

PRACTICAL PHOTOSHOP® CS5

TUTORIAL 2: FILES FOR PRINT & WEB

In this tutorial you will take a first look at preparing files to be printed, emailed for screen viewing, or displayed on the World Wide Web.

OBJECTIVES

- Differentiate among monitor, document, and printer resolutions, and understand when to use each measurement.
- Distinguish between appropriate resolution for print and for Web or email images.
- Print a Photoshop document by configuring the **Print** dialog box.
- Save a copy of the print-quality document for fast online transmission.

RESOLUTION

Resolution is a difficult concept to grasp. In nearly every class we teach, at every level, we get questions about resolution. Part of the problem is that the word **RESOLUTION** is used to measure different things. And, to make it worse, each item being measured has two kinds of measurements: a quality measurement and a quantity measurement. When measuring the **QUALITY** of an image, resolution specifies the number of pixels within a given area, such as in a square inch. Here, you see measurements such as pixels per inch or dots per inch. But resolution can also refer to the total **QUANTITY** of pixels in something—its absolute image dimensions.

MONITOR RESOLUTION

Let's begin with what we see on screen—**MONITOR RESOLUTION**. Monitors display patterns of colored pixels. Measured by quality, these displays are measured in **PIXELS PER INCH** or **PPI**. Monitor resolution can also refer to the physical properties of a monitor—how many total pixels it can display—its quantity. Monitor resolution determines how much of a Photoshop document can be seen when viewed at actual size (**100%**). Modern, adjustable monitors have adjustable resolution.

Some monitor numbers to keep in mind:

- The smallest computer monitor is typically **640 pixels** wide and **480 pixels high (640 x 480)**, a quantity measurement. Handheld devices have even smaller resolution; older iPhones have a screen resolution of **320 x 480**.
- Photoshop CS5 requires a screen resolution of at least **1024 x 768 pixels**.

DOCUMENT RESOLUTION

DOCUMENT RESOLUTION is the absolute measurement of a document in pixels, with width being the first number and height the second. Thus a document that is **600 x 400** is **600 pixels** wide and **400 pixels** tall. This is the "quantity" form of resolution.

Each Photoshop document also has a resolution measurement in **PIXELS PER INCH**, or **PPI** (ppi). This is the “quality” form of resolution. Web pages and multimedia projects typically use 72-96 ppi images both to keep file sizes down and to display properly on small or low-resolution monitors that display from 72 to 96 pixels in each square inch of the computer monitor.

PRINTER RESOLUTION

PRINTER RESOLUTION describes how a document is set up for printing. Printers apply dots of ink or toner onto paper or other media. Printed images are measured in **DOTS PER INCH** or **DPI** (dpi). Modern desktop printers, laser or ink jet, typically print somewhere in the range from 300 to 2400 dpi.

Printed documents use resolutions of 100 ppi and up. A 4 inch by 5 inch document with an image resolution of 100 ppi will have pixel dimensions of 400 x 500 pixels, while a 4 inch by 5 inch document with an image resolution of 300 ppi will have pixel dimensions of 1200 x 1500 pixels. The small number of pixels in web graphics make them load quickly—ideal for screen work. However, these low resolution images print poorly because they don't have enough pixels to provide the optimal number of dots for each inch of printed document.

The smaller the print dots, the higher the printer resolution setting. For instance, an image with a dpi of 150 will have smaller dots than an image set to 72 dpi. The higher the resolution, the higher quality the printout will be, up to the printer's physical capabilities. When an image is printed, each image pixel puts out a dot of ink or toner. When an image is printed with enough dots, the human eye perceives discrete color changes as continuous, and the digital image looks like an analog photograph. Your brain blends the colors.

What can be very confusing is that an image with a low resolution can look good on the screen if not zoomed in too close. You could work away on an image believing that you have a high quality image. Then, when you print it out, you are very disappointed because the large size of the printed dots makes the image look blocky or pixilated. The bottom line is that it takes a much higher resolution for an image to look good in print than it does on screen.

