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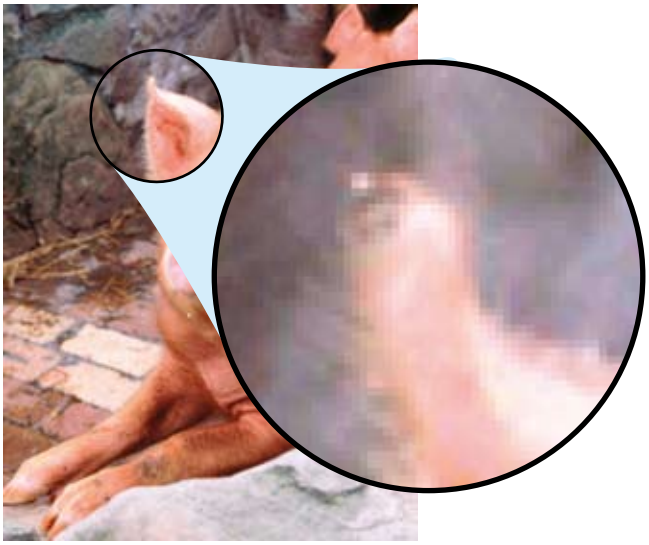
Image resolution

When printing photographs and similar types of image, the size of the file will determine how large the picture can be printed whilst maintaining acceptable quality. This document provides a guide which should help you to judge whether a particular image will reproduce well at the size you want.

What is resolution?

A digital photograph is made up of a number of discrete picture elements, known as "pixels". We can see these elements if we magnify an image on the screen (see right). Because the number of pixels in the image is fixed, the bigger we print the image, then the bigger the pixels will be. If we print the image too big, then the pixels will be visible to the naked eye and the image will appear to be poor quality.

Let's take as an example an image from a "5 megapixel" digital camera. Typically this camera at its maximum quality setting will produce images which are 2592 x 1944 pixels. (If we multiply these two figures, we get 5,038,848 pixels, which approximately equates to 5 million pixels/5 megapixels.) Printing this image at various sizes, we can calculate the number of pixels per inch, more commonly referred to as dots per inch (dpi). Just note that this measure is dependent on the image being printed, it is unrelated to the resolution of the printer, which is also expressed in dpi.



Original image size 2592 x 1944 pixels

Print size (inches)	8 x 6	16 x 12	24 x 16	32 x 24
Print size (mm)	203 x 152	406 x 305	610 x 457	813 x 610
Print resolution (dpi)	324	162	108	81

We can see that the effective resolution reduces as we increase the print size. Now comes the subjective bit: what resolution is "good enough"? For many years in conventional (offset litho) printing, the reprographic standard for good quality commercial printing has been to require a resolution of 300dpi at the printed size. This figure still holds good, but for many digital print applications it is possible to get good reproduction with lower resolution.

Although it is possible to increase image resolution using image editing software, such as Photoshop, this is unlikely to improve the print quality of an image at high degrees of enlargement. Some low-resolution images can have their print quality improved, often by the use of specialist software; ask us for advice.

Small format (up to A3)

When printing images onto A4 or A3 pages, aim for 300dpi if at all possible. This means that your image will be suitable for printing digitally or conventionally. You are unlikely to need a higher resolution, unless the image contains text or fine line detail. Ask us for further advice if this is the case.

If the image is to be printed digitally (usually on a toner-based press) then 240dpi is generally more than adequate. Resolution can be further reduced, to around 150dpi, without very significant loss of quality. It is even possible to get usable results from lower resolutions, down to 75dpi or so, but this is very dependent on the type and content of the image.

Large format (above A3)

Digital poster printing uses large-format inkjet printers. Because the results are viewed from greater distances than small-format print, then lower resolutions can normally be used. 300dpi is generally more than is required and would mean very large file sizes. 200dpi is fine; for most work 150dpi will give very good results. Particularly for larger poster sizes, resolution can be reduced down to 75dpi if necessary. Again, images containing text or fine lines benefit from resolutions higher than the minimum.

Approximate image sizes

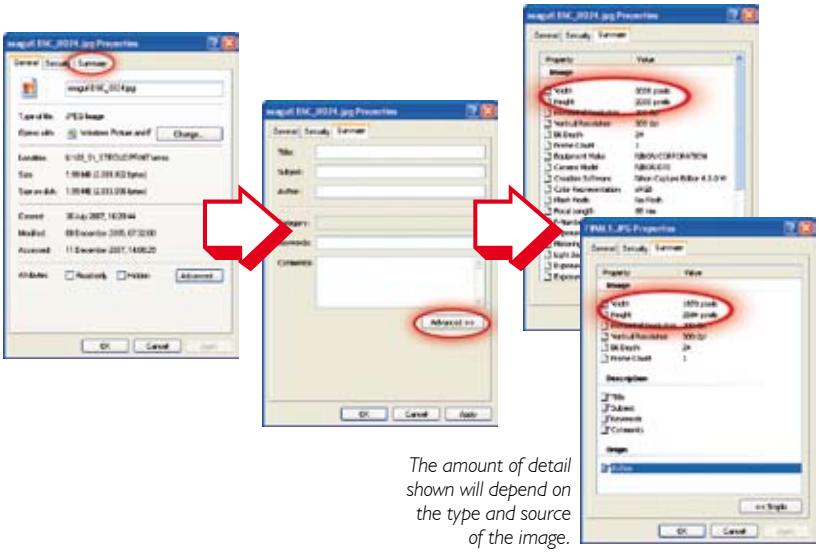
	Print size						
Resolution	A6 105 x 148mm	A5 148 x 210mm	A4 210 x 297mm	A3 297x420mm	A2 420x594mm	A1 594x841mm	A0 841x1189mm
300dpi	1240x1750 pixels 7 Mb*	1750x2480 pixels 13 Mb	2480x3510 pixels 26 Mb	3510x4960 pixels 52 Mb	4960x7020 pixels 105 Mb	7020x9930 pixels 210 Mb	9930x14040 pixels 420 Mb
240dpi	990x1400 pixels 4 Mb	1400x1980 pixels 8 Mb	1980x2810 pixels 17 Mb	2810x3970 pixels 34 Mb	3970x5610 pixels 67 Mb	5610x7950 pixels 134 Mb	7950x11230 pixels 270 Mb
150dpi	620x870 pixels 2 Mb	870x1240 pixels 4 Mb	1240x1750 pixels 7 Mb	1750x2480 pixels 13 Mb	2480x3510 pixels 26 Mb	3510x4970 pixels 52 Mb	4970x7020 pixels 105 Mb
75dpi	310x440 pixels 0.5 Mb	440x620 pixels 1 Mb	620x880 pixels 2 Mb	880x1240 pixels 4 Mb	1240x1750 pixels 7 Mb	1750x2480 pixels 13 Mb	2480x3510 pixels 26 Mb

*This is the approximate uncompressed size of the image. If the image is saved in a compressed file format, such as JPEG, then the actual file size will be substantially smaller.

Overleaf: how to check image resolution ➤

Checking image resolution

As already mentioned, file size is not a reliable guide to the size of an image because of the effects of compression. Therefore it is useful to be able to check the actual pixel size of an image. The image can of course be opened in a suitable editing program, such as Adobe Photoshop, or Paintshop Pro, but it is also possible to check the size without opening the file. Assuming that the image is on a PC running Windows, locate the image via **My Computer** or **Explorer**, right click on the file and select **Properties** from the pop-up menu. Next select the tab **Summary** (see right), then click the **Advanced** button which will display information about image size and resolution (far right).



The amount of detail shown will depend on the type and source of the image.