Optimising Graphics

This handout is a general guide about optimising images for the web rather than a specific 'how to'.

What does optimising mean?
Optimising a graphic means
- Converting an image file to a type that can display in a browser
- Reducing the file size of an image so that it is small enough to be sent or received electronically e.g. downloaded as part of a web page.

Why reduce file size?
It is important that a web page downloads into a browser window as fast as possible. This enhances the user experience. Without sufficient optimisation, graphic files can increase the total file size of a web page enough to slow download. This can result in a user waiting for a page to appear with the potential that they will become frustrated or irritated and decide that their time be spent best elsewhere.

How does file size reduction work?
File size reduction is achieved by reducing visual information such as detail colour or tone in an image. This can have the effect of reducing image quality. This is not so much of an issue when displaying images on a computer screen as quality does not need to be as great as that required for printed media.

Screen resolution
Screen resolution is measured as 72 pixels per inch. Graphic documents that are prepared for display in a web page should have their document properties set as 72 ppi (compared to images prepared for print which would typically be set to 300 ppi).

Setting an image to 72 ppi means that the resolution of an image matches the resolution of the dots on the screen, pixel-for-dot. Originally there were 72 dots per inch on computer screens but now it is typically 96 dots per inch. 72 ppi is not an exact match but is still used as a convention for expressing web graphics. Sometimes you will find web graphics that are set to 96 ppi but using the Save for Web and Devices method in Photoshop outputs to 72 ppi.

Types of image optimisation for the web
The optimisation methods have been developed to deal with different image types. There are three methods:
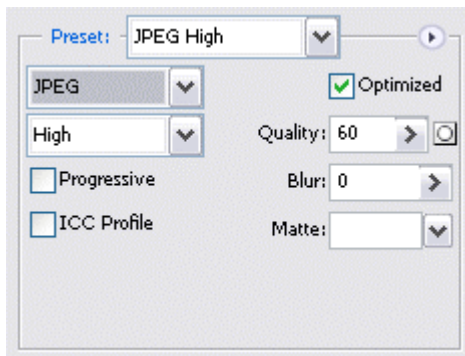
JPEG: Joint Photographic experts Group. A method for images with continuous tone (a gradual blend of light and colour) .e.g. photographs. Does not support transparency. Usually expressed as *.jpg* in the file extension though *.jpeg* can also be used.

GIF: Graphic Interchange Format. A method for images that have a limited range of colours or areas of flat colour e.g. charts, cartoons and often graphics for icons etc. Supports transparency and simple animations (animated gif).

PNG: Portable Network Graphic. There are two methods for PNG; 8 bit and 24 bit. 8 bit is a method similar to GIF optimisation. Both 8 and 24 bit support transparency. The 24 bit PNG is better for high quality transparency but can result in comparably higher file sizes than the other methods.
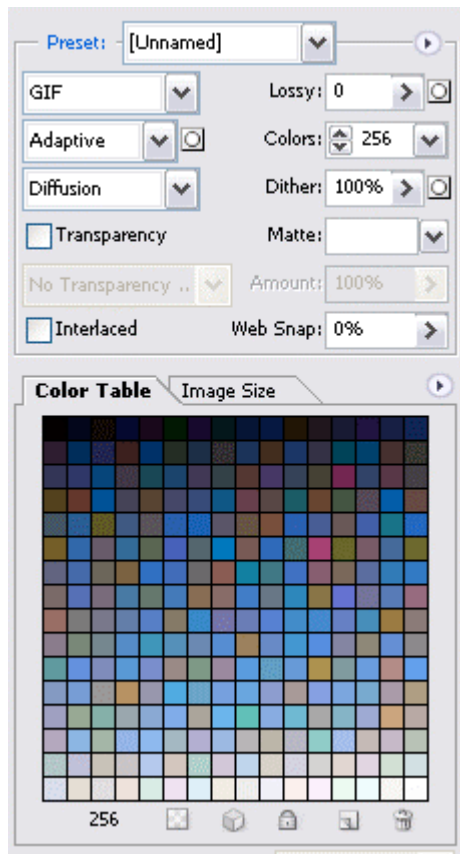
Jpeg optimisation