SETTING UP DOCUMENTS FOR PRINT

Before you can set up a document for printing, you need to know the resolution of the printer you are using, or your **OUTPUT PRINTER**. The best way to do that is to read the fine print on the manual that came with your printer, but that is not always easy to do. The Internet is also a good source for finding out more information about your printer. But, just in case you lost your manual or are printing in a computer lab, here are some guidelines:

- If a printer lists two resolutions, such as this description for an HP Officejet Pro K5400 Color Printer: “Up to 1200 x 1200 dpi or up to 4800 x 1200 optimized dpi color” you should use the lower number to calculate your image resolution.
- Color laser printers are usually 600 dpi printers.
- Older color ink jet printers are 720 dpi printers; newer photo ink jet printers are at least 1200 dpi printers.
- Graphics applications such as Photoshop measure files in **ppi**, and the printer converts the **ppi** into **dpi** when it prints the document.

Beginning graphics students tend to assume that if you have a 600 dpi printer, you should have at least one pixel in your image for every one of those dots. As we shall see, this is often not correct.

If you print an image that has only black and white pixels, and no shades of gray, your resolution should match that of the printer. In this case, the printer places only solid black dots onto the printout. But, if you print a photograph or graphic, either in color or in shades of gray, the **PRINTER DRIVER**, the software that tells the printer how to work, does its own special interpolation between each document pixel to fill in transitional colors. For this reason, these documents only need **ONE THIRD** the ppi of the output printer for high-quality results. If your document has a higher resolution than your printer needs, the document will take longer to print; it will be a larger file that will take longer to edit, but its quality will not be any better. So, what resolution should you choose? This simple chart, with file sizes based on a document that is 4 x 6 inches (960 x 1440 pixels), shows the relationship between resolution and file size, and gives some recommended printer-based resolutions.

Technically, following the “rule of one-third,” you should print your photo ink jet printouts at 400 dpi. However, since the human eye cannot see such small color transitions, you will not typically get a better printout at 400 ppi than at 300 ppi, but your file will be much larger. For color and grayscale, think one third; for pure black and white think one to one.

PRINTER	BLACK DOTS ONLY	COLOR AND/OR GRAYSCALE DOTS
Color laser	600 ppi	200 ppi
File size	1.03 M	2.75 M
Older color ink jet	720 ppi	240 ppi
File size	1.48 M	3.96 M
Photo ink jet	1200 ppi	300 ppi
File size	4.12 M	6.18 M

PRINTING PHOTOSHOP DOCUMENTS

When you first choose **File > Print**, you will see a huge dialog box with a thumbnail of your image on the left side, and a number of controls on the right.

The portion of the image that will print (as shown in the Print dialog box shown on page 31) is called the **THUMBNAIL**. Some folks are questioning whether it really is a “thumbnail” since it is so large. Adobe calls it a thumbnail because it is smaller than the actual printed document.

The left side, or **PREVIEW AREA**, shows a thumbnail of how your image will print relative to a piece of paper. The largest gray box represents the full page of paper as set in the Page Setup dialog box (usually US Letter) and the smaller white box represents the printable area for your printer.

Printers need to grab the paper to pull it through the printing mechanism. This usually is a small amount on the top and sides, and a larger amount on the bottom of the paper. These areas, called **MARGINS**, typically will not print. The portion of the paper that can be printed is called the **PRINTABLE AREA**. If you don’t see any of the white box, this usually means that your image is too large to be printed on this paper.

File > Print will display Photoshop’s **Print** dialog box for your printer that you will use in the next guided exercise. Within it is the **Print Settings** button to view and change printer-specific settings such as print quality, paper type, and number of copies. After configuring your **Print Settings**, click **Save** to save the printer settings and return to Photoshop’s **Print** dialog box.

File > Print One Copy doesn’t bring up any dialog box at all— it just prints a copy of your image using the settings you used last time you printed.

INK JET PAPER QUALITY AND IMAGE LONGEVITY

As you learn Photoshop, you will probably print your work on an ink jet printer.

Ink jet paper choice has a tremendous effect both on the quality of your original output and its longevity. Ink jet prints are sharper and brighter when printed on specially-made ink jet photo paper than on junk copy paper. These specialty papers have a large amount of clay in them, and the clay keeps the print dots on top of the paper, so that those bright, crisp dots you worked so hard to create don't get absorbed into the paper and become dull and blurry. Often, you may not need a new printer, but simply better paper.

