

Colour

A brief guide

WINWOOD+HAINES

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Why use colour?

Colour is one of the most powerful tools a designer can use. Given that the average human eye can detect around one million different colours, it offers an almost limitless palette.

We attribute meanings and emotions to colour. Colours can excite, calm, conflict and reassure us. Over centuries we have built associations with them so that certain colours hold particular symbolism (see [page 4](#)).

It is estimated that a healthy human eye can detect around one million different colours from the visible spectrum¹.

Combining colours lends to further possibilities as the play between them provokes a different set of physical and emotional reactions. Designers can use juxtaposition, contrast, size and shape to draw attention, or guide the viewer towards a desired pathway or response.

So, faced with such a huge choice, where do you start? How do you choose colours for your brand palette or material? There are various methods. Using the colour wheel as a basis, is one

of the more established ones (see [page 6](#)). Of course, breaking with convention might be appropriate for your brand. However, understanding what works and why is an important first step.

Not everyone experiences vision or colour in the same way. In the UK, 13 million people have an impairment or disability and 3 million have a colour deficiency (colour blindness). Making material accessible benefits everyone (see [page 12](#)). And it carries economic implications as well. In 2019, it was estimated the UK economy lost a potential £17.1 billion due to people abandoning websites with poor accessibility and usability².



¹ <https://www.pantone.com/articles/color-fundamentals/how-do-we-see-color>

² <https://www.clickawaypound.com/index.html>

The psychology of colour

Colour psychology plays a significant role in design, influencing how people perceive and interact with various visual elements.











Our reactions to colours are not solely based on the physical perception of colour but are also affected by our personal tastes and cultural background.



Design and advertising have long employed colour to influence behaviour and generate certain emotional responses. It is widely acknowledged that warm colours can stimulate whereas cooler ones can calm.

Understanding how colours can generate a physical or emotional response is an important factor in determining brand or design colours. However, it is essential to consider cultural differences in colour perception. For instance, in the western world, white symbolises purity and is often used for bridal branding, whereas in Japan, India, China, Korea and the Middle East, white is the colour for mourning. Yellow is commonly associated with sunshine and happiness, but in Chinese culture, it is linked to the erotic, and in Mexico, it represents both life and death – a belief inherited from Mayan culture.

A general guide to colour symbolism

	Positive associations	Negative associations	Common industry sectors
 Red	Excitement, passion, energy, love, power, strength	Danger, aggression, fire, warning	Food, entertainment, sport, (fire) protection
 Orange	Warmth, youth, optimism, fun, confidence, innovation	Immaturity, frivolity, frustration	Art, entertainment, technology, food
 Yellow	Happiness, warmth, optimism, creativity, friendliness	Caution, irrationality	Travel, sports, transport, construction
 Green	Nature, environment, growth, renewal, luck, health, hope	Envy, sickness, boredom	Ecology, environment, energy, farming, non-profit
 Blue	Stability, reliability, trust, integrity, tranquillity, security	Authoritarian, formal, lacking innovation	Finance, law, technology, healthcare
 Purple	Spirituality, royalty, wisdom, luxury, fantasy, creativity	Decadence, suppression, introversion, moodiness	Humanitarian, well-being
 Pink	Creativity, imagination, intuition, sexuality, balance	Inhibition, emasculation/femininity, outrageousness	Women's health and products, fashion
 Brown	Nature, earthiness, reliability, seriousness, support	Heaviness, lack of sophistication, lack of imagination, dirty	Agriculture, food, construction, transportation
 Black	Modernity, luxury, elegance, authority, sophistication	Oppression, menace, austere, coldness	High-end fashion and luxury goods, technology
 White	Simplicity, cleanliness, purity, clarity, freshness	Sterile, cold, bland, isolation	All industries (used with other colours)

