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Sizing and Resolution in Adobe Photoshop

1. Basics

Digital Files
The size of a digital file is measured in pixels. The H and V measurement are called the "pixel dimensions." A megapixel = one million pixels. A digital image made with a 12.5 megapixel camera is comprised of 12.5 million pixels (sort of). It actually measures 2912 X 4368 pixels for a total of 12,719, 616 pixels (vendors tend to "round it off) . It occupies 72.8 megabytes of space on your hard drive. The number of pixels DO NOT CHANGE if you merely change the resolution.

For print, you need a resolution of 300 ppi (pixels per inch).
For web, you need a resolution of 72 or 100 ppi.

Commercial printing presses typically require 300 ppi.
Epson or Canon printers like multiples of 120, so prints are made at 240 or 360 ppi.
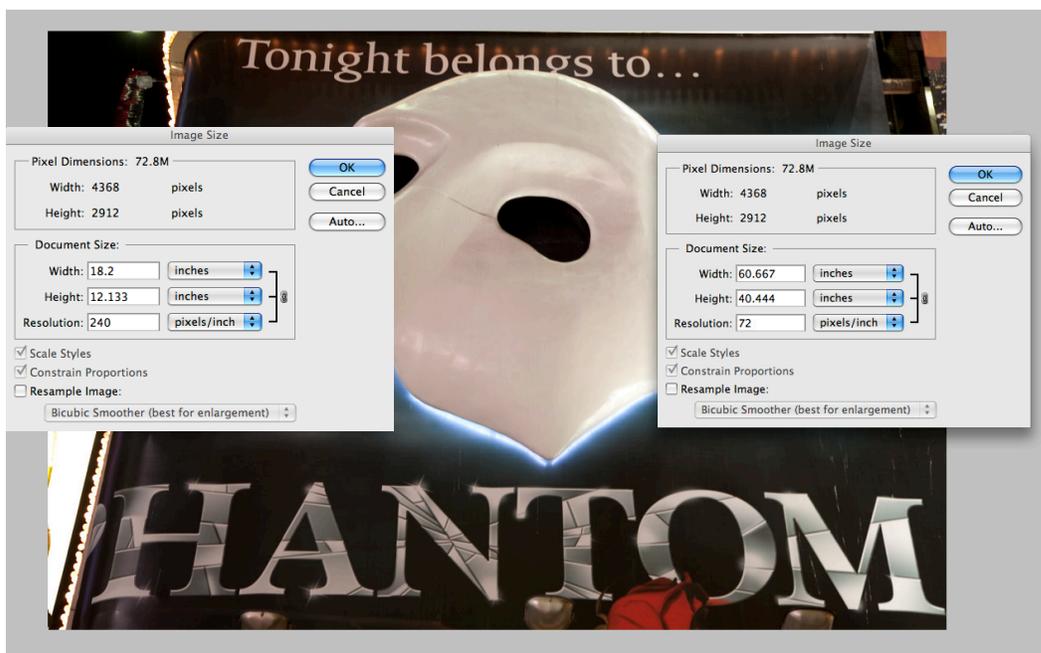
ALL computer monitors, depending on quality, render images at 72 or 100 ppi.

Notice in the example that if the resolution is changed for print or web, the size (dimension in inches) changes but NOT the pixel dimensions.

In this example, the Resample image box is checked OFF, since I only want to change the resolution and the size in inches, but not the pixel dimensions.

Commercial Printing Press
Commercial printing presses measure quality based on a different measurement, called lines per inch, or lpi.

To prepare a file for a commercial printing press, your pixel resolution (ppi) needs to be TWICE, 2X the line screen. So, for example:

Low quality reproduction, newsprint
85 lines per inch X2 = 175 ppi

Medium quality reproductions, newsletters, brochures
125 lines per inch X2 = 250ppi

High quality reproductions, magazine quality
150 lines per inch X2 = 300ppi

Very high quality reproduction, art books, magazine covers
200 lines per inchX2 = 400ppi

Scanning
When scanning an image, you will achieve highest quality if you scan an object that is fewer generations away from the original. For example, a print is at least one generation away from the original negative or slide.