Unless they are printed on special, long-lasting or **ARCHIVAL PAPER**, and stored away from light, moisture, heat, and ozone—your digital printouts will not last very long. Someone we know printed out some photographs of her new granddaughter using Epson Photo paper, and put them on her refrigerator, which does not receive any direct sunlight. Six weeks later, the photos were badly faded. By reading the following article on print permanence, she learned that if she had protected the photos behind glass, they would have lasted a lot longer: <http://www.shutterbug.net/pointofview/0705point/index.html>.

GUIDED EXERCISE 2.1: PRINT YOUR PUMPKIN

In this guided exercise, you will use Photoshop's Print dialog box to set up your carved pumpkin document for high quality printing, and then print it.

1. Open the **pumpkin 1.psd** image if necessary.
2. Choose **File > Print** to open the Print dialog box.
3. Choose your desired printer from the **Printer** drop-down menu at the top of the dialog box.



- Look at the thumbnail. Notice that the document is too big for the paper. You can see white space on the top and bottom, but not on the sides of the thumbnail.
- Click the **Landscape** orientation button below the image thumbnail to change from the default Portrait (or tall), to Landscape (or wide). Notice that the document now has white space all around the thumbnail.



Do not change any other settings in the Print dialog box unless you know how to use them. (They are for more advanced users.)

- Click the **Print Settings** button to view your printer settings. Set settings as needed and click **Save**.
- Click **Print** to print the document.

BEWARE OF SCALE TO FIT MEDIA

In the center of the Print dialog box, you will find a section called Scaled Print Size. At the bottom of the section, the Print Resolution for your image is specified. For pumpkin1.psd, your resolution should be 300 ppi, or perfect for most modern printers. (We set it up that way when we created the tutorial.)

The Height and Width of the document is approximately 6 x 8 inches. When printed, it will not cover the entire 8.5 x 11 inch page or even its printable area.

If you click the **Scale to Fit Media** check box, the image enlarges proportionately to cover the printable area of your paper, approximately 8 x 10 inches. But, to enlarge the document, Photoshop lowers the print resolution from 300 ppi to 235 ppi, thereby slightly reducing the quality of the printout. As the preview shows you, this image will still print pretty clearly (but not quite as well as if there were 300 ppi).

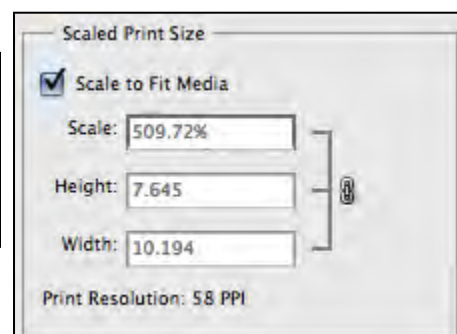
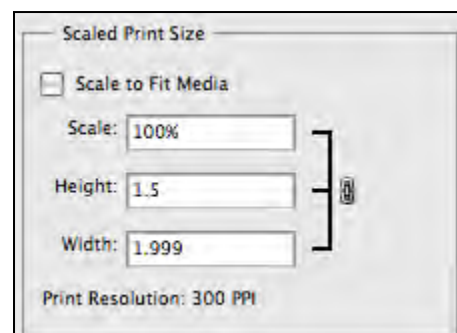
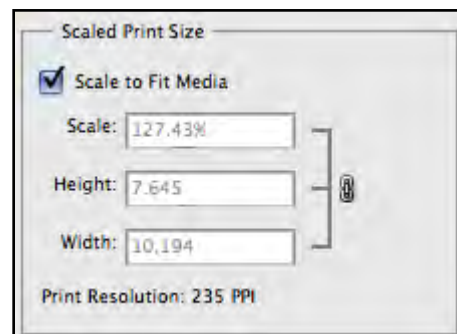
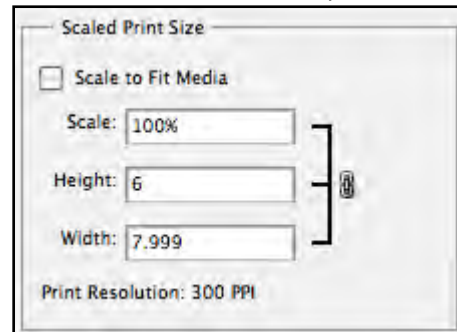
In the next section of the tutorial, you will resize a copy of the pumpkin image for fast Web transmission. This low-resolution copy will not have enough pixels to make a high-quality printout of the same size as the original. At **300 ppi**, it will only print at about 1 1/2 by 2 inches.

