

Image File Types

Digital image formats for both Mac and PC platforms are accepted.

Preferred file types: *These file types work best and typically encounter few problems.*

- tif (TIFF)
- jpg (JPEG)*
- psd (Adobe Photoshop document)
- eps (Encapsulated PostScript)
- ai (Adobe Illustrator)
- pdf (Portable Document Format)

* jpg files should be submitted only if no other file type is available and can be accepted only if they meet the minimum 300 ppi resolution requirement .

Image sizing specifications should be discussed with the Editorial Office prior to digital file submission. Digital images should be submitted in the final size desired. Extra white space around the edges should be cropped out.

Image Resolution

The minimum acceptable resolution is 300 ppi for the image at the final size in the paged article. To ensure the highest-quality printed image, follow these optimum resolutions:

- *Line* = 1200 ppi. Contains only black and white; no shades of gray. These images are typically ink drawings or charts. Other common terms used are monochrome or 1-bit.
- *Combination* = 600 ppi. Gray or color image combined with a line image. An example is a photograph with letter labels, arrows, or text added to it. Another example is a map with a legend. Anytime a picture is combined with type, the resolution must be high enough to maintain smooth, readable text. The resolution for combos is not set to 1200 ppi because the file size would be too large for timely processing, downloading, printing, etc. 600 ppi is a middle ground between the two other image type qualifications. A color graph is treated as a combo because it contains both color channels and text.
- *Grayscale* or *Color* = 300 ppi. Contains no text. A photograph or a painting is an example of this type of image.

On occasion, low-quality images that appear to be line images are processed as combos. When anti-aliasing happens around text, it becomes blocky and pixilated. The gray “dots” around the text help to smooth the edges.

Resolution will decrease when an image is enlarged; conversely, resolution will increase when an image’s size is reduced. This is a process known as resampling, and it balances the size/ppi ratio proportionally.

Vector files do not have a resolution and are preferred if available. Altering of size and text can be done without loss of integrity to the visual quality of the image. (File formats eps, ai, and pdf are the most common. It does not mean that just because the file type is one of these formats it will be vector.)

* The diagram on the next page demonstrates the difference in resolution.

Pixels

A pixel is the smallest element of a raster image. It is these pixels that make up digital images; the amount of them defines the visual quality both on screen and in print.

Pixels are measured as dots per inch (dpi) or as pixels per inch (ppi). These terms are sometimes used interchangeably, although the actual meanings of the two are very different. The term dpi refers to a printer’s dot density, and ppi is the dot display of digital devices such as monitors or digital cameras.

Resolution is a common term used to describe ppi. It is the result of the pixel width in combination with the desired print width.

Digital Photography

When using a digital camera to capture images, use the highest resolution setting option with the least amount of compression. Digital camera manufacturers use many different terms and file formats when capturing high-resolution images, so please refer to your camera’s manual for more information.

As a general guide, a setting of 2048 × 1536 pixels will produce a 300 ppi image at approximately 7 × 5 inches. This can be calculated by either of the following equations:

pixel width ÷ desired resolution = width in inches **OR** pixel width ÷ width in inches = final resolution

Color Mode

The two most common color modes are CMYK and RGB.

CMYK stands for Cyan, Magenta, Yellow, black. These four represent the colors of inks used on our press. (Pantone colors are separate from CMYK.)

RGB stands for Red, Green, Blue. These colors are made up of light and are used in the displays of computer monitors, digital cameras, TVs, etc.