Jpeg optimisation works by *compressing* an image. This method is known as a *lossy* form of file reduction e.g. the image information is degraded or lost. Jpeg compression is expressed in terms of a percentage (when using Save for Web in Photoshop) of the original image with 100% being the best quality. High compression (low percentage) produces a reduction in tonal information and image detail. Highest compression rates result in 'jpeg artefacts' that are like speckles which appear, especially around edges of high contrast. As a rough guide, a reasonable pay-off between file reduction and image quality can be around 60%. For a photograph, this will result in a significant reduction in file size but still be acceptable for display on screen.

JPEG options as seen in Photoshop – Save for Web

Gif and PNG 8 bit optimisation

These work by mapping the image to a colour palette. There are various types of colour palettes available but the maximum number of colours available is 256. This may seem, and is, a small number of colours but actually works quite well. Gif and 8 bit PNG compressions are known (confusingly) as lossless methods e.g. not degrading image information but, with only a small colour palette available, this should be seen as a relative term. Suffice to say, an image suitable for gif or 8 bit PNG optimisation will retain image detail even with a small colour palette.

GIF options with colour palette as seen in Photoshop – Save for Web

Gif and 8 bit PNG colour palettes
Depending on the graphic software used these terms may differ slightly or there may be more options available but they fall into three main types:

> **Web safe**: Developed from the days when computer monitors displayed only 256 colours. To add to the confusion, not all these colours were shared by Mac and PC. It was determined that from this palette there were 216 common colours between the two systems. Therefore, a web safe palette is one that will produce consistent results in colour Between Mac and PC. It can be argued that this palette is now redundant because even relatively old monitors will display thousands of colours. Using the web safe colour palette can produce results that are not very sympathetic to the original image.

> **Perceptive, Adaptive** and **Selective**: It is difficult to determine the difference between the results of these two colour palettes. They work by assessing the colours in an image and creating a colour palette from those colours to a maximum of 256. The results are more sympathetic to the original than the web safe palette.

More about GIF and 8 bit PNG
When optimising an image there is also an option to reduce the *number of colours* and use *dither.*

The file size can be reduced by reducing the *number of colours* in the colour palette.

Dither produces blending between areas of the image to produce smoother tones. Gif and 8 bit PNG optimisation has difficulty in producing images that contain continuous tone (a gradual blend of light and colour). Use of dither can increase the file size.

Animated GIF

These are gif files that contain image 'frames' which play an animation when displayed. They can be used in the same way as a static gif file. They are best used for short animations containing a handful of frames. These can be made with a graphics editor capable of making animated gifs.

Comparing GIF, 8 bit PNG and jpeg

With your graphic software, try comparing the file size and quality of an image optimised by the GIF, 8 bit PNG and JPEG methods.

With a *photographic* image you will probably find that to optimise it as a GIF or PNG will result in a higher file size compared to a JPEG optimisation with similar image quality.
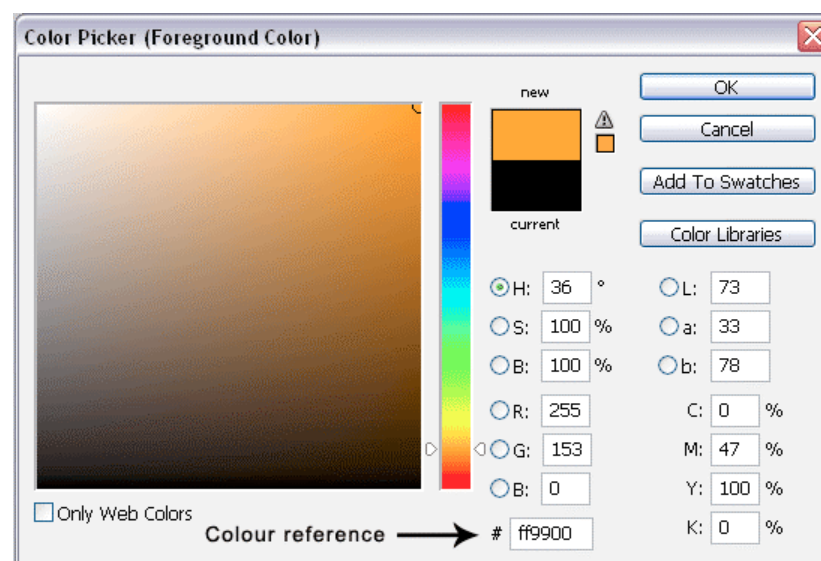
Optimising a *graphic* as a JPEG often results in a higher file size and undesired JPEG artefacts compared with optimising as a GIF or PNG.

