University of Bristol
Information
Services

# Scanning and optimising images using Photoshop

## Practical workbook

## Aims and Learning Objectives

The aim of this course is to explore the procedures of image capture using a scanner and to optimise the resulting digital images using Photoshop.

After completing the course, you will be able to:

- understand colour rendition issues;
- understand the digitisation process;
- set scanning parameters adequately for the intended output;
- capture images using a scanner;
- crop images;
- correct perspective problems;
- adjust the tone and colours of images;
- sharpen images;
- scale images.

# Document information

## Course files

When working in the Computer Centre training rooms save your files in **C:\USER\Scanning**\.

## Related documentation

Other related documents are available from the web at:

http://www.bristol.ac.uk/is/learning/documentation/docs-by-category.html#graphics

If you have any comments or queries about this document mail iser-docs@bristol.ac.uk.

# Introduction

There is little doubt that the use of digital images in learning, teaching and research projects is growing. Typical uses include: supporting lectures and other presentations; creating Web-based instruction and creating digital image archives. Another aspect of digital images is that they can be delivered on a variety of supports: PowerPoint, Web, image database, CD-ROM and print. It is therefore important to be familiar with image digitisation processes in order to obtain images that will be 'fit for purpose'.

Scanning provides a means for converting traditional film images to the digital format, where they can be manipulated and enhanced just like any digital image.

This course shows you how to make better use of your scanner and apply image enhancement techniques using Adobe Photoshop.
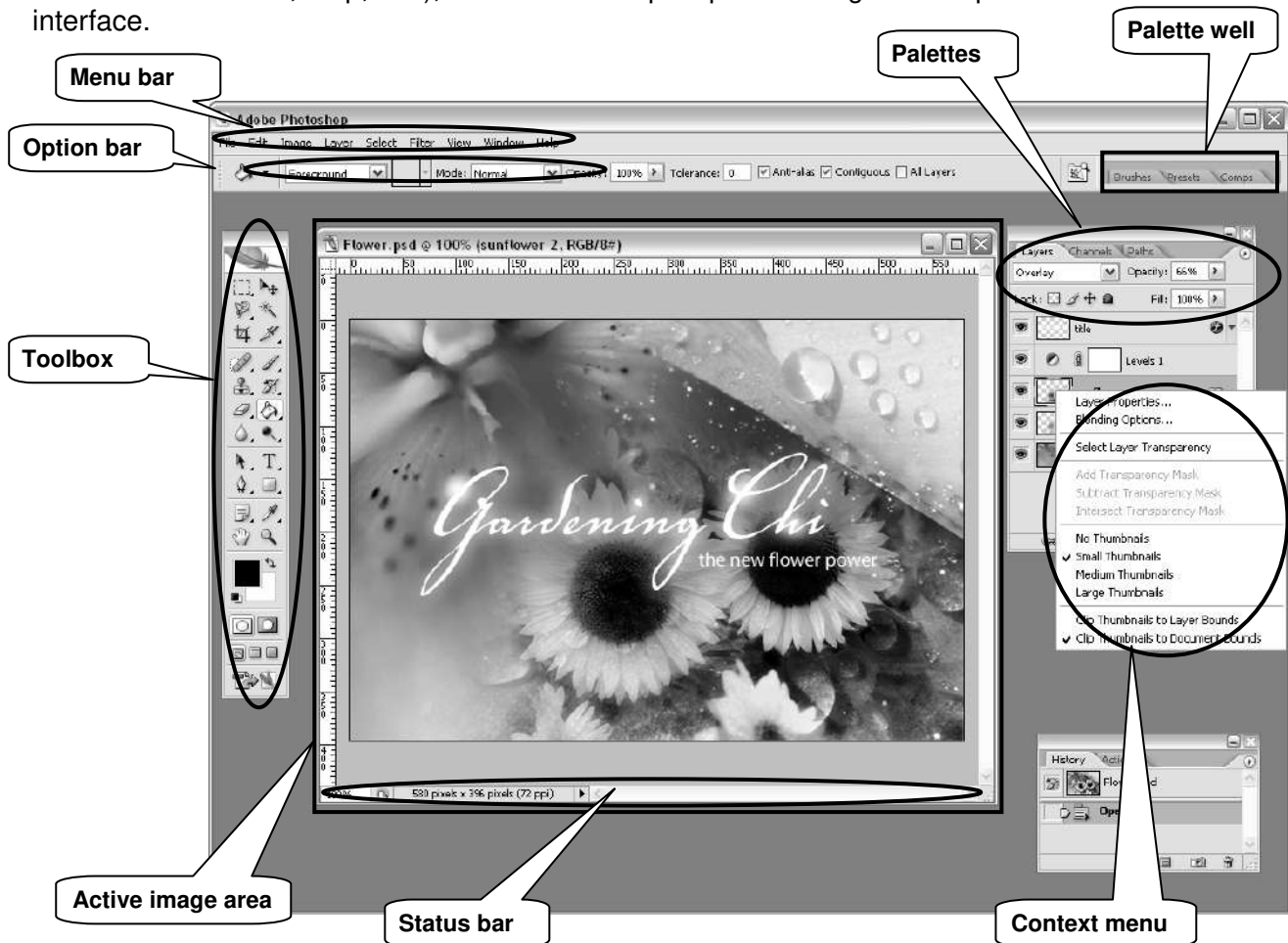
# Prerequisites

