Layer Blending Modes are options available in the Layers panel that determine how the data on a given layer interacts with the data on the layer below it. Blending Modes are a set of instructions that determine how the combination of the data on the Blend Layer (the active layer where a Blending Mode is applied) and the data on the Base Layer (the layer below) are merged/displayed.

Base + Blend = Result

Three terms, Base, Blend, and Result, can be used to explain how Blending Modes work:

- The “Base” is the starting image – the data present in the Base Layer.
- The “Blend” is what is applied with the Blending Mode settings – the data on the Blend Layer plus the blend instructions.
- The “Result” is what is displayed after the combination – the Base + Blend interaction.

Opacity vs Fill

Before exploring Blending Modes specifically, it is important to understand two other tools also found in the Layers panel: Layer Opacity and Fill Opacity.

- Adjusting the Layer Opacity slider changes the transparency percentage of everything on the layer: 0 = fully transparent (0% opaque), 100 = fully opaque (100% opaque). Adjusting this slider changes the transparency of all pixels, fills, layer styles, and effects.

- Adjusting the Fill Opacity slider changes the transparency percentage of the pixels and fills only, leaving any layer styles and/or effects that have been applied at 100% opaque. Example: If a Text layer is created with a Drop Shadow applied and then the Fill Opacity slider is set to 0%, only the text outline and Drop Shadow effect will remain visible. The text “fill” will become transparent.
The following example shows the results when a Blend Layer (the upper, active layer) with a pure black vertical bar, a 50% gray vertical bar, and a pure white vertical bar, is blended - using the Hard Mix Blending Mode - with a photo of Venice (the lower, Base Layer). The left example has the Blend Layer set to 100% Opacity, the center example is set to 50% Opacity, while the right example is set to 50% Fill.

Example of adjusting Opacity vs Fill using the Hard Mix Blending Mode

19 of the 27 Blending Modes behave the same way when either Layer Fill or Layer Opacity is adjusted. However, eight of the Blending Modes give a different result when Fill is changed compared to Opacity. This additional option extends the capabilities of these Blending Modes. The result tends to be more aesthetically pleasing when using Fill rather than Opacity with these eight Blending Modes:
1. Color Burn
2. Linear Burn

3. Color Dodge
4. Linear Dodge (Add)

5. Vivid Light
6. Linear Light

7. Hard Mix


**8 Blending Modes** have a different result when *Layer Fill* is changed compared to *Layer Opacity*

**“Transparency Shapes Layer” Check Box:**
The 8 Blending Modes mentioned above also have an extra blending option available by selecting the **“Transparency Shapes Layer”** checkbox (circled below) in the *Layer Style* panel. When checked, the applied Effect is restricted to only the opaque areas in the Base Layer. When unchecked, the Effect is applied to both the opaque and the transparent areas.
The **Transparency Shapes Layer** option in the *Layer Style* panel

**Blending Mode Descriptions with Examples**

The images below will be used to illustrate the results of applying each Blending Mode. The top two images are the **Blend Layers** consisting of a **Greyscale array** (left) and a **Color array** (right). The two identical bottom images (Venice) will be the underlying **Base Layers**. The examples that follow will show the results of the **Base + Blend = Result** interaction for each Blend Mode.
Normal Category:
The Blending Modes in the Normal Category do not have algorithms that blend pixels. Instead, the Layer Opacity and/or Layer Fill sliders control the interaction between two layers. Reducing the opacity of either reveals, in the same manner, the pixels in the layer below.

Normal
The Normal Blending Mode is the default Blending Mode for Photoshop layers. Opaque pixels hide the pixels below them without applying any math or algorithm. In this example both Layer Opacity and Layer Fill are at 100%, totally obscuring the layers underneath (Venice). Reducing Layer Opacity or Layer Fill will reveal pixels on the Layers underneath.

The Normal Blending Mode, with Layer Opacity and Layer Fill set to 100%
**Dissolve**

The *Dissolve Blending Mode* also does not blend pixels. When the Opacity of the Blend Layer is reduced below 100% the pixels in the Base Layer below are revealed through a dither pattern (noise) whose intensity is based on the *Layer Opacity* and/or *Layer Fill* settings.

