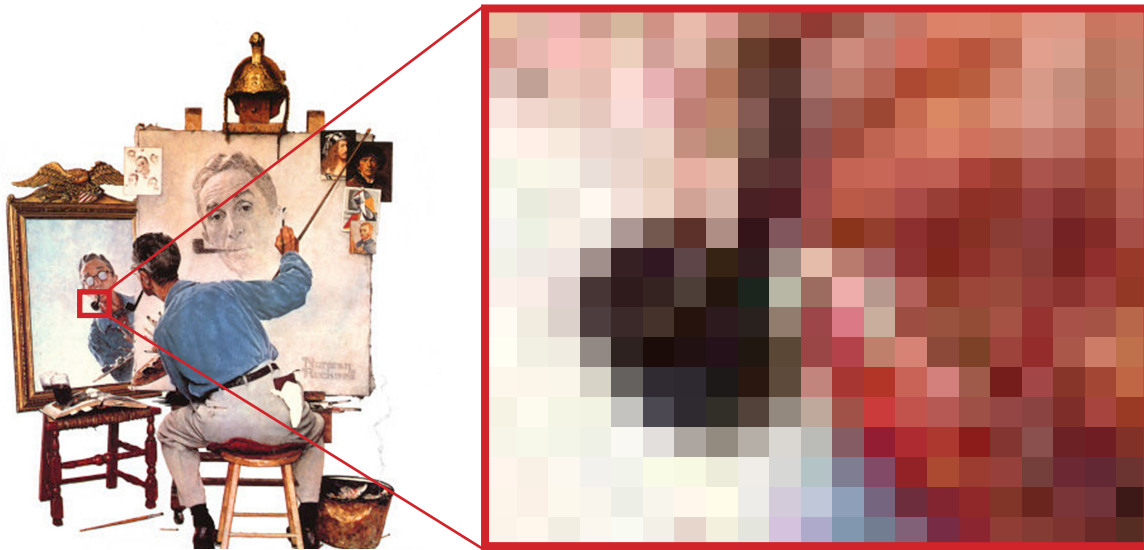
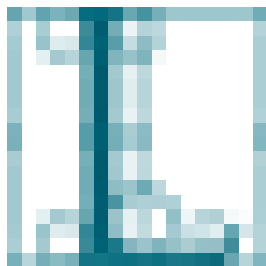


Resolution 101

Digital images are made up square dots called pixels. Each pixel represents the color of a small part of an image. The more pixels you have in an image the smoother and more realistic the image will appear - to a point.



Resolution refers to the density of pixels in an image (# pixels/unit area) e.g. pixels/dots per inch (ppi/dpi).

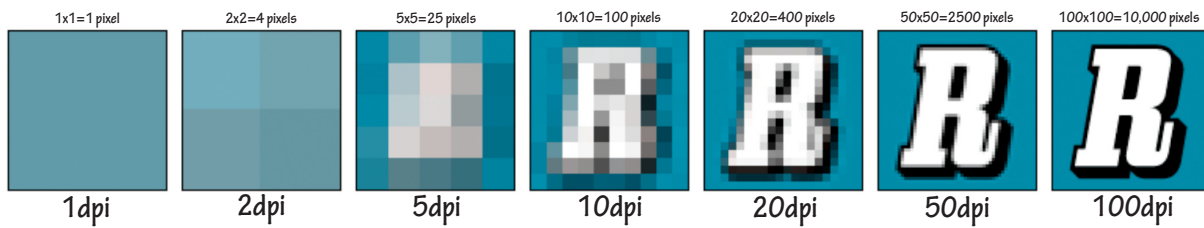


Low resolution images have few pixels per unit area and lines that look jagged as a result of the visibility of the individual pixels comprising the image.