This course assumes that you are familiar with the use of a computer keyboard and mouse, and with the Windows environment.

# Contents

# Introduction to Photoshop

Photoshop is the ultimate Swiss army knife for all your imaging needs, from basic to highly sophisticated image editing. For example you can simply enhance a photograph (remove red eye effect and scratches, crop, etc.), or create a complex photo collage or a sophisticated Web interface.

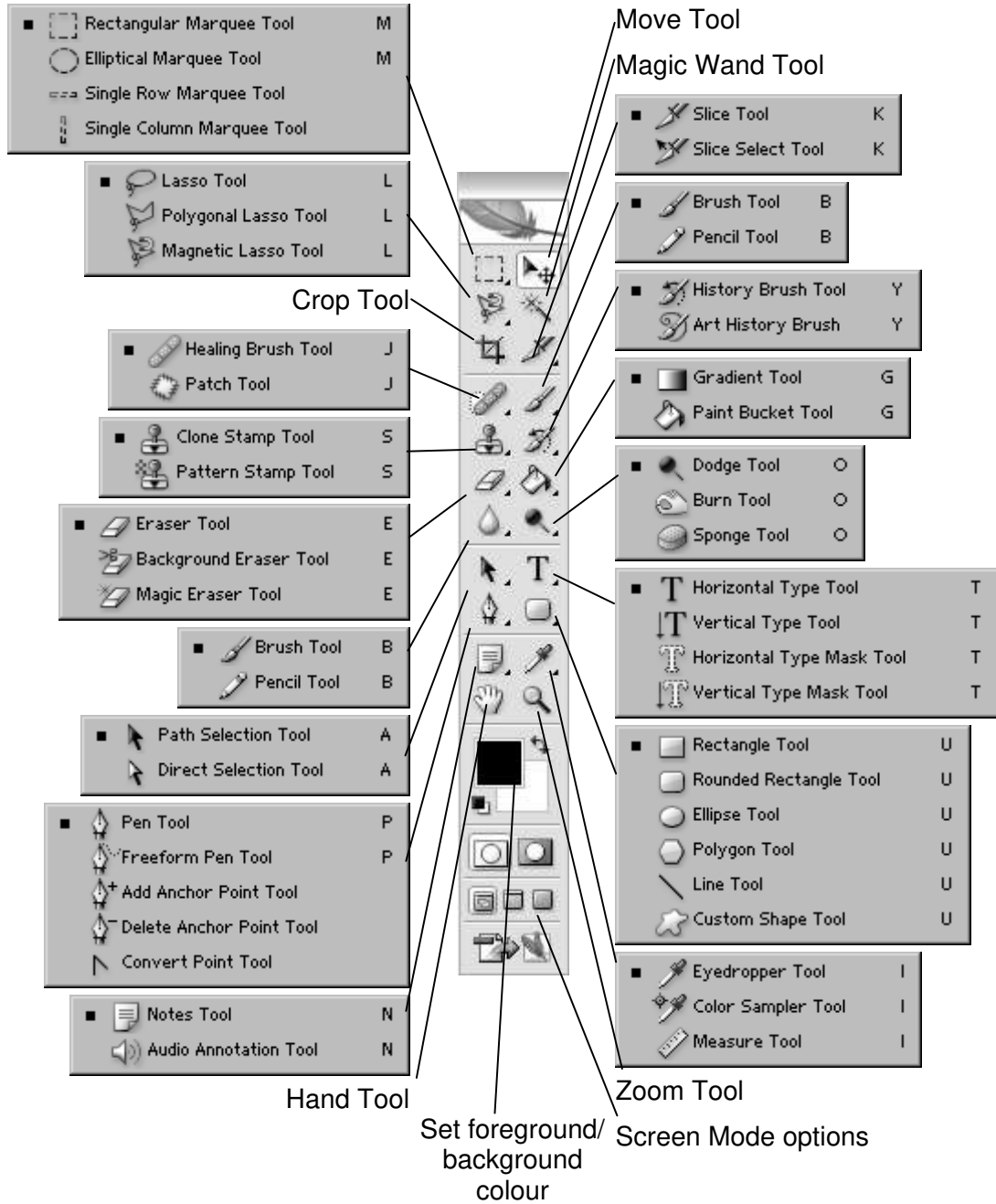The main components of the Photoshop work area are:
- **Menu bar** - contains menus organised by tasks. For example, the **Layers** menu contains commands for working with layers.
- **Toolbox** - contains tools for creating and editing images.
- **Options bar** – provides options for the currently active tool.
- **Active image area** (also called **Document window**) – displays the active open file. Several images can be open at the same time, but only one can be active at a time.
- **Palettes** – help you monitor and modify images. They can be nested by dragging the title tab of one into the body of another. Use the **Window** menu to show/hide palettes