Moreover, if you click **Scale to Fit Media**, although the printout will be approximately 8 x 10 inches, its print resolution will only be **58 ppi**.

The Print dialog box warns you by showing a very blocky or **PIXILATED** preview. That means your printout will be of very low quality.



The take home message? Use high quality images for print, and make low-quality smaller images for Web and email since smaller images transmit much more quickly online.



SAVING A FILE FOR FAST ONLINE TRANSMISSION

Assuming that you are a Photoshop beginner, we pre-configured the pumpkin image for you so that it would print properly on an ink jet printer. This image has 300 pixels per each inch of the printed image; the image is 2400 pixels wide and 1800 pixels high. Saved to disk, it started out as a jpg file at slightly less than 1 MB. When you opened it in Photoshop and changed it to PSD format, it expanded to 12.2 MB, and once the face layer was added, it became 24.7 MB. That is a BIG file.

When you send a file over the Internet, either attached to an email message or uploaded to a Web page, big files can cause three kinds of problems.

1. Big files take a long time for you to send (upload) and for the recipient to receive (download).

If you send someone a 24 mb file, it might take twenty minutes for them to receive it if they use a modem to connect to the Internet (dialup connection) and maybe twice as long for you to send the file with a dialup modem.

2. Big files can cause problems with Internet Service Providers.

Each Internet Service Provider typically gives each client a small amount of space, often 2-10 MB, to store all your downloaded files. If someone sends you a 24 MB file, or a bunch of people send you 1 MB files, you can quickly run out of room, and your provider may stop serving you. If students send their instructor large files, that instructor's email capabilities may be turned off until the inappropriately big files are deleted.

3. Big files don't display well when included in Web pages.

That's because they take so long to become visible, and because they have more pixels than the width of the monitor. Your goal is to make files that can be viewed as an email attachment or in a Web browser without scrolling. The smallest standard monitors are 640 pixels wide and 480 pixels high. Monitors, thus, are landscape (wider than they are tall). Even for folks with larger monitors, operating system and browser controls such as menus and scroll bars take some room on the screen. To allow for those controls, try to keep your Web and emailed images in this course to 600 pixels in their largest dimension unless as assignment specifies otherwise.