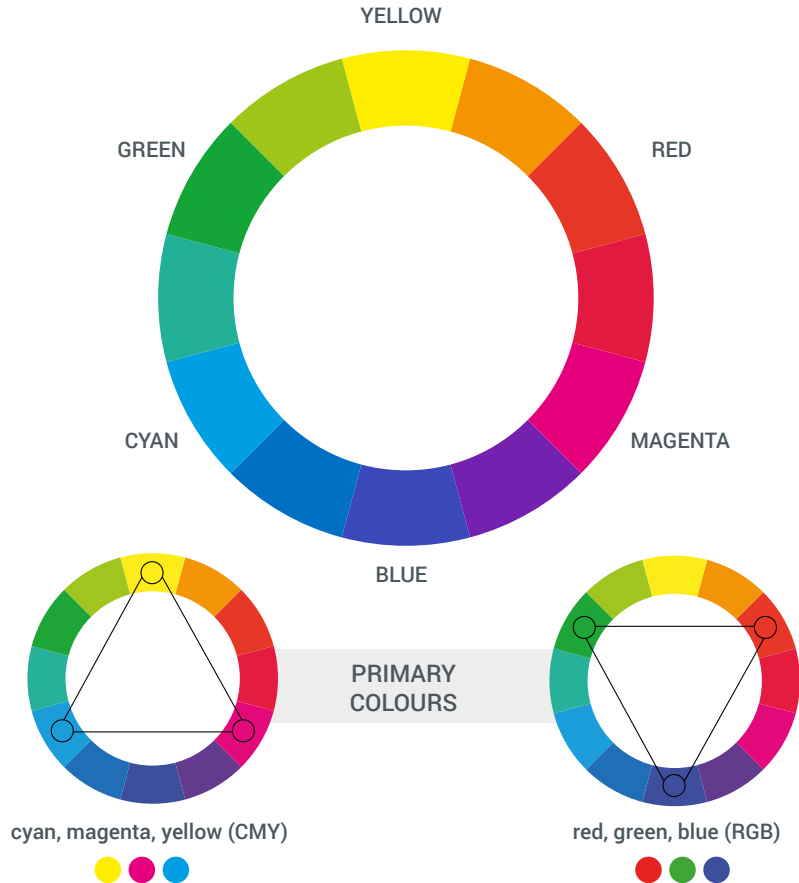
Choosing colours

Once you've established the colour that reflects your brand or will resonate most with your audience, the next stage is to build a colour scheme around it.

Colour wheel

There are many ways to choose colours but using the colour wheel is one of the more established methods.

For primary colours, there are three commonly used colour models. For centuries, artists have traditionally relied on the red, yellow, and blue (RYB) colour model. However, for this purpose we will look at two other models – cyan, magenta and yellow (CMY) that form the basis of printing; and red, green and blue (RGB) that are used in digital devices. These two colour models have a reciprocal relationship that we will explore further on [page 10](#).



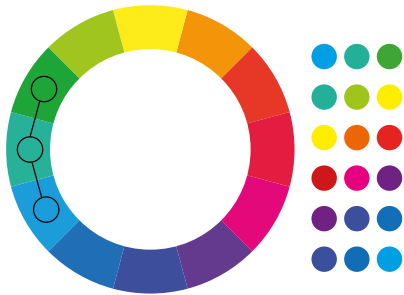
Colour schemes

Most colour schemes are based on a simple geometric relationship. Combinations can be created by rotating the shape around the colour wheel.

Below are some basic combinations using the very simplest 12-colour wheel. There are numerous colour variations between each of these neighbouring colours, lending to further possibilities.

Analogous

A sequence of colours that appear next to each other on the colour wheel.

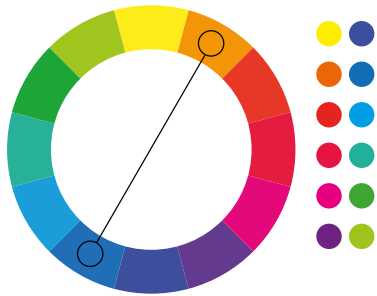


Complementary

Colours that are opposite each other. These can clash, so be careful.

Split complementary

A colour and the two colours either side of its complementary.