Other useful elements are:

- **Palette well** – helps you organize the palettes in your work area.
- **Status bar** – located at the bottom of every document window, it displays useful information about the image and brief instructions for using the active tool.
- **Context menu** – display commands relevant to the active tool, selection, or palette. You access them by right-clicking on an image or palette item.

The **Toolbox**, **Palettes** and **Active image area** can easily be moved around the workspace by clicking the top bar and dragging them.

# The Toolbox

Move Tool

Magic Wand Tool

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|---|---|
| ■ [ ] Rectangular Marquee Tool | M |
| ◯ Elliptical Marquee Tool | M |
| ⊏⊐ Single Row Marquee Tool | |
| ⫞ Single Column Marquee Tool | |

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|---|---|
| ■ ◯ Lasso Tool | L |
| ◺ Polygonal Lasso Tool | L |
| ◺ Magnetic Lasso Tool | L |

Crop Tool

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|---|---|
| ■ ◢ Healing Brush Tool | J |
| ◯ Patch Tool | J |

| | |
|---|---|
| ■ ♔ Clone Stamp Tool | S |
| ♔ Pattern Stamp Tool | S |

| | |
|---|---|
| ■ ◢ Eraser Tool | E |
| ◈ Background Eraser Tool | E |
| ◈ Magic Eraser Tool | E |

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|---|---|
| ■ ◢ Brush Tool | B |
| ◢ Pencil Tool | B |

| | |
|---|---|
| ■ ▸ Path Selection Tool | A |
| ▸ Direct Selection Tool | A |

| | |
|---|---|
| ■ ◊ Pen Tool | P |
| ◊ Freeform Pen Tool | P |
| ◊⁺ Add Anchor Point Tool | |
| ◊ Delete Anchor Point Tool | |
| ◣ Convert Point Tool | |

| | |
|---|---|
| ■ ▤ Notes Tool | N |
| ◁)) Audio Annotation Tool | N |

| | |
|---|---|
| ■ ◢ Slice Tool | K |
| ◢ Slice Select Tool | K |

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|---|---|
| ■ ◢ Brush Tool | B |
| ◢ Pencil Tool | B |

