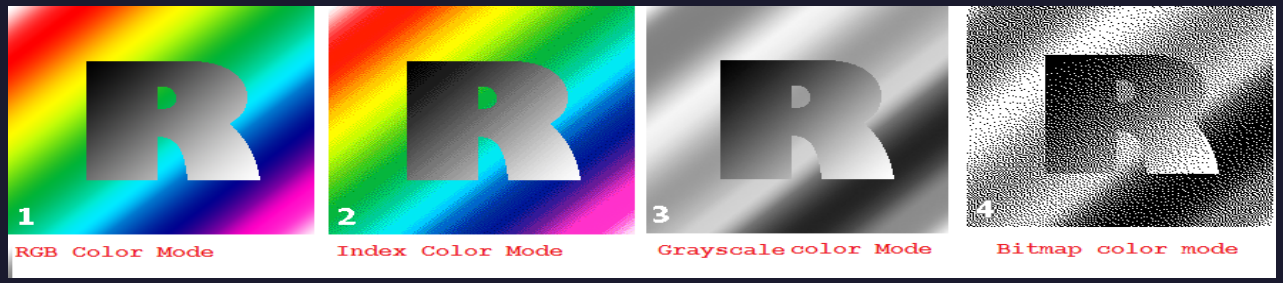
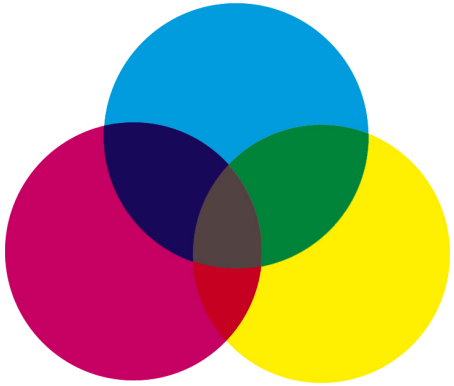
COLOR MODES

RGB · CMYK · LAB · Grayscale · Bitmap

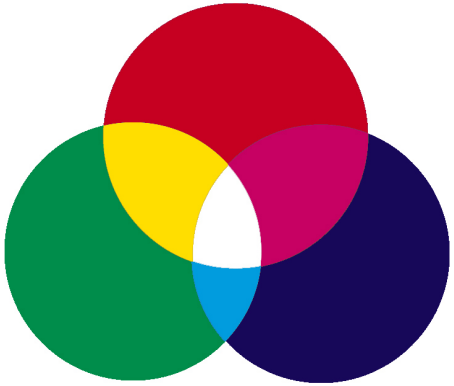
Understanding how digital and print colour systems work — from screen to press.



WHAT ARE COLOR MODES?



Subtractive color (CMYK)



Additive Color (RGB)

Color Mode

A color mode (or color model) determines how colors are represented and stored as numerical values in a digital image.

Digital Use

RGB is used for screens, monitors, cameras, and web — anything that emits light.

Print Use

CMYK is used for printing — combining inks on paper to produce a full range of colors.

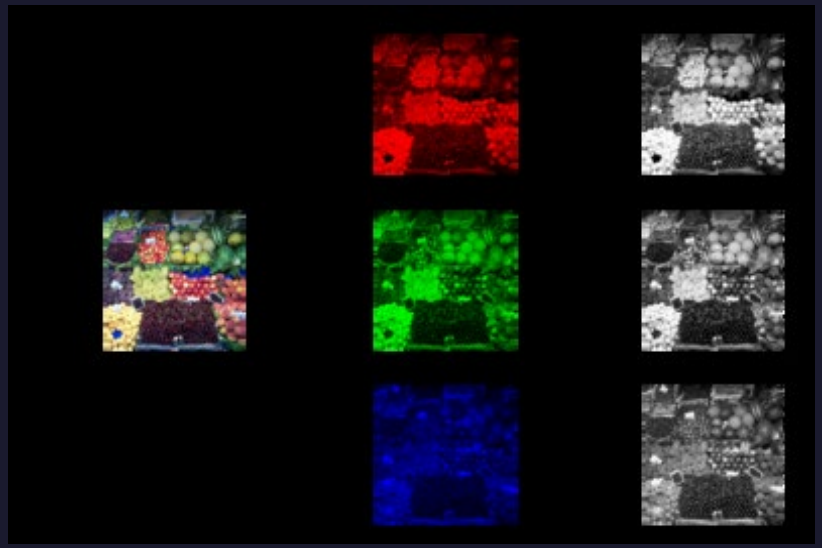
Choosing Wisely

Selecting the right color mode affects file size, print quality, and color accuracy.