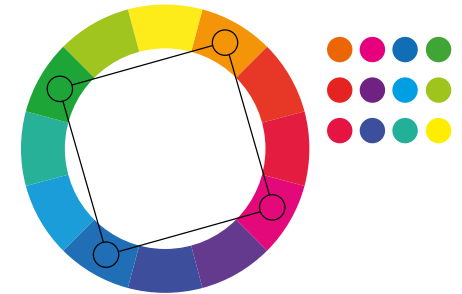
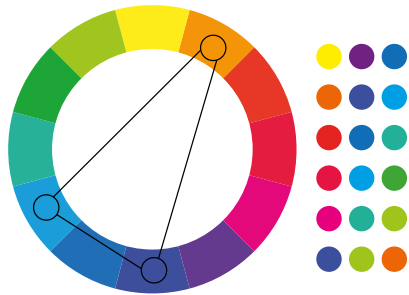
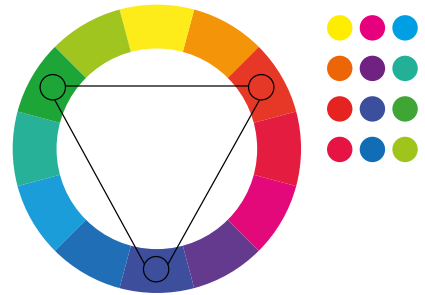


Triadic

Three colours evenly spaced.

Quadratic (square)

Four colours evenly spaced. A similar scheme is possible based on a rectangle (Tetradic).



Hue, saturation and brightness

Hue

A hue is a colour in its purest form, without the addition of white or black.

Saturation (or tone)

Saturation refers to a colour's brilliance or dullness. The higher the saturation, the closer the colour is to a hue. With a lower saturation, there is more of a grey tone and the colour appears duller.

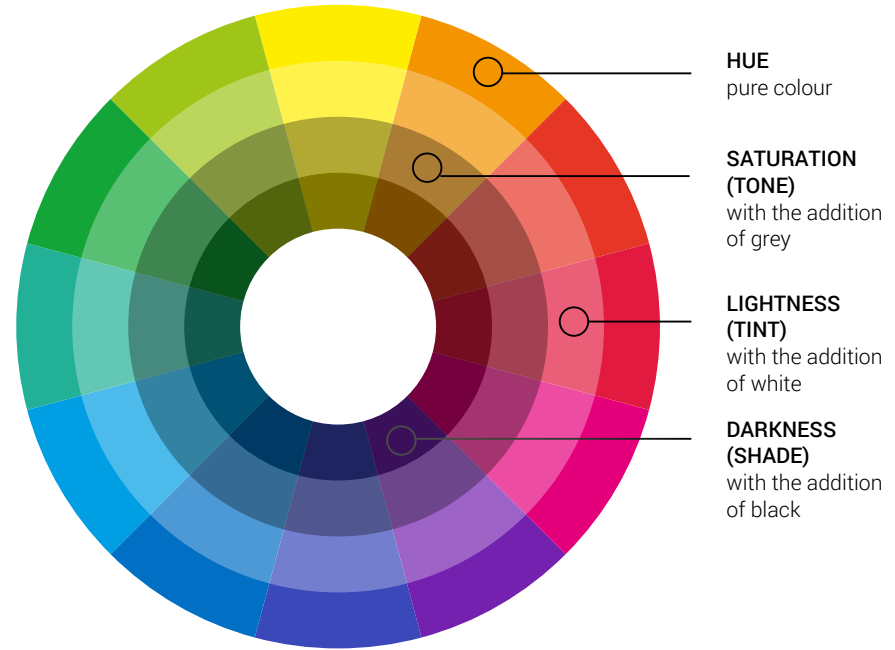
Brightness

The addition of white to a colour lightens it, known as a tint. The addition of black to a colour darkens it, known as a shade.

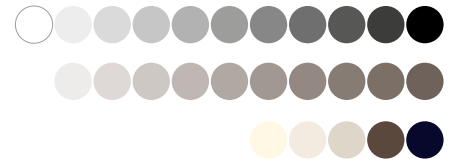
Using variations of all three tonal ranges will not only increase the number of available colours but also add greater depth to your palette.

Neutrals

Neutrals are important in any colour palette. They are the base to tie a scheme together or to enhance accent colours. Pure neutrals include white, black, and grey but there are many



near neutrals that have a slight colour undertone – examples include cream, beige and taupe. Navy and brown are also considered to be near neutral colours.



Building a brand palette

To give you an insight into how we would choose a brand palette, we've taken the colour scheme models and applied variations in hue, saturation and tone. Ones that are closest to pure hues are bold and impactful, the ones that use tints, shade and saturation are more muted and calm. Notice how applying shade, tint and tone to complementary colours can make them less jarring.