Highest quality is achieved scanning a negative or slide over a print.

When scanning, you need to determine the target resolution. For example for print purposes, that target resolution will be usually 300 ppi.

The formula for scanning is:

Number of times you are enlarging the file multiplied by (times X) target resolution = scanning resolution. In other words, the degree of enlargement needs to be multiplied by the target resolution.

If you are enlarging a 4" X 5" transparency to make an 8"X10" print, you must multiply the target resolution by a factor of 4.

4"X5" = 20 square inches
TO
8"X10" = 80 square inches
Equals a factor of 4.

In this example, four times your target resolution equals your scanning resolution.
4 X 300 ppi (target resolution) = 1200 ppi (actual scanning resolution)

File Formats

RAW file: 16 bit color (greatest color and tonal depth), highest quality file, largest size. Must be processed in RAW converter before use.

Tif file: High-quality image file, 8 or 16 bit, no compression. Supports layers. Cross platform.
PSD: Photoshop file, high quality, 8 or 16 bit, Supports layers, No compression.

Jpg. Compression format. Image format supported by web. Smaller file size. 8 bit only.

2. Resizing for Print or Web
When purchasing a camera or a scanner, you should purchase equipment that allows for the maximum size files, in megapixels (camera)or ppi (scanner), that you THINK you may need, now and in the future. You can downsample (reduce the number of pixels) an image for the web with no visible loss of quality. You cannot, however, easily upsample (add pixels) images without loss of visible quality.

Pay attention to the NATIVE resolution of a camera or scanner. This represents the size file that you can make without any interpolation (adding pixels).

To view the image size, resolution, and pixel dimensions in Photoshop, go to Image>Image Size.

This shows your pixel dimensions, size and resolution—and allows you to resample images upward or downward. Remember, when you upsample images, the file is "interpolated", meaning that pixels are added, and this generally results in a loss of iamge quality.

To save for the web:
Go to Image>Image size and make sure that the Resample image box is checked ON. This allows you to resample the number of pixels.

Decide on how big you want your image. For most websites, less than 500 Kilobytes to one megabyte is appropriate. Decide on the pixel dimensions on the longest end and typt this into the box (see illustration). On my website, I have standardized 800 pixels on the longest end. Make sure that Constrain Proportions is checked ON, and make sure that Bicubic Sharper is checked ON for your resampling algorithm. For minor tasks of enlarging images, up to 25% or so, use Bicubic Smoother. Click OK to resize.
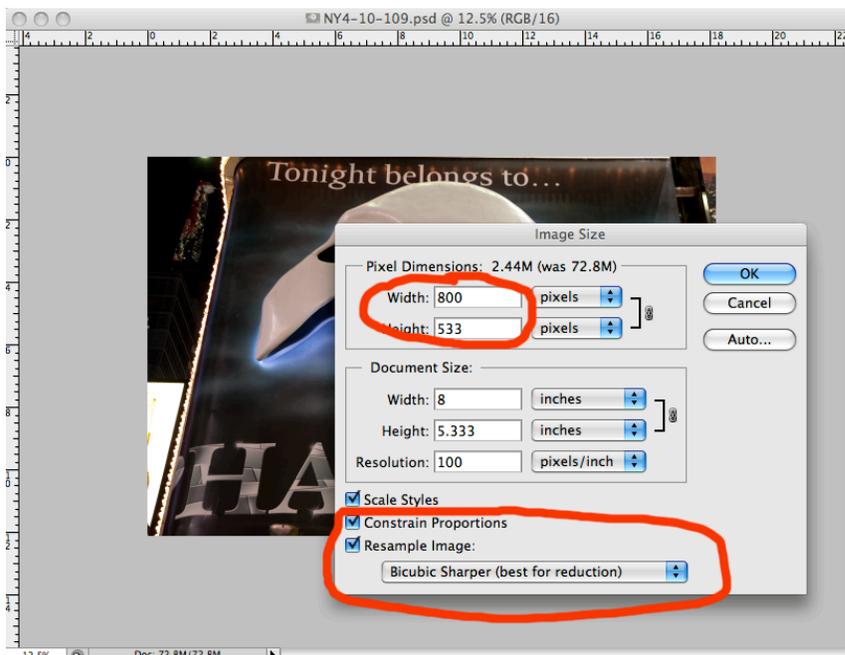
To save as a jpeg, you need to convert the file to 8 bit color if it isn't already. Go to Image>Image Mode and check 8 bit color.