![Dissolve Blending Mode](image)

**Darken Category:**

As the name implies, the Blending Modes in the *Darken Category* will turn the “Result” colors darker. Pixels that are white in the Blend Layer will have no impact, and any that are darker than white may have some darkening effect on the pixels in the Base Layer below. Pixels in the Blend Layer that have color, and are darker, may both darken and alter the color of the pixels in the Base Layer below.

**Darken**

The *Darken Blending Mode* compares the *pixel luminance values* in the *Red*, *Green*, and *Blue* channels individually, from both the Base and Blend layers, then “keeps” the darkest value. Pixels in the Blend Layer that are lighter than those below are replaced, and darker pixels do not change.

![Darken Blending Mode](image)
**Multiply**

The *Multiply Blending Mode* multiplies the luminosity of the Blend color by the luminosity of Base color. The resulting color is always a darker color. Multiplying a Base color with black produces black. Multiplying a Base color with white leaves the color unchanged.

**Color Burn**

The *Color Burn Blending Mode* increases the contrast between the Blend and Base colors, resulting in more highly saturated mid-tones and reduced highlights. Blending a Base color with black produces black. Blending with white produces no change. Color Burn blends differently when *Layer Fill* is adjusted, compared to when *Layer Opacity* is adjusted.

**Linear Burn**

The *Linear Burn Blending Mode* decreases the brightness of the Base color based on the value of the Blend color. Blending a Base color with white produces no change. The result is darker than *Multiply* but less saturated than *Color Burn*. Linear Burn also produces more contrast in darker colors than any of the other Blending Modes in the Darken Category. Linear Burn blends differently when *Fill Opacity* is adjusted, compared to when *Opacity* is adjusted.
The Linear Burn Blending Mode

Darker Color
The Darker Color Blending Mode is very similar to Darken, but it does not alter the color of pixels. It compares the Base and Blend colors, and it keeps the darkest of the two. Darker Color does not produce a third color (which can result from the Darken blend mode) because it chooses the lowest value from the combined RGB channel rather than comparing values from each R, G, and B channel separately.

Lighten Category:
As the name implies, the Blending Modes in the Lighten Category turn the “Result” colors brighter. Pixels that are black in both the Base and Blend layers are unchanged. Pixels in the Blend layer that are lighter than black will have some lightening effect on the pixels in the Base layer below.

Lighten
The Lighten Blending Mode compares the luminance values in each of the Red, Green, and Blue channels from both the Base and Blend layers, then “keeps” the lighter value from each. If the Blend colors and the Base colors are the same, then no change is applied. As with the Darken Blending Mode, Lighten compares the three RGB channels separately when blending the pixels.
The **Lighten Blending Mode**

**Screen**
The **Screen Blending Mode** multiplies the inverse of the Blend and Base colors. The resulting color is always a brighter color. Black produces no change, white produces white. Screen can produce many different levels of brightening depending on the luminosity values of the Blend layer, making Screen a great Blending Mode for brightening images or creating highlights.

**Color Dodge**
The **Color Dodge Blending Mode** results in a brighter effect than Screen by decreasing the contrast between the Base and the Blend colors, resulting in saturated mid-tones and extreme highlights. The effect is very similar to the result you would get when using the Dodge Tool to brighten up an image. Blending with black produces no change. Color Dodge blends differently when **Fill Opacity** is adjusted, compared to when **Opacity** is adjusted.
The **Color Dodge Blending Mode**

**Linear Dodge (Add)**
The **Linear Dodge (Add) Blending Mode** produces similar but stronger brightening results compared to Screen or Color Dodge. This Blending Mode compares the color information in each channel. Blending with black produces no change. Linear Dodge (Add) blends differently when *Fill Opacity* is adjusted, compared to when *Opacity* is adjusted.

**Lighter Color**
The **Lighter Color Blending Mode** does not blend pixels. It compares the Base and Blend colors, and it keeps the lightest of the two. Lighter Color does not produce a third color (which can result from the *Lighten* blend mode) because it chooses the highest value from the combined RGB channel rather than comparing values from each Red, Green, and Blue channel separately.
The Lighter Color Blending Mode

Contrast Category

The Blending Modes in the Contrast Category are a mixture between the Darken and the Lighten Blending Modes. They increase contrast by both lightening and darkening the result colors, using complementary Blending Modes to create the blend. If the colors are darker than 50% gray, a darkening Blending Mode is applied. If the colors are brighter than 50% gray, a lightening Blending Mode is applied. Pixels that are 50% gray produce no change for all Blending Modes in this category, except for Hard Mix.