In Photoshop: Image → Mode to select your colour model

RGB COLOR MODE

- Stands for Red, Green, Blue — an additive color model
- Used for screens, monitors, web, cameras & digital output
- Each channel ranges from 0–255 (8-bit) = 16.7 million colors
- All channels at 255 = White (light added together)
- All channels at 0 = Black (no light emitted)
- Digital cameras always capture in RGB mode

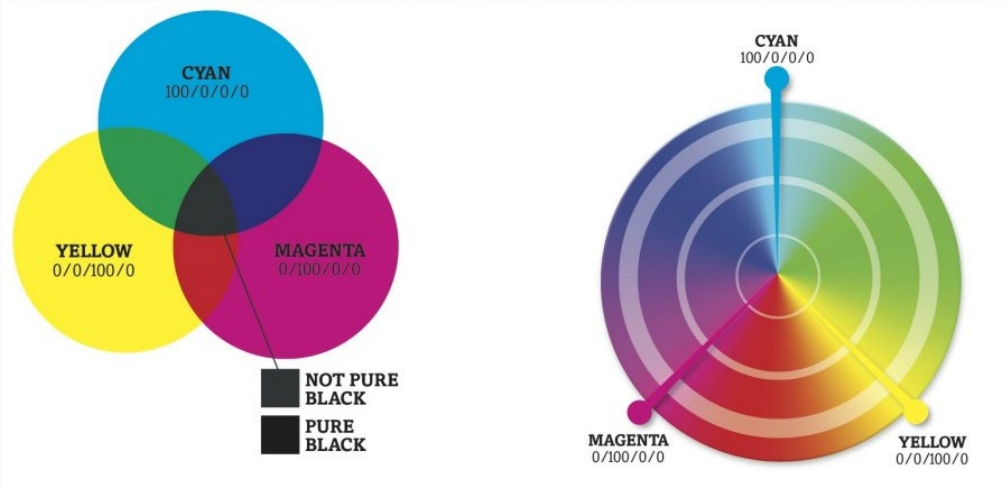


Additive Color: Light combines to form colors

R + G + B = White | R + G = Yellow | R + B = Magenta | G + B = Cyan

CMYK COLOR MODE

C Cyan	Absorbs Red
M Magenta	Absorbs Green
Y Yellow	Absorbs Blue
K Black (Key)	Depth & Detail



- Subtractive color model — inks absorb (subtract) light
- Used for commercial printing, brochures, magazines
- CMY combined theoretically makes black, but 'K' black ink is added for crisp text and true blacks
- Colors appear different on screen vs. printed — always proof before final print
- File sizes larger than RGB due to 4 channels

CMYK COLOR SEPARATIONS

How Color Separation Works

- Each image is split into 4 separate plates: Cyan, Magenta, Yellow, and Black
- Each plate prints a single ink layer — tiny halftone dots at different angles
- When all 4 layers combine on paper, the eye perceives a full-color image
- Dot sizes vary to create tonal ranges — larger dots = deeper color

CMYK COLOR VALUES

Color	% Cyan	% Magenta	% Yellow	% Black
Red	0%	100%	100%	0%
Blue	100%	50%	0%	0%
Green	100%	0%	100%	0%
Orange	0%	30%	100%	0%
Purple	60%	75%	0%	0%
Violet	50%	80%	0%	0%
Aqua	70%	0%	35%	0%
Brick	10%	95%	95%	10%
Olive	40%	20%	40%	20%
Brown	0%	30%	40%	50%

These values represent approximate CMYK percentages for common colors when printing.

GRAYSCALE & BITMAP MODES

A 1-bit greyscale image contains only white or black pixels. This is called a "Line art" or "Lith" image.

1-BIT BITMAP

Only Black & White
(Line Art / Lith)

A 4-bit image contains 16 levels of grey with the 2 extremes being white and black.