Finally, Save As a jpg and decide on the quality, the degree of compression. I use High Quality 8-12.

To Upsample Images

There may be instances where you need to make your file larger, for large prints or for reproduction purposes. Most magazines will not accept anything made with a camera under 10 megabytes.

There are two reliable methods of Upsampling: Adobe Camera RAW (ACR) and Third party software.

To use Camera RAW for upsampling:

Go to the Workflow Option panel at the bottom center of the front page of ACR. Click on the pull-down menu of the Size options. You can effectively upsample up to TWO "steps" in this panel with no visible loss of quality.
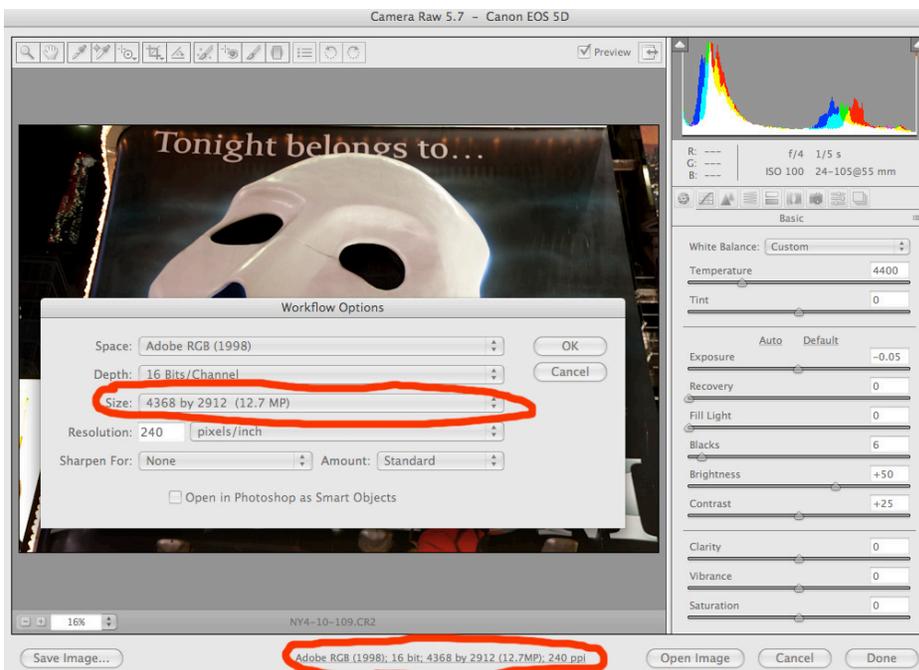
To use Third Party Software for Upsampling:

There are two software programs on the market: Genuine Fractals and SI Pro 2.5

Genuine Fractals is expensive. SI Pro 2.5 is sold by www.fredmiranda.com and is shareware. Fred Mrianda has developed a Stair step interpolation method that is quite effective. SI Pro 2.5 is currently only available for PS CS 4; has not yet been developed for CS 5. The cost is $24.95. I highly recommend it and use it for my own work in making large prints.