GUIDED EXERCISE 2.2: SAVE A DUPLICATE FILE FOR THE WEB

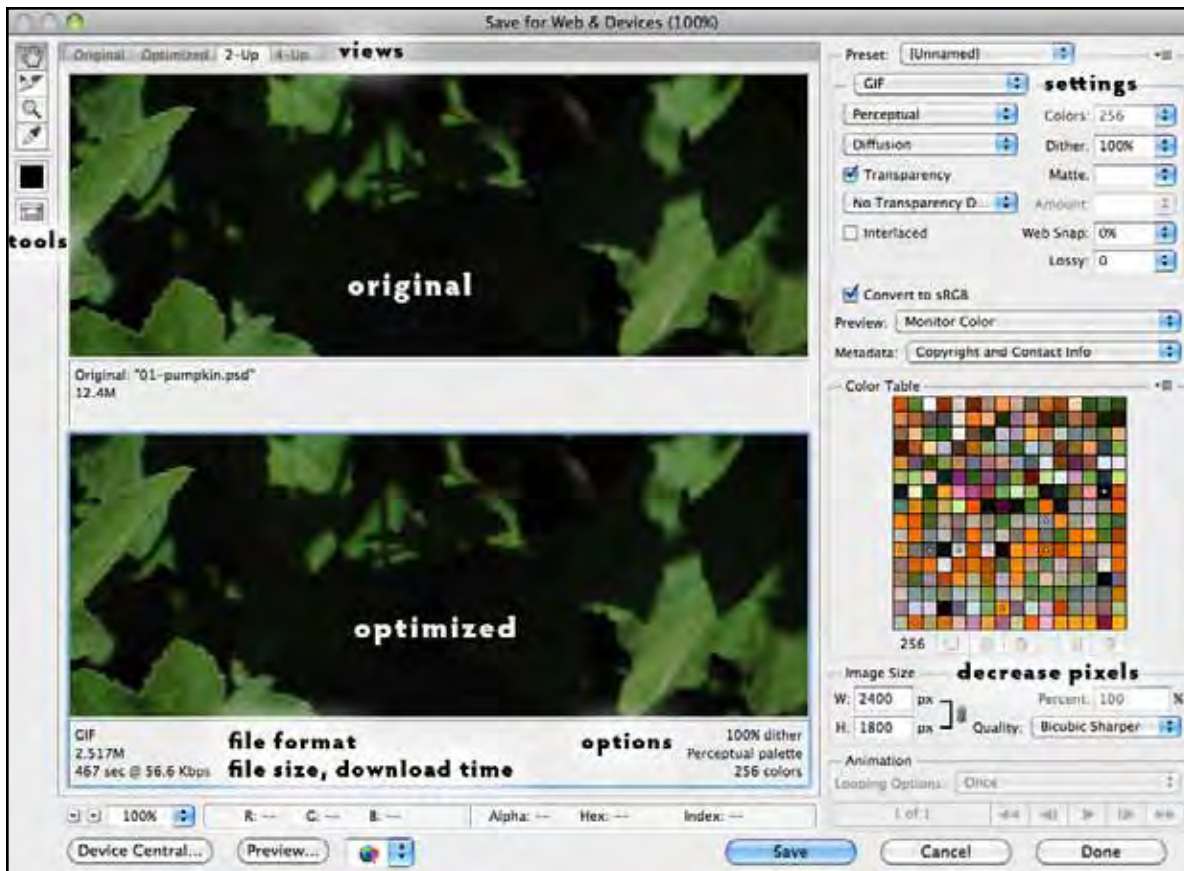
Photoshop has a special command, **File > Save for Web and Devices** that helps you to save a Web or email-ready copy of your image without harming your original source image. This copy is known as an **OPTIMIZED** version of the file. In this guided exercise you will save a Web copy of your finished pumpkin image. **DEVICES** are small hand-held electronic objects such as cell phones and PDAs.

1. Open **pumpkin1.psd** image if necessary.
2. Choose **File > Save for Web and Devices**.

This command opens a huge dialog box, as shown on the next page. The dialog box will show one of four different (pre)views on the left side, identified by the highlighted tab in the upper left region of the dialog box.

Original shows only the original file.

Optimized, the default, shows only the preview of the Web file with its current optimization settings.



2-Up splits the image preview into two panes, either side by side or top and bottom depending on the pixel dimensions of the original file. The left or top preview shows the original file, and the right or bottom view shows the optimized view for easy comparison.

4-Up displays four versions of the image. The upper left image is the original. The upper right image is highlighted, as indicated by the colored line (Mac) or box (Win) around its preview. You can click any other panel to activate it.



3. Choose the **2-up** view, if it is not already chosen.
4. Identify the other major regions of the **Save for Web and Devices** dialog box.
 - a. The tools are in the upper left corner of the dialog box with the **Hand Tool** chosen by default.

When a document is too large for the whole image to fit in its preview, only its upper left corner appears in the preview panel. It is difficult to tell the quality of your Web optimization in the dark leaf corner of this image. You can use the **Hand Tool** to move about in the image to an area with more detail.

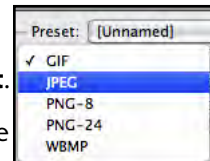
When you drag the **Hand Tool** in one panel, all the other panes also move, so that your preview regions stay comparable.
 - b. The **settings** region is used to adjust the optimized Web file format settings, to get a decent quality image with the smallest file size.
 - c. The **Image Size** region lets you lower the total number of pixels in your Web copy so that it will load more quickly and look better on a Web page. We call this process “putting an image on a pixel diet.”

- d. Underneath each preview is information about that version of the image. Here, we can see that with the default settings, this image will be in **(COMPUSERVE) GIF** format, be reduced from the original **12.4 M** (the size of the file without layers) to **2.49 M**, and that on a dialup modem (56 kb) it will take 462 seconds—or almost 8 minutes—to receive. (NOTE: your file and speed numbers may differ slightly from ours.)
- 5. Change the file format of the Web copy from **GIF** to **JPG**.

The default **GIF** format works well for images with just a few colors, like logos and type, that contain up to 256 colors. The **Color Table** just above the **Image Size** region, shows what those colors will be.

