a primary Yellow with a secondary Violet (moves towards mid Brown), a Red with a Green (towards dark Grey), a Blue with an Orange (towards dark Brown). Once again, varying the proportions will create any number of 'greys' or 'browns' to suit what you are painting, and adding a TINT of white to the mix further increases the possibilities; revealing the underlying 'colour' bias, neutrality, or warm/cool tendencies.
Don't worry about this exercise, but read it :)

| Mix a Black from<br>⅓ mid primary Blue<br>1/3 mid primary Yellow<br>1/3 mid primary Red |
|---|

| Add more Blue | Add more Yellow | Add more Red |
|---|---|---|

In the square above, create a Grey with an equal mix of the three primaries: Blue, Yellow, Red
In the squares above, see what happens when you vary the proportion of the three primaries.

First, add a 'touch' more Blue, then Yellow, then Red

| Mix a grey/brown from Yellow and Violet | Mix a grey/brown from Red and Green | Mix a grey/brown from Blue and Orange |
|---|---|---|

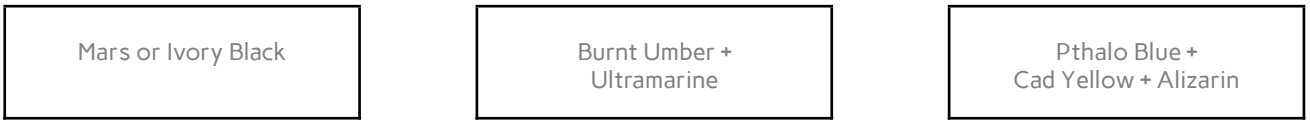
In the squares above, mix the complementary colours together to see what Greys or Browns are created.
Firstly, mix a primary Yellow with a secondary Violet, then a primary Red with a secondary Green, and finally a primary Blue with a secondary Orange.

| + white | + white | + white | + white | + white |
|---|---|---|---|---|

In the squares above, add white to any of the (tertiary) greys or browns you have already produced to reveal any underlying 'colour' bias, neutrality, or warm/cool tendencies.


In the square above, create an achromatic Grey from a 50/50 mix of Black and White.
In the right hand square, try to create a grey that is as close as possible (as neutral) to that, without using Black.
You have at your disposal warm and cool colours, the primaries, secondaries, and white to tint it.

An effective way to mix a colour that approximates a Black is by combining Burnt Umber with a warm Blue like Ultramarine. You can also mix together a cool Blue like Pthalo, a warm Yellow such as Cadmium Yellow Medium, and a cool Red such as Alizarin Crimson to produce a Black. It is said that these mixes are not as cold and 'colourless' as a Black taken directly from the paint tube; thus some artists resist introducing a manufacturer's Black to their palette—however, other artists find a manufacturer's Black an agreeable solution on both practical and aesthetic levels, and see few gains having to mix their own.
Do this exercise - if you don't have black from the tube, just do the 2 right rectangles.




Above left: Black straight from the tube. Middle: Mix a Black from Burnt Umber & Ultramarine.
Right: Mix a Black from Pthalo Blue, Cadmium Yellow Medium, and Alizarin Crimson.