Traditional & elegant



Split complementary + Neutral
+ shade and tone

Examples: Interior design, Law, Heritage

Modern classic



Split complementary + Neutral
+ tone

Examples: Finance, Insurance, Healthcare

Natural calm



Complementary + Neutral
+ tint, shade and tone

Examples: Landscape/Agriculture, Well-being

Bold & adventurous



Analogous + Neutral

Examples: Technology, Fashion, Entertainment

Harmonious warmth



Analogous + Neutral + shade

Examples: Travel, Food

Harmonious energy



Analogous + Neutral

Examples: Environment, Energy, Healthcare

Bright & youthful



Tetradic (rectangle) + Neutral

Examples: Community, Eco, Art

Fun & fresh



Quadratic (square) + Neutral

Examples: Food, Retail, Entertainment

Opulent



Quadratic (square) + Neutral

Examples: Luxury goods, Fashion, Heritage

Colour values

To ensure consistent colour usage, it's crucial to note the values of each colour. There are various colour models and colour matching systems available. The most commonly known ones are RGB, CMYK, HEX and Pantone. So which one should you use?

RGB

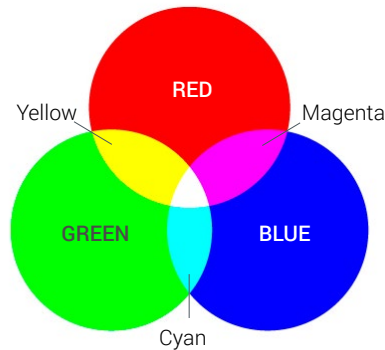
Digital devices and screens use RGB (red, green and blue). It's an additive model, where three light beams overlap to generate secondary colours (cyan, magenta, and yellow). When all three beams converge, white light is produced. Values are represented numerically from 0 to 255.

HEX

A hexadecimal value is a six-digit alphanumeric code used by web designers as a shorthand to RGB values. Numbers range from 0-9 and letters from A-F.

CYMK

In theory, CMYK is the opposite to RGB (although there are issues with matching, see [page 11](#)). It is a subtractive model used in printing, where cyan, magenta and yellow pigments are combined to form the secondary colours of red, green and blue. Theoretically, the combination of all colours produces black, but as this doesn't yield a definitive black, printers incorporate a black ink (the 'K' in CMYK). Values are expressed numerically from 0 to 100.



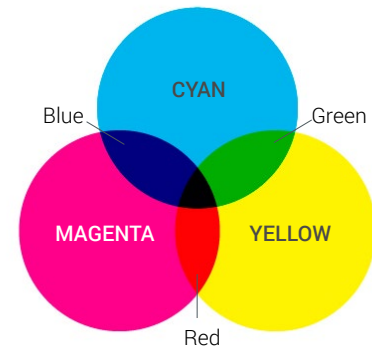
Example:

White

CMYK 0.0.0.0
 RGB 255.255.255
 HEX #FFFFFF

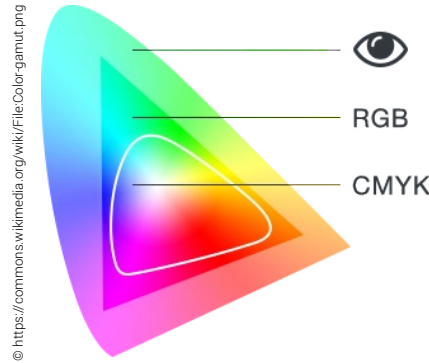
Black

CMYK 0.0.0.100
 RGB 0.0.0
 HEX #000000



Conversion between RGB and CMYK

Have you ever chosen a bright blue for your project and then been disappointed by the dull navy blue that's printed? This is due to the difference in the colour ranges of RGB and CMYK, known as the gamut. A much broader spectrum of colours are possible with RGB – about 16.7 million colours – compared to CMYK that has 16,000 possibilities³. Green and blue colours are particularly affected. The diagram (on the right) illustrates the visual disparity between colours in RGB and their CMYK conversions.