4-BIT GRAYSCALE

16 levels of grey

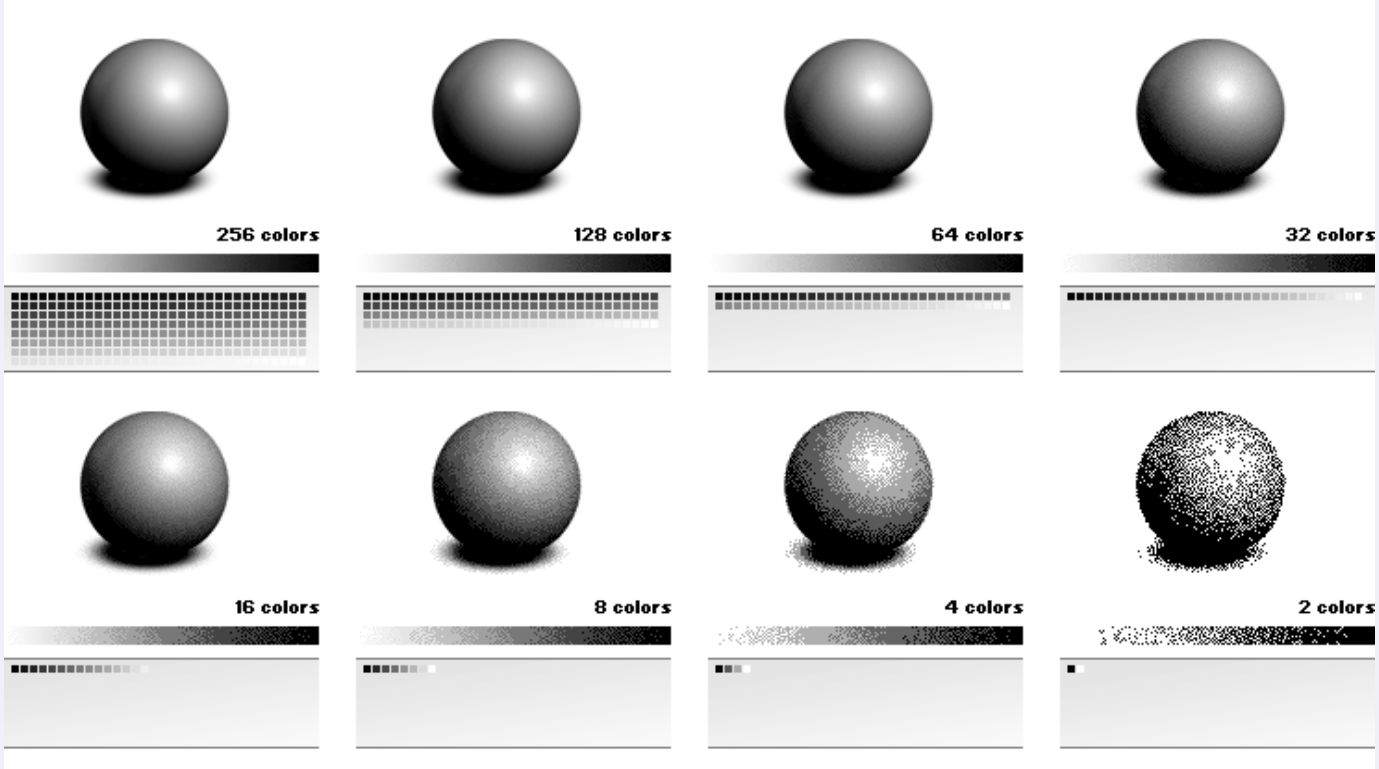
An 8-bit image contains 256 levels of grey with the 2 extremes being white and black.

8-BIT GRAYSCALE

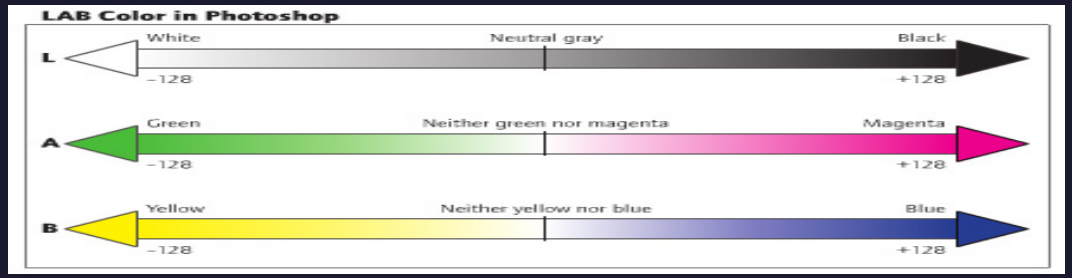
256 levels of grey

DITHERING

Dithering simulates more tones by scattering pixels. Used in bitmaps and low-bit-depth grayscale images to create the illusion of smooth gradients. Essential when reducing colours in an image.



LAB COLOR MODE



L* Lightness: 0 (black) → 100 (white)

A* Color axis: –128 Green ↔ +128 Magenta/Red

B* Color axis: –128 Blue ↔ +128 Yellow

Key Advantages

- Device-independent — not tied to any specific display or printer
- Widest color gamut of all modes — encompasses all perceivable colors
- Separates luminosity from color, ideal for color correction workflows
- Used internally by Photoshop for color conversions between modes
- Professional photographers use LAB for precise tonal adjustments

COLOR MODES AT A GLANCE

Mode	Usage	Channels	Value Range	Best For
RGB	Screen / Digital	3 (R, G, B)	0–255 each	Web, photography, video
CMYK	Print	4 (C, M, Y, K)	0–100% each	Brochures, magazines
LAB	Color Editing	3 (L, a, b)	L:0–100, a/b: –128–128	Color correction, pro editing
Grayscale	B&W Images	1 (K)	0–255 (8-bit)	B&W photos, print prep
Bitmap	Line Art	1 (1-bit)	Black or White only	Logos, technical drawings