- a. Be sure the **Optimized** panel is the active one.

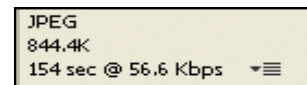
- b. In the **Settings** region change **GIF** to **JPEG** in the drop down menu just below **Preset**.



The **Color Table** vanishes, because the resultant copy keeps virtually all its colors. The **JPEG** (extension **.jpg**) supports millions of colors, not just 256, so it is better than **GIF** for preserving colors and detail in photographs and other continuous tone images.

JPEG also reduces the file size of most photographs more efficiently than does the **GIF** format.

- c. Check the file size at the bottom of the optimized preview.

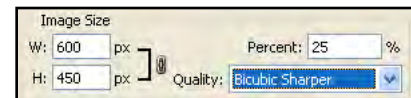


The **JPEG** is less than half the size of the **GIF**. With the default quality of 60, the **Web copy** will load in 154 seconds, taking about 2.5 minutes to receive instead of almost 8 minutes.

This transmission time is better, but the image is still too big for fast **Web** transmission; studies show that viewers tend to navigate off of **Web** pages that take more than 30 seconds to view. So, let's keep that 30 seconds as our target download speed.

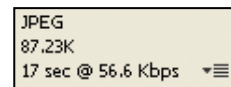
- 6. Reduce the number of pixels in the **Web copy** of the image to reduce its file size. (This image is so big that you can't even see the pumpkin in the **Save for Web and Devices** preview window.)
 - a. Locate the **Image Size** tab near the bottom of the right side of the dialog box.

- b. Change whichever dimension is larger, **Width** here, to **600 pixels** and then press the **Tab** key to move the cursor to the next box. When you type in the new width, the other values in the **Image Size** tab recalculate, and the preview changes on screen. This image will become 25% of its original size when the new size is applied, and you will now be able to see half of the jack-o'-lantern.



- c. Choose the **Quality** Photoshop should use to change the **Image Size**. **Bicubic Sharper**, shown here, will usually give the best results when you shrink an image.

- 7. Check your file size at the bottom of the optimization preview. With fewer pixels it loads much more quickly.



- 8. Leave the other settings in the dialog box alone, as they are for more advanced users.
- 9. Save the file
 - a. Click **Save** to save the **Web copy** of your image using your chosen settings.

In the **Save Optimized As** dialog box that pops up next, notice that the image is already appended with **.jpg**, the three character extension for **JPEG** files.

- b. Name your file, making sure you are saving the file in the correct location by using the top drop down menu.
- c. Click **Save**.

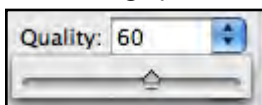
When you name files for this Web or email use, please keep the names short (under 10 characters) and avoid spaces or punctuation in the file names.

The web-sized copy, in JPEG format, will be saved to the place you designated with the original, unchanged, document still open. Close the original if desired.

JPEG QUALITY

There are two different **Quality** boxes in **Save for Web and Devices**. The upper one controls how strongly the image is compressed.

After you set your pixel dimensions, you should then make the file size on disk larger or smaller by adjusting the **JPEG QUALITY**. This sets the amount that the image is compressed, by approximating its color transitions mathematically rather than using the actual image pixels.