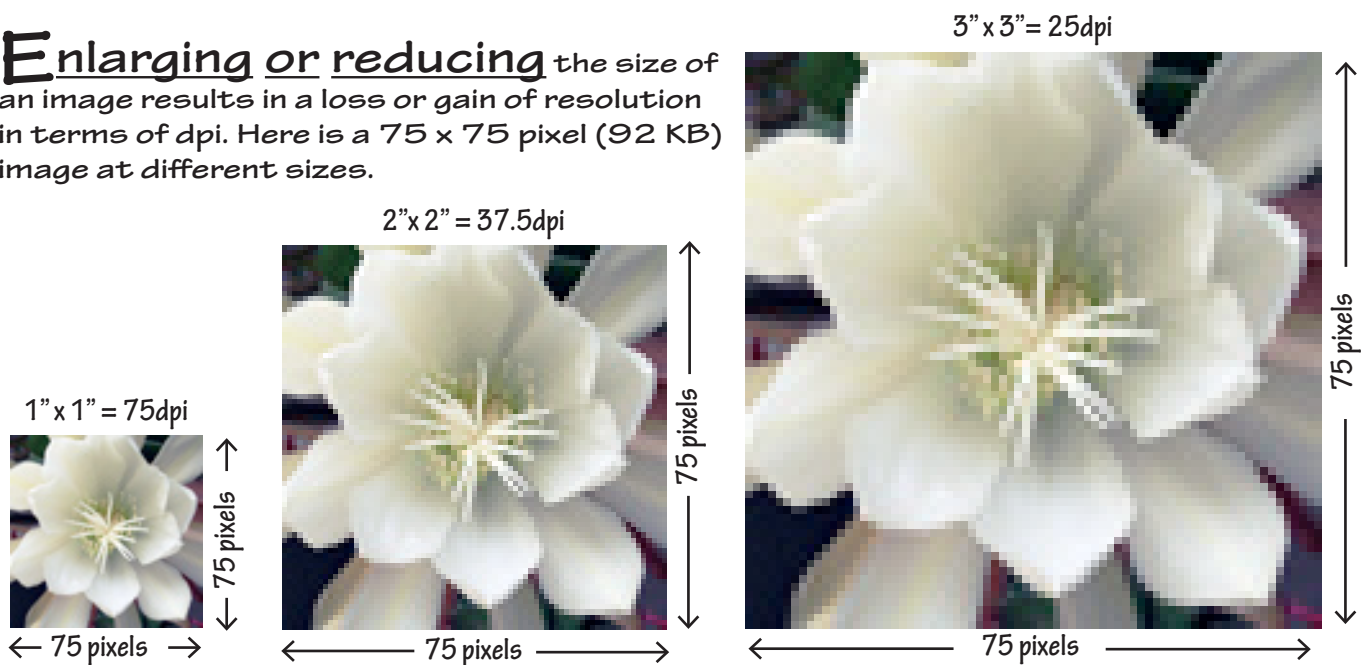
High resolution images have many more pixels per unit area. As each pixel occupies an increasingly smaller part of the image, it becomes less visible. But there is a point where the pixels become so small that adding more (increasing resolution) won't result in a better image quality.

Spatial Resolution or Pixel Dimension is an absolute measure of the number of pixels in an image, both horizontally and vertically. With a pixel dimension of 300 x 300, an image has a total of 90,000 pixels. With a doubled pixel dimension of 600 x 600 the image has four times as many pixels (360,000) to play with. The more pixels, or specific points of information there are in a picture, the more detail that can be represented.



Different spatial resolutions of a 1" x 1" image

Enlarging or reducing the size of an image results in a loss or gain of resolution in terms of dpi. Here is a 75 x 75 pixel (92 KB) image at different sizes.



Examples of relationship between file size, spatial resolution and format.

print area inches	resolution dpi	spatial resolution #pixels	file size	
			(RGB tiff, no comp)	(RGB jpg, 8 comp)
4 x 6	100	400 x 600	703 KB	48 KB
	300	1200 x 1800	6.18 MB	60 KB
5 x 7	100	500 x 700	1 MB	50 KB
	300	1500 x 2100	9 MB	64 KB
8 x 10	100	800 x 1000	2.29 MB	52 KB
	300	3400 x 3000	20.6	88 KB
11 x 14	300	3300 x 4200	39.7	124 KB
24 x 36	250	60,000 x 90,000	154.5	356 KB
36 x 48	250	90,500 x 120,000	309 MB	664 KB
typical PowerPoint slide				
15 x 17	72	1080 x 1224		52 KB

What resolution do you want?