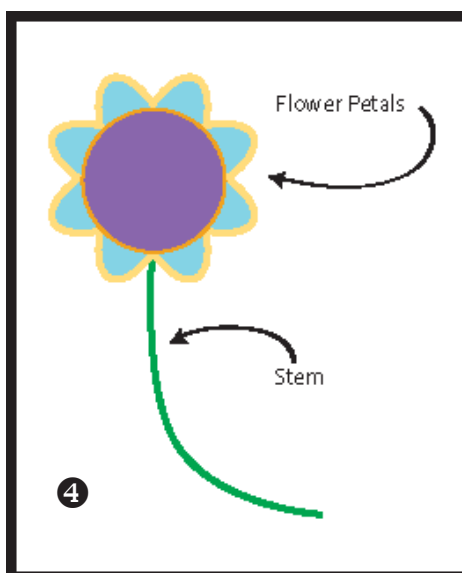
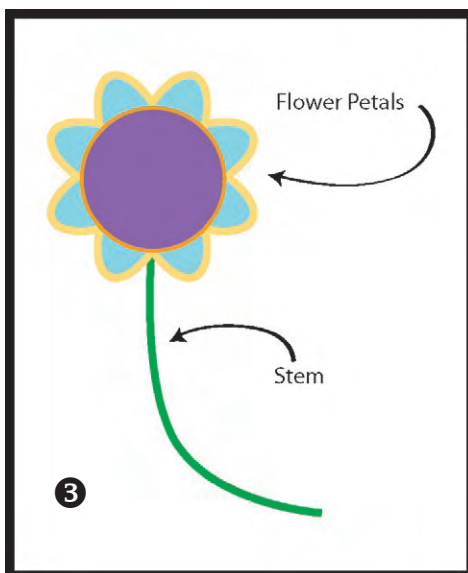
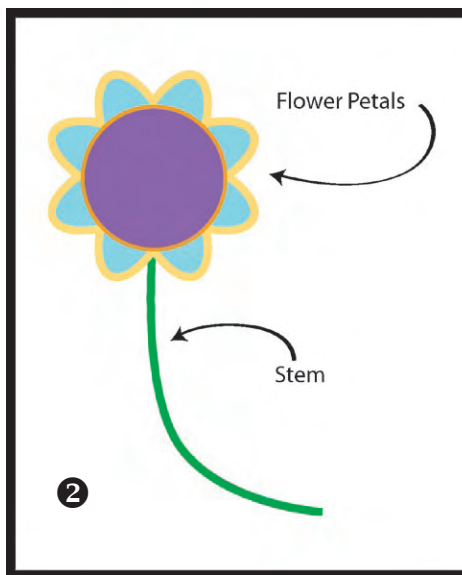
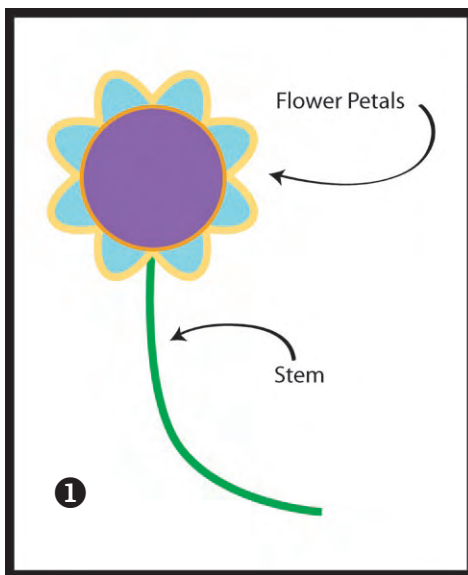
All color modes are accepted, but all printed images are converted to CMYK. A color shift is typical when converted. Because of this, it is preferable that digital color files be submitted in CMYK mode. While the gamut of colors in RGB is very wide, CMYK is more limited. In order for a printer to simulate RGB, it has to combine CMYK channels (Red = Yellow + Magenta; Green = Cyan + Yellow; Blue = Cyan + Magenta). That is why Green on your monitor is going to appear more pure and vibrant than a printed combination of two inks.

Fonts

Fonts should be embedded in the document to avoid incorrect font conversion. Symbols and Greek characters do not transfer well if not protected. Embedding the fonts is going to ensure that what is seen on the monitor will translate throughout the process all the way to press or online. Similar to embedding, some vector applications may allow Creating Outlines or Converting Type to Curves. If using Acrobat Distiller to create PDFs, use a Press setting.