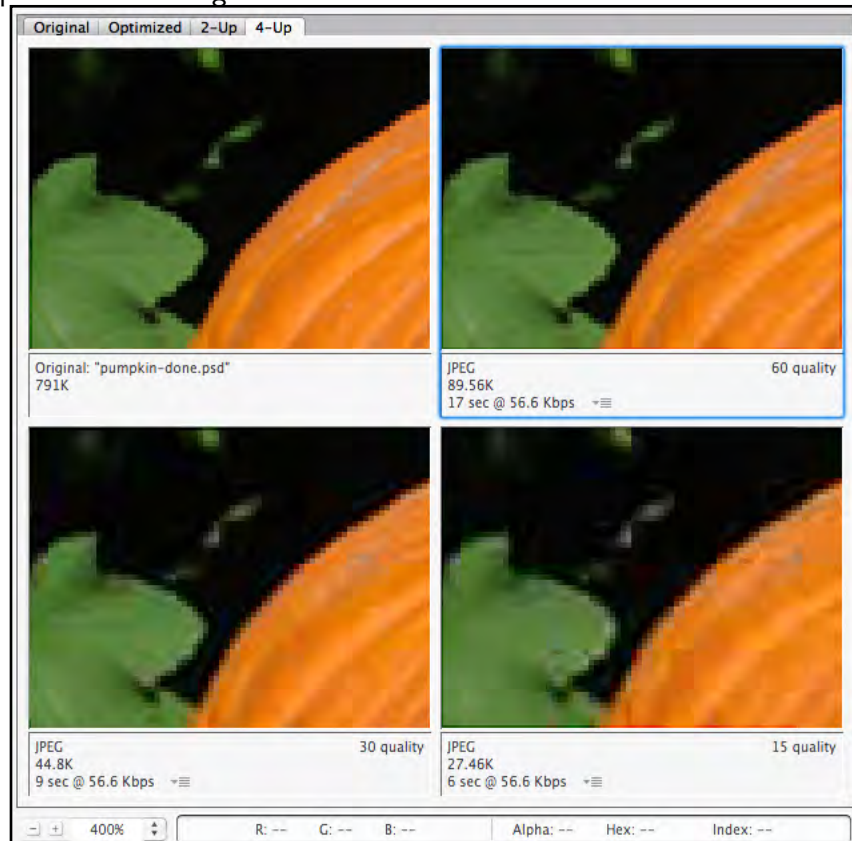


The extent to which the image distorts depends upon the color transitions of the original image, and are most noticeable with abrupt color changes. The distortion is called **JPEG ARTIFACTING**.

If you change your view from **2 up** to **4 up**, the additional previews will show your image with increasingly strong amounts of jpeg artifacting, and also decreasing file sizes (trading off time for quality).

The jpeg artifacting becomes more apparent if you raise the default 100% view to 400% at the bottom of the dialog box. In our experience, for images that are about 600 pixels in their larger dimension, adjusting the **Quality** until the file is between 85KB and 99KB will give a professional quality Web file that still loads quickly.

In most cases you should avoid **Maximum Quality**. This setting is designed to compress big, print sized files, to send to commercial print houses for publication—not for Web work. Changing the pumpkin to Maximum Quality or 100% increases the file size to 327.4 kb—even bigger than before it went on its pixel diet. It will take a full minute to load, and might make Web viewers or email recipients unhappy.



HOW BIG IS YOUR FILE?

When we talk about the size of an image, we might be referring to the dimension size which reflects the size an image would print out (inches), or we might be referring to the space an image takes up on a hard drive or disk (bytes, kilobytes, or megabytes).

A **BIT** is the smallest unit of information on a computer. A **BYTE** is made up of 8 bits. A **KILOBYTE** (K or KB) is roughly 1,000 bytes (1,024) and a **MEGABYTE** (M or MB) is 1,024 kilobytes.

When you compress an image to send by email or put up on the Web, you need a small file that will download quickly. Usually, you will be looking at kilobytes (K or KB) unless the image is extremely small, then it will be in bytes. Images that are 1 MB or more are generally considered too large for Internet transmission. We recommend that you try to keep all course files you will send on the Web to under 100 KB unless otherwise specified.

If you want to check the size of a file after you make it, view its **Properties** (Win) or **Get Info** (Mac) from the Desktop. When you open a JPEG file in Photoshop, it temporarily expands for editing. Thus the **89 K JPEG** we just made opens to **791 K**.

AVOID COMMON SAVE FOR WEB MISTAKES

We're going to cover this twice because it is such a common problem for both new and experienced Photoshop users.



Look at these settings. Although this image was placed on a pixel diet to reduce its overall pixel dimensions, its JPEG compression setting of **100 quality** is not strong enough and its file size of **327.4K** is too large for Web and email attachments.

Follow this strategy to avoid this common mistake:

1. Reduce the image pixels.
2. Check the file size of your image.
3. Gradually reduce the quality of the image until it is small enough to meet your Web guidelines.

Another problem we often see is when folks apply the JPEG compression very strongly, they are assuming that it is best to make the smallest file possible. As you can see from the opposite page, at a quality of 15, the pumpkin image artifacts badly, seriously diminishing its appearance. You can see this much more dramatically if you refer to the color version of the screen image on your Practical Photoshop DVD.