The Contrast Blending Modes apply a formula based on the luminance values of the colors in the Blend layer, except the Overlay Blending Mode (below) which makes its calculations based on the luminance values of the colors in the Base layer.

Overlay

The Overlay Blending Mode uses the Screen Blending Mode at half strength on colors lighter than 50% gray, and the Multiply Blending Mode at half strength on colors darker than 50% gray, preserving the highlights and shadows in the Base layer. The Base color is not replaced, but mixed with the Blend color to adjust the lightness or darkness of the original color.
Soft Light

The *Soft Light Blending Mode* is very much like Overlay. It applies either a darkening or lightening effect depending on the luminance values, but in a much more subtle way. You can think of Soft Light as a softer version of Overlay without the harsh contrast.

![Soft Light](image)

The *Soft Light Blending Mode*

Hard Light

The *Hard Light Blending Mode* combines the Multiply and Screen Blending Modes using the brightness values of the Blend layer to make its calculations. If the Blend color is lighter than 50% gray, the image is lightened, as if it were screened. This is useful for adding highlights to an image. If the Blend color is darker than 50% gray, the image is darkened, as if it were multiplied. This is useful for adding shadows to an image. Blending with pure black or white results in pure black or white. The results with Hard Light tend to be intense. In many cases, reducing the Opacity yields better results.

![Hard Light](image)

The *Hard Light Blending Mode*

Vivid Light

The *Vivid Light Blending Mode* is an extreme version of Overlay and Soft Light. Anything darker than 50% gray is darkened by increasing the contrast, and anything lighter than 50% gray is lightened by decreasing the contrast. Use *Opacity* and/or *Fill* to reduce the effect (*Fill* generally yields better results).
The **Vivid Light Blending Mode**

### Linear Light

The **Linear Light Blending Mode** uses a combination of the Linear Dodge blending and Linear Burn blending. If the Blend color is lighter than 50% gray, Linear Dodge blending is applied. If the Blend color is darker than 50% gray, Linear Burn blending is applied. Linear Light blends differently when Fill Opacity is adjusted, compared to when Opacity is adjusted (*Fill generally yields better results*).

### Pin Light

The **Pin Light Blending Mode** is an extreme Blending Mode that performs Darken and Lighten Blending Modes simultaneously to replace colors, depending on the Blend color. If the Blend color is lighter than 50% gray, pixels darker than the Blend color are replaced, and pixels lighter than the Blend color do not change. If the Blend color is darker than 50% gray, pixels lighter than the Blend color are replaced, and pixels darker than the Blend color do not change.
The **Pin Light Blending Mode**

**Hard Mix**
The **Hard Mix Blending Mode** applies the blend by adding the value of each RGB channel in the Blend layer to the corresponding RGB channel in the Base layer. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if less than 255, a value of 0. The resulting image loses a lot of detail, and the colors can only be black, white, or any of the six primary colors - red, green, blue, cyan, magenta, or yellow.

The **Hard Mix Blending Mode**

**Inversion Category**
The **Inversion Category** of Blending Modes selectively inverts colors on the Base layer by subtracting the luminance value of a pixel on the Blend (active) layer from the luminance value of the equivalent pixel in the Base (underlying) layer. Black on the Blend layer never gets inverted, white inverts absolutely, and the other luminance levels invert based on their brightness on a channel-by-channel basis. Similar colors cancel each other, resulting in gray.

**Difference**
The **Difference Blending Mode** compares the color information in each channel and subtracts either the Blend color from the Base color or the Base color from the Blend color, depending on
which has the greater brightness value. Blending with white inverts the Base color values, blending with black produces no change, while dark grays apply a slight darkening effect.

Difference blends differently when Fill Opacity is adjusted, compared to when Opacity is adjusted.

**Difference**

The **Difference Blending Mode**

**Exclusion**

The **Exclusion Blending Mode** is very similar to Difference. Blending with white inverts the Base color values, blending with black produces no change, blending with 50% gray produces 50% gray.