True Type fonts or compatible fonts should be used, such as Times New Roman, Times Roman, Arial, or Helvetica.

Image Resolution

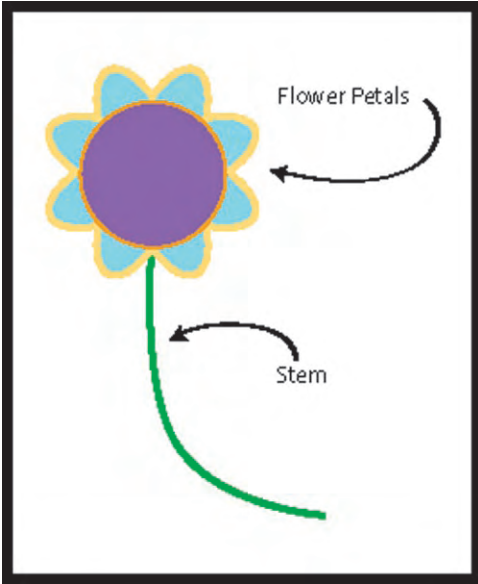


1 600 ppi - optimal quality (smooth curves, text very legible)

2 300 ppi - good quality (looks OK, less smooth)

3 200 ppi - less than acceptable quality (curved edges are getting a stair-step appearance, text still legible)

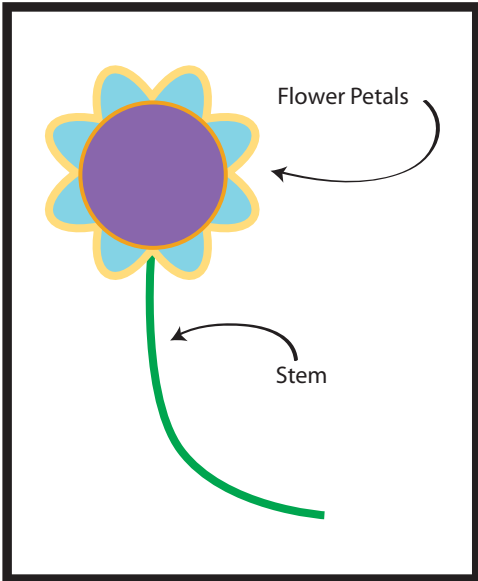
4 72 ppi - poor quality (stair-stepping is prevalent, text begins to become illegible - especially if it is small)



Resampling Images

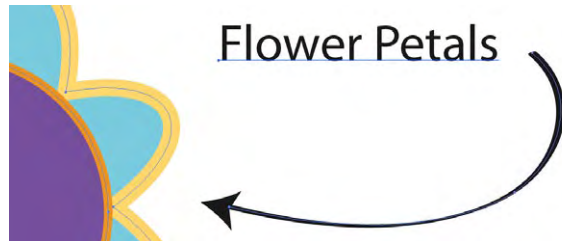
When the resolution of an image is forced to be a higher resolution than it was originally assigned, it does not fix the problem. The figure in this example was 72 ppi. It was forced to be 600 ppi. That does not make it a 600 ppi quality image. Now it has 72 ppi characteristics with fuzzy edges.

The proper way to resize an image is to let the resolution change proportionally with the physical size. (In Photoshop there is a Resample Image box at the bottom of the Image Size window that must be UNchecked.)



Vector Images = No Resolution

The blue outlines and underlines (as seen in the screen capture below) indicate the elements of this figure that are vector and indefinitely editable. We can reduce and enlarge this over and over without any loss of quality. There is no stair-step appearance because a resolution has not been assigned to it. Resolution is determined by the density of dots or pixels per square inch required to render the details of an image.



Vector line art vs 1200 ppi line art