Of course, not all images fall neatly into being optimised by one method or another. In that case it is up to you to decide which optimisation method has the best result for your requirements.

About transparency

Transparency refers to a part of an image which contains no pixels and is therefore transparent. This is used when the subject of an image is not rectilinear, such as a circle, and is going to be placed over a patterned background or where specific background colours are uncertain.

If the background colour is specific then there is no need to use transparency, just make the background of the image match the colour of the web page. Do this by using the colour reference of the page background and inserting it into something such as the Colour Picker in Photoshop.
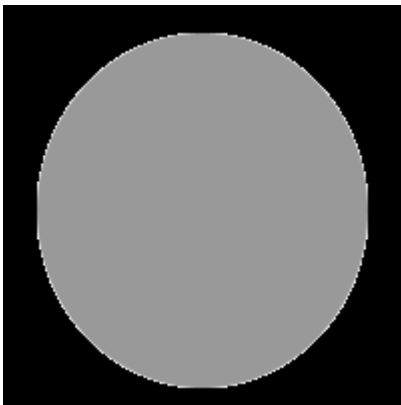
If transparency is required, the easiest way to do this is to turn off the visibility of the background layer in the Photoshop document before going to Save for Web. Choosing GIF, PNG 8 bit or PNG 24 bit gives you an option to select transparency for the transparent areas in the document.
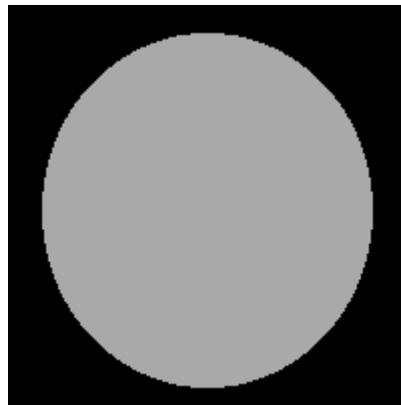
PNG 24 gives a much superior transparency than GIF or PNG 8. This creates much smoother outlines and allows semi transparent areas such as drop shadows.

GIF and PNG 8 bit transparency have difficulty rendering anti-aliasing and therefore can exhibit fringing around the edge of transparent areas. This can result in white fringing, thereby spoiling the transparent effect. This can be remedied by either filling this area with the predominant colour of the intended web page background (matte) or by choosing None for Matte. The latter hides the fringing but results in a pixelated edge.
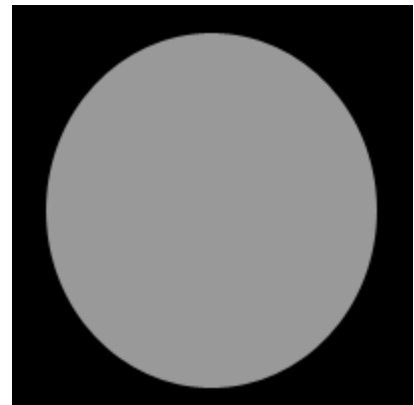
The following show a grey circle with transparency on a black background, illustrating the effect of matte.

White matte results in white fringing

No matte results in a pixelated edge

Black matte results in a smooth looking edge

The black matte in the illustration above fills the fringe pixels with black thereby blending them into the background.