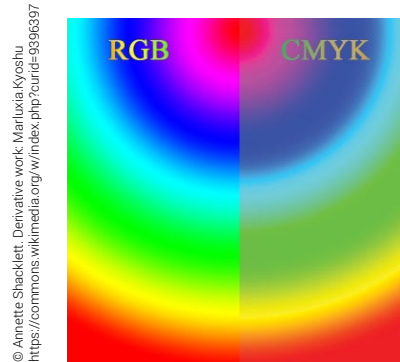
When selecting brand colours, it's important to be aware of these issues. An experienced brand designer will provide a colour palette that has a good match between CMYK and RGB (often using Pantone or printed swatches as a starting point).

It's more expensive to print in Pantone (or spot) colours so they are generally used if accurate colour reproduction is essential. Or if printing on certain substrates (such as polyethylene folders or cotton bags) where a spot colour might produce a better, solid finish compared to digital printing. (Note that Pantone is only used for printing solid colours, images are printed in CMYK).

Printing on different materials or paper stocks may also produce unexpected results due to ink absorption. For example, uncoated paper absorbs more ink so colours appear duller. It's advisable to keep to the same paper stock if you're creating a suite of materials. Speak to a printer if you're in any doubt.

Pantone Matching System® (PMS)

In 1963, Pantone introduced a series of specialised pigmented inks to address some of these absent areas. The Pantone Matching System® emerged as a standardised colour matching system for designers and professional lithographic printers worldwide. Despite the predominance of digital printing today, designers and printers still refer to the PMS system for colour reproduction.



³ <https://blog.thenounproject.com/rgb-vs-cmyk-understanding-the-differences/>

Colour accessibility

According to statistics from the World Health Organization, 217 million people worldwide were recorded as having a moderate to severe vision impairment in 2015, with this number expected to rise to 588 million by 2050⁴. In addition, approximately one in 12 men and one in 200 women have a colour vision deficiency or colour blindness.

Therefore, it's important to ensure that your digital and printed material can be accessed by as many people as possible.

Colour blindness (colour vision deficiency) affects approximately 1 in 12 men (8%) and 1 in 200 women in the world. In Britain this means that there are approximately 3 million colour blind people (about 4.5% of the entire population), most of whom are male⁵.

⁴ <https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment>

⁵ <https://www.colourblindawareness.org>

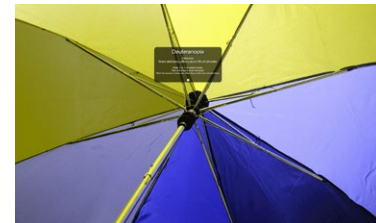
Colour vision deficiency

There are four main types of colour blindness: Deuteranopia, which is a reduced sensitivity to green light and affects 5% of males; Protanopia, which is a reduced sensitivity to red light and affects 2.5% of males; and Tritanopia, which is a reduced sensitivity to blue light and affects 0.5% of males. Achromatopsia is total colour blindness where those affected see in greyscale.

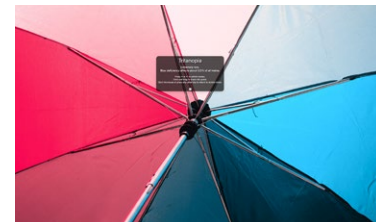
Colour Oracle is an excellent free tool for assessing how an image appears to those with colour blindness. You can quickly switch your screen between types. <https://colororacle.org>



No visual deficiency



Deuteranopia



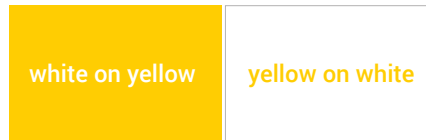
Tritanopia

Ways to increase accessibility

Colour contrast

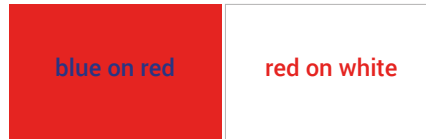
Having a higher contrast between foreground and background colours improves accessibility. This includes text, icons and illustrations. There are many online contrast checkers such as <https://colourcontrast.cc> and <https://webaim.org/resources/contrastchecker/>. Contrast is measured as a ratio – ranging from zero contrast (1:1) to the maximum contrast of black text on white (21:1). The Web Content Accessibility Guidelines (WCAG) recommends a minimum contrast ratio of 4.5:1 but an ideal ratio of 7:1. This is particularly important for text on a background colour than the contrast needed between graphic elements.