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|---|---|
| ■ ◢ History Brush Tool | Y |
| ◢ Art History Brush | Y |

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|---|---|
| ■ ▭ Gradient Tool | G |
| ◢ Paint Bucket Tool | G |

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|---|---|
| ■ ● Dodge Tool | O |
| ◯ Burn Tool | O |
| ◯ Sponge Tool | O |

| | |
|---|---|
| ■ T Horizontal Type Tool | T |
| ┃T Vertical Type Tool | T |
| T Horizontal Type Mask Tool | T |
| ┃T Vertical Type Mask Tool | T |

| | |
|---|---|
| ■ ▢ Rectangle Tool | U |
| ▢ Rounded Rectangle Tool | U |
| ◯ Ellipse Tool | U |
| ⬠ Polygon Tool | U |
| ◣ Line Tool | U |
| ◈ Custom Shape Tool | U |

| | |
|---|---|
| ■ ◢ Eyedropper Tool | I |
| ◈ Color Sampler Tool | I |
| ◢ Measure Tool | I |

Hand Tool

Zoom Tool

Set foreground/ background colour

Screen Mode options

The Photoshop CS2 **Toolbox** contains all the tools you need for manipulating and creating images, for example, making selections, cropping, drawing, painting, erasing, moving, magnifying, etc.
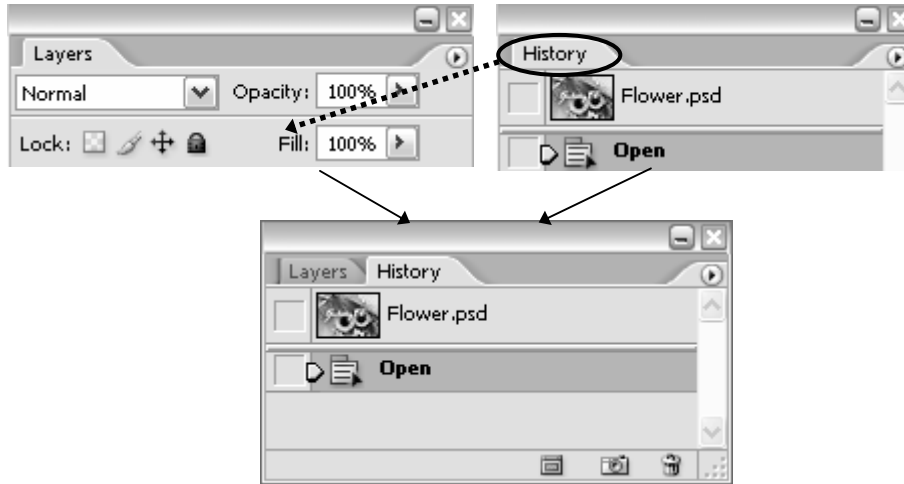
Some of the buttons represent families of tools rather than single tools. For example, the **Rectangular Marquee Tool** is the default for selecting geometrical shapes, but if you right-click on it, a palette pops out with more choices such as an **Elliptical Marquee Tool**.

Further options are available when you hold down the **<Shift>**, **<Ctrl>** or **<Alt>** keys as you use a tool. For example, hold down **<Shift>** to select a circular shape with the Elliptical Marquee Tool.

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# Palettes

**Palettes** are one of the main means of accessing many of the features of Photoshop. You can show and hide them using the **Window** menu. Alternatively, you can press the **<Tab>** key while holding down **<Shift>** to hide/show them all.