That depends on what you need.

For standard PRINTED OUTPUT, the best results are achieved with images not less than 200 dpi at the size of the final print. 300 dpi is a sort of magic number. Greater than 400 dpi at size results in nominal image improvement under most circumstances.

At this point it is beneficial to repeat “at the size of the final print” as there is a common misconception that because an image looks good on the monitor, it will enlarge & print well. Images on the web or projected in a PowerPoint presentation are typically 72-100 dpi, far below the resolution needed for printing. It is not unheard of for us to receive a 2” x 3” image at 72dpi downloaded from the web with the request we print a 24” x 36” poster. Just doesn’t work.

While one can, with software, interpolate (add resolution) and refine an image which is at less than optimal



printing resolution, these tools have their limits and it is better to start out in the higher range of resolution if your intention is to print, be it a family photo, an illustration for a publication, or an element of a poster for a colloquium.

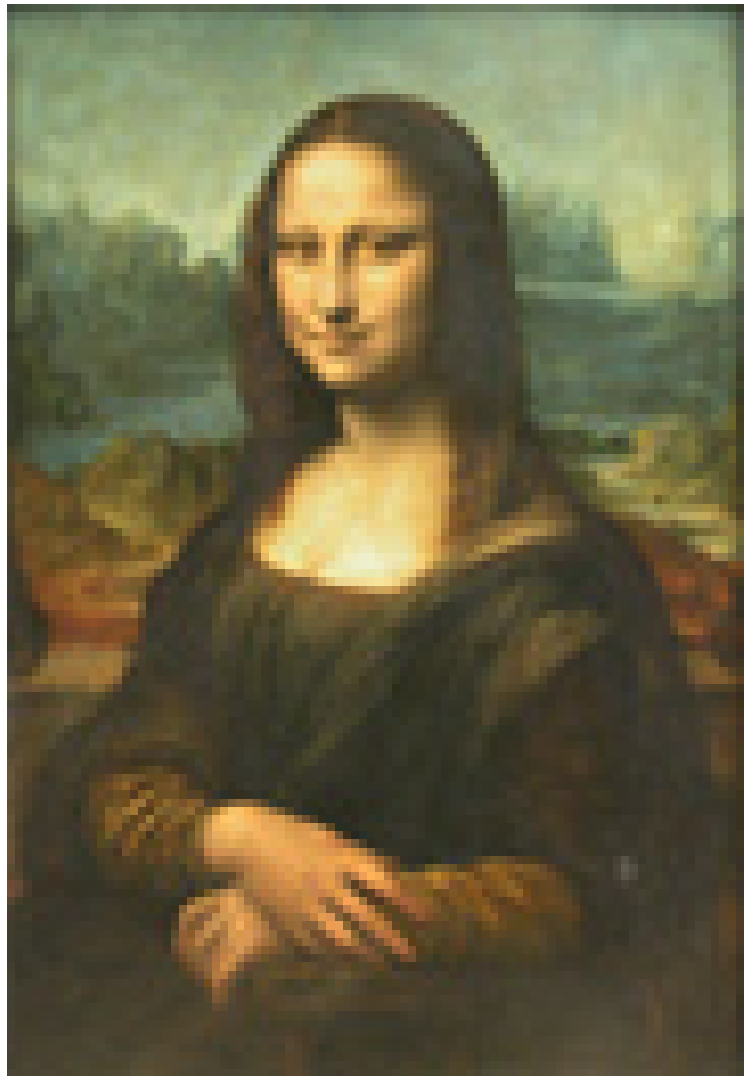
The failsafe method is to work backwards. What is the desired FINAL size (in units of area) of the print?

4” x 6”?

11 x 17”?

36 “ x 48”?

Then see if your image can accommodate the enlargement by being ~ 300 dpi when at the desired size.



For POWERPOINT or WEB use, resolutions between 72-100 dpi at the size they will appear on the monitor will work well for most images.