**Exclusion**

The **Exclusion Blending Mode**

**Subtract**

The **Subtract Blending Mode** compares the color information in each channel and subtracts the Blend color from the Base color. In 8- and 16-bit images, any resulting negative values are clipped to zero. This Blending Mode drastically darkens pixels by subtracting brightness. Black has no effect. As the blend values get lighter, the result gets darker.

Notice how the light areas of the gradient are almost pure black, while the dark areas of the gradient produced a minimal change.
The Subtract Blending Mode

Divide
The Divide Blending Mode compares the color information in each channel and divides the Blend color from the Base color, producing the opposite effect as Subtract. White has no effect. As the blend values get darker, the result gets lighter. Dark areas of the Blend layer produce bright colors, while the light areas of the Blend layer produced a very small change.

Component Category
The Component Category of Blending Modes use different combinations of the primary color components (hue, saturation, and brightness) to create the blend.

Hue
The Hue Blending Mode preserves the luminosity and saturation of the Base pixels while adopting the hue of the Blend pixels. Hue can be used to change hues in a layer while maintaining the tones and saturation of the original.
The **Hue Blending Mode**

**Saturation**
The **Saturation Blending Mode** preserves the luminosity and hue of the Base layer while adopting the saturation of the Blend layer. A black-and-white Blend layer will turn the image into grayscale because none of the pixels in the blending layer have saturation.

**Color**
The **Color Blending Mode** preserves the luminosity of the Base layer while adopting the hue and saturation of the Blend layer. This preserves the gray levels in the image and is useful for coloring monochrome images and for tinting color images.
Luminosity

The Luminosity Blending Mode preserves the hue and saturation of the Base layer while adopting the luminosity of the Blend layer. This mode creates the inverse effect of Color mode.

SPECIAL BLENDING MODES

Pass Through Blending Mode

The default Blending Mode for a Layer Group is not Normal. Instead, it is “Pass Through.” The Pass-Through Blending Mode tells Photoshop to treat layers within the group as if they were just part of a regular layer stack and not part of a group. The group acts only as an organizational tool and the individual layers all blend as you would expect, based on their individual Layer Blending Modes.

However, if you changed the Pass-Through Blending Mode to any other blending mode, Photoshop will first blend the layers in the group, then it will blend the resulting composite with the layers below it using the Blending Mode that you selected for the Group. This is the same as merging all the layers in a group and then applying a Blending Mode.

For this reason, a Group can be used to create some great effects, especially when compositing. You can set a Group’s Blending Mode to Normal, and all the adjustment layers inside of the group will only affect the contents of that group.

Special Blending Modes for Painting with Brush Tools

There are two Blending Modes that only apply to paint applied with one of the Brush Tools:

Behind

Edits or paints only on the transparent part of a layer. This mode works only in layers
with Lock Transparency deselected and is analogous to painting on the back of transparent areas on a sheet of acetate.

**Clear**
Edits or paints each pixel and makes it transparent. This mode is available for the Shape tools (when Fill Region is selected), Paint Bucket tool, Brush tool, Pencil tool, Fill command, and Stroke command. You must be in a layer with Lock Transparency deselected to use this mode.

**Blending Modes with 32-Bit Images**
Only 15 blending modes are available when you are working with 32-bit images. They are: Normal, Dissolve, Darken, Multiply, Lighten, Linear Dodge (Add), Difference, Hue, Saturation, Color, Luminosity, Lighter Color, Darker Color, Divide and Subtract.

**Committed Blending Modes**
There are two sets of Committed Blending Modes, Overlay and Hard Light, and Color and Luminosity. A pair/set of Committed Blending Modes has the same result when you apply one Blending Mode to the Blend layer, or when you apply the corresponding Commuted Blend Mode to the Base layer, and then reverse the order of the layers.

For example, the same result is achieved by 1) applying the Overlay Blend Mode to the Blend layer, or 2) applying the Hard-Light Blend Mode to the Base layer, then reversing the order of the layers.

**BLENDING MODE KEYBOARD SHORTCUTS**
A Blending Mode can be selected by holding Alt+Shift (Win) / Option+Shift (Mac) and pressing the shortcut letter of the desired Blending Mode. If a layer is active (selected), these shortcuts will change the Blending Mode of the layer. If a painting tool is active (selected), these shortcuts will change the Blending Mode of the tool.
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*Blending Mode Keyboard Shortcuts*