Ps **PHOTOSHOP** ∨

Image essentials

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>
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Applies to: **Photoshop**

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About bitmap images

Bitmap images—technically called *raster images*—use a rectangular grid of picture elements (pixels) to represent images. Each pixel is assigned a specific location and color value. When working with bitmap images, you edit pixels rather than objects or shapes. Bitmap images are the most common electronic medium for continuous-tone images, such as photographs or digital paintings, because they can more efficiently represent subtle gradations of shades and color.

Bitmap images are resolution-dependent—that is, they contain a fixed number of pixels. As a result, they can lose detail and appear jagged if they are scaled to high magnifications on-screen or if they are printed at a lower resolution than they were created for.

Example of a bitmap image at different levels of magnification

Bitmap images sometimes require large amounts of storage

space, and often need to be compressed to keep file sizes down when used in certain **Creative Suite** components. For instance, you compress an image file in its original application before you import it into a layout.

> **Note:**
>
> In Adobe Illustrator, you can create bitmap effects in your artwork using effects and graphic styles.

About vector graphics

Vector graphics (sometimes called *vector shapes* or *vector objects*) are made up of lines and curves defined by mathematical objects called *vectors*, which describe an image according to its geometric characteristics.

You can freely move or modify vector graphics without losing detail or clarity, because they are resolution-independent—they maintain crisp edges when resized, printed to a PostScript printer, saved in a PDF file, or imported into a vector-based graphics application. As a result, vector graphics are the best choice for artwork, such as logos, that will be used at various sizes and in various output media.

The vector objects you create using the drawing and shape tools in Adobe **Creative Suite** are examples of vector graphics. You can use the Copy and Paste commands to duplicate vector graphics between **Creative Suite** components.

Combining vector graphics and bitmap images

When combining vector graphics and bitmap images in a

document, it's important to remember that how your artwork looks on-screen isn't always how it will look in its final medium (whether commercially printed, printed on a desktop printer, or viewed on the web). The following factors influence the quality of your final artwork:

Transparency   Many effects add partially transparent pixels to your artwork. When your artwork contains transparency, Photoshop performs a process called *flattening* before printing or exporting. In most cases, the default flattening process produces excellent results. However, if your artwork contains complex, overlapping areas and you require high-resolution output, you will probably want to preview the effects of flattening.

Image Resolution   The number of pixels per inch (ppi) in a bitmap image. Using too low a resolution for a printed image results in *pixelation*—output with large, coarse-looking pixels. Using too high a resolution (pixels smaller than what the output device can produce) increases the file size without increasing the quality of the printed output, and slows the printing of the artwork.

Printer resolution and screen frequency   The number of ink dots produced per inch (dpi) and the number of lines per inch (lpi) in a halftone screen. The relationship between image resolution, printer resolution, and screen frequency determines the quality of detail in the printed image.

Color channels

Every Photoshop image has one or more *channels,* each storing information about color elements in the image. The number of default color channels in an image depends on its color mode. By default, images in Bitmap, Grayscale, Duotone, and Indexed Color mode have one channel; RGB

and Lab images have three; and CMYK images have four. You can add channels to all image types except Bitmap mode images. For more information, see Color modes.

Channels in color images are actually grayscale images that represent each of the color components of an image. For example, an RGB image has separate channels for red, green, and blues color values.

In addition to color channels, *alpha channels*, can be added to an image for storing and editing selections as masks, and spot color channels can be added to add spot color plates for printing. For more information, see Channel basics.

Bit depth

Bit depth specifies how much color information is available for each pixel in an image. The more bits of information per pixel, the more available colors and more accurate color representation. For example, an image with a bit depth of 1 has pixels with two possible values: black and white. An image with a bit depth of 8 has 2^8, or 256, possible values. Grayscale mode images with a bit depth of 8 have 256 possible gray values.

RGB images are made of three color channels. An 8-bit per pixel RGB image has 256 possible values for each channel which means it has over 16 million possible color values. RGB images with 8-bits per channel (bpc) are sometimes called 24-bit images (8 bits x 3 channels = 24 bits of data for each pixel).

In addition to 8-bpc images, Photoshop can also work with images that contain 16-bpc or 32-bpc. Images with 32-bpc are also known as high dynamic range (HDR) images.

Photoshop support for 16-bit images

Photoshop provides the following support for working with 16-bpc images:

- Working in Grayscale, RGB Color, CMYK Color, Lab Color, and Multichannel modes.

- All tools in the toolbox, except the Art History Brush tool, can be used with 16-bpc images.

- Color and tonal adjustment commands are available

- You can work with layers, including adjustment layers, in 16-bpc images.

- Many Photoshop filters can be used with 16-bpc images.

  To take advantage of certain Photoshop features, such as some filters, you can convert a 16-bpc image to an 8-bpc image. It's best if you do a **Save As** and convert a copy of the image file so the original file retains the full 16-bpc image data.

Convert between bit depths

1. Do any of the following:

   - To convert between 8 bpc and 16 bpc, Choose Image > Mode > 16 Bits/Channel or 8 Bits/Channel.

   - To convert from 8 bpc or 16 bits to 32 bpc, choose Image > Mode > 32 Bits/Channel.

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