**Palettes** can be moved around or nested (stacked behind one another) by dragging the title tab of one palette onto the body of another.
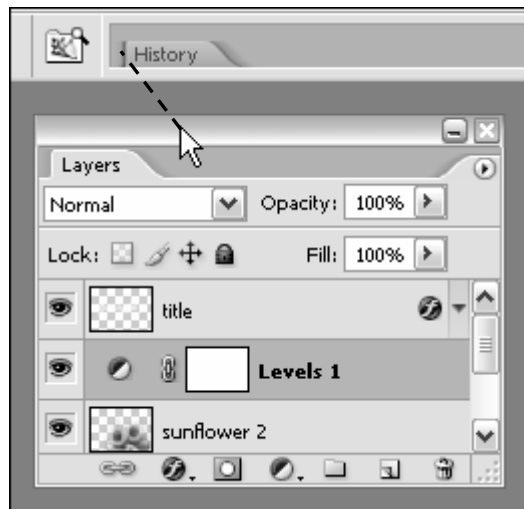
To bring a palette to the front, just click its title tab.

You can also expand/collapse them by double-clicking on the title tabs.

If you don't like having palettes floating around, you may prefer accessing them from the **Palette well**. To add a palette to the Palette well, simply drag it into it as illustrated on the right.

Clicking on the right pointing arrow in the top right corner will bring out a menu specific to the active palette.
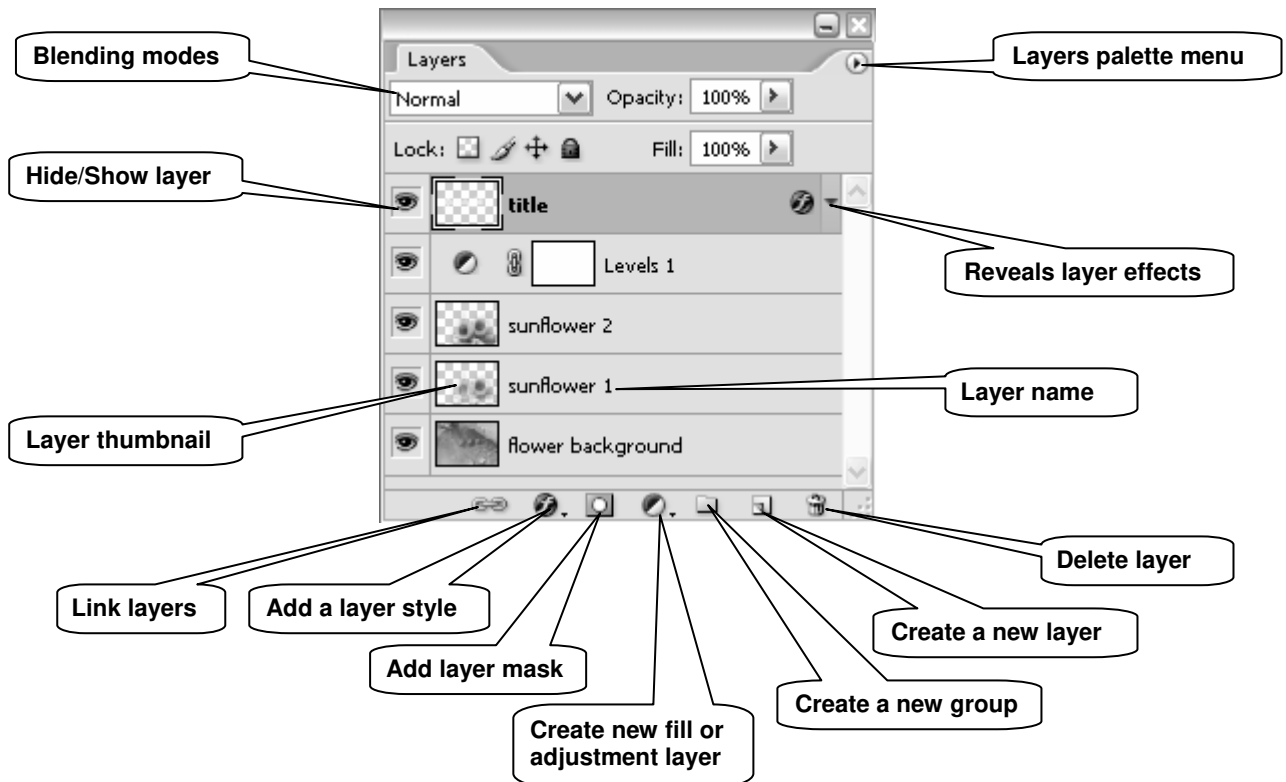
Two of the most useful palettes are the **Layers** palette and the **History** palette:

## The Layers palette

Layers are an essential part of Photoshop and you need to think of them as the building blocks to every image that you create. Individual palettes and the toolbar can be displayed or hidden using the **Window** menu (those with a tick mark next to them are visible).

The **Layers** palette enables you to control elements of an image by assigning separate layers to each individual element. Layers allow you to work on one element of an image without disturbing the others.
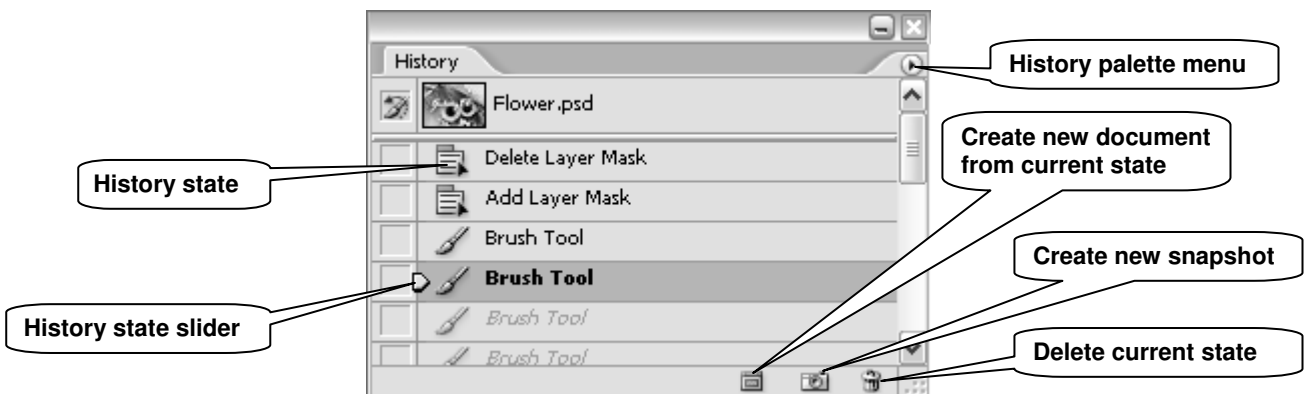
**Blending modes**

**Layers palette menu**

**Hide/Show layer**

**title**

**Reveals layer effects**

**Levels 1**

**sunflower 2**

**sunflower 1**

**Layer name**

**Layer thumbnail**

**flower background**

**Link layers**

**Add a layer style**

**Delete layer**

**Add layer mask**

**Create a new layer**

**Create new fill or adjustment layer**

**Create a new group**

The idea is that you stack layers (in the same way that you would stack sheets of acetate transparencies) containing the various elements that will form your final image. There are different types of layers:

- **Image layers** are transparent and may contain images or part of images. They can also be used for drawing, filling with colour, etc. They contain pixel information only.

- **Adjustment and fill layers** allow you to make colour and tonal adjustments to your image without permanently changing its pixel values.

- **Type layers** allow you to insert text in your image. A new **Type** layer is automatically added above the active layer when using the **Type Tool**.

- **Shape layers** are filled with solid colours and the outline is defined with a vector mask and/or a layer mask. A new **Shape** layer is automatically added above the active layer when using one of the shape tools (**Rectangle**/**Rounded Rectangle**/**Line**/**etc Tool**).

In addition, you can manipulate each layer individually by applying various styles and effects (blending, drop shadow, etc.), filters and masks.

## The History palette

Every change that you make to your image is recorded in the **History** palette as a history state.

**History palette menu**

**Flower.psd**

**Create new document from current state**

**History state**

**Delete Layer Mask**

**Add Layer Mask**

**Brush Tool**

**Create new snapshot**

**Brush Tool**

**History state slider**

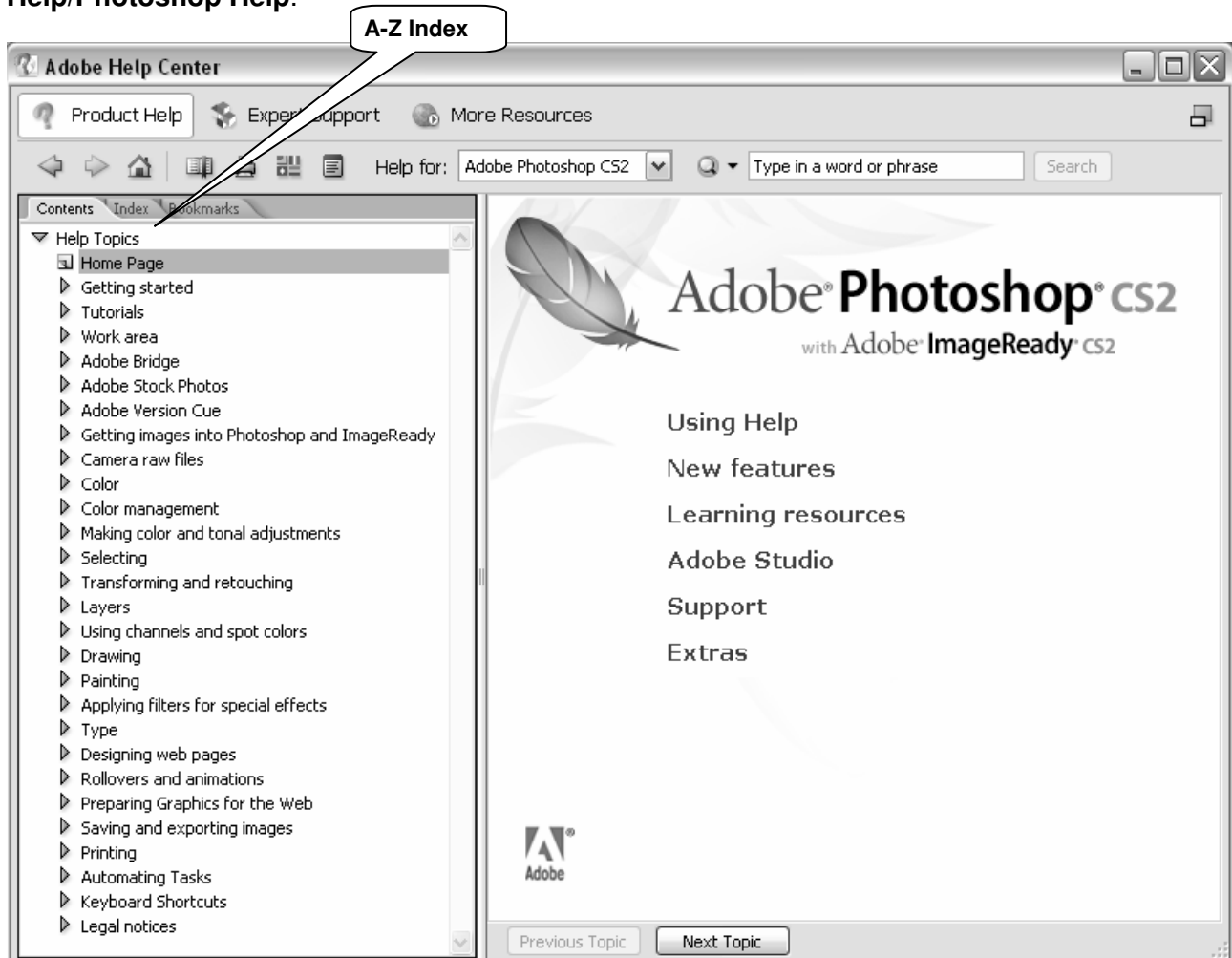**Brush Tool**

**Brush Tool**

**Delete current state**

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Just click on a state in the **History** palette to go back to that state (alternatively drag the **History state slider** up or down to point to the state you wish to move to). The states below the one you click on are dimmed and will be discarded if you continue to work from the selected state.

You can also delete states by dragging them into the wastebasket icon in the bottom right corner of the palette (alternatively right-click on the name of the state you want to delete, then choose **Delete** from the pop-up menu). Notice that this action will also delete all the subsequent states.

By default, the **History** palette will remember 20 states. You can change this by going to **Edit/Preferences/General**.

## Getting help

Photoshop has a comprehensive help tool (see illustration below). To open it, go to **Help/Photoshop Help**.
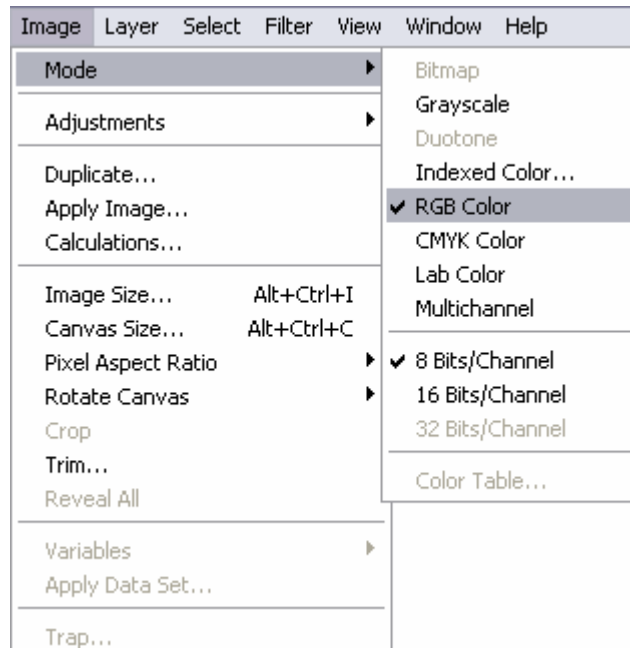


**Adobe Photoshop Help Center**

# Colour management

## Colour settings

One problem with imaging software is the issue of screen, scanner and printer inconsistency. For example, monitor brightness, contrast and resolution all affect the way an image is displayed. Photoshop includes features to help ensure that screen colours will, as far as possible, resemble the final image.

As a rule of thumb, the image mode should be set to **RGB Color** when working for screen display and **CMYK Color** for printing. To check this, from the main menu, select **Image**/**Mode**.



The reason for this is the differing nature of colour creation between media.

Printers use **C**yan, **M**agenta, **Y**ellow and **B**lack to simulate the full spectrum.  This is known as the **subtractive** method; remove all of these colours and you will end up with white (hence the standard paper colour). Adding 100 percent cyan, magenta and yellow would, in theory, result in black. However, in practice, results are never perfect, so printers include black ink; this is also a more economical way to work.

Computer screens, along with other digital media such as scanners and digital cameras, replicate colour using the **additive** method.  **R**ed, **G**reen and **B**lue are combined to create a range of millions of colours: Adding 100 percent of each colour results in white light, whereas 0 percent will render black, in other words, no light.

If converting from a screen image to a printed version, all changes should be made in RGB mode before a final conversion to CMYK, using the menu shown above. This will remove any colours that can only be displayed on screen, replacing them with their nearest printable equivalents. If you need to work on an image that has been saved in **Indexed Color** mode, you will need to convert it to **RGB Color** in order for it to be fully editable. **Indexed Color** uses a smaller palette to cut down on file size.

The advantage of working in **RGB Color** is that you have access to all the bells and whistles of Photoshop which would otherwise be hidden or greyed out in **CMYK Color**.

## Choosing an RGB working space

The colour working space refers to the gamut (range of colours) that can be displayed or printed. This range varies for different RGB working spaces and for different devices and can be changed in Photoshop.