Increasing the contrast ratio can also mitigate the visual phenomenon of chromostereopsis, where two adjacent colours (such as blue and red) appear to ‘vibrate’. Although this effect can be artistically interesting, it’s best avoided as it can cause visual fatigue.



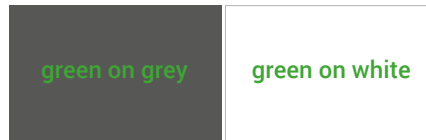
Ratio: 1.5:1 Fail

Ratio: 1.5:1 Fail



Ratio: 2.4:1 Fail

Ratio: 4.6:1 Pass



Ratio: 2.3:1 Fail

Ratio: 3.2:1 Fail



Ratio: 9.1:1 Pass

Ratio: 10.9:1 Pass

Differentiating content without solely relying on colour

Colour is a great tool for conveying mood and communicating information, however, it’s important not to rely on colour alone to distinguish content. Digital assistive devices, such as screen readers, do not voice visual information unless an alternative text description is supplied.

So, if you’re using colour to differentiate, it’s advisable to include text as well – for instance ‘select the green Proceed button’.

For charts and graphs, place high contrasting colours next to each other or use a slight pattern to distinguish between each bar. Check with software such as Colororacle for tonal similarities.

In all cases, including a full alternative text description (alt text) ensures that those using screen readers can access the information.

Resources

Colour palette generators*

Adobe Color

A colour wheel enables you to select a palette based on colour schemes such as complementary, triad, monochromatic, etc. Users of Adobe Creative Cloud can add palettes to their account.

<https://color.adobe.com/create/color-wheel>

Colour-hex

This platform offers a collection of five-colour palettes to browse or add to. Values are provided for HEX, RGB, and CMYK colour breakdowns. Tints, shades, complementary and analogous colours related to a single colour are also provided.

<https://www.color-hex.com>

Coolors

A free online tool allowing users to browse and modify colour palettes by using the space bar. An initial tutorial guides users on selecting, adjusting, and locking a custom colour scheme. Coolors also allows the user to pick a palette from an uploaded image.

<https://coolors.co>

ColorSpace

If you already have a HEX code or preferred colour, this online tool will generate 25 further colour palettes. While not necessarily the most scientific approach, it can offer inspiration if you're feeling stuck.

<https://mycolor.space>

Colour converter*

CMYK to RGB converter

A straightforward online tool that provides CMYK, RGB and HEX colour values. Input the values of one set to find the equivalent colour values, or use the sliders.

<https://capitalizemytitle.com/rgb-to-cmyk-converter/>

* As these are free online tools, they are better suited for obtaining RGB and HEX values for websites and digital media. For printed media, it's best to speak to a designer or printer who will use colour books and industry-standard software for conversion.

Accessibility

Colour Contrast

A clear, simple website that provides immediate WCAG results for any foreground and background colour combinations. Simply add HEX codes or use the slider.

<https://colourcontrast.cc>

Colour Contrast Checker

This free desktop software is available for Windows and Mac. It's user-friendly and provides comprehensive WCAG results. Additionally, it features a picker tool to quickly sample colours without the need to input HEX codes.

<https://www.tpgi.com/color-contrast-checker/>

Contrast Grid

Test up to 10 colour combinations for accessibility. The colours are presented in a grid format with the WCAG results, indicating whether they pass at AAA, AA, AA18 or not at all (DNP).

<https://contrast-grid.eightshapes.com>

Accessible color palette generator

This tool enables quick generation of an accessible colour palette. Users can either input the HEX code of a single colour to generate an expanded palette of four additional colours or randomly generate options. All colour pairings adhere to WCAG 2.1 AA standards based on a contrast ratio of 4.5:1 and offer sufficient contrast for use with normal text, large text, and graphics.

<https://venngage.com/tools/accessible-color-palette-generator>

Colour Oracle

Colour Oracle is a free desktop application to assess how an image appears to individuals with colour blindness. Users can switch their screen between the different types of colour deficiency, including no colour deficiency, Deuteranopia, Protanopia, Tritanopia, and Achromatopsia.

<https://colororacle.org>

A brief guide

Coming soon in the series:

Images

Typography

Design

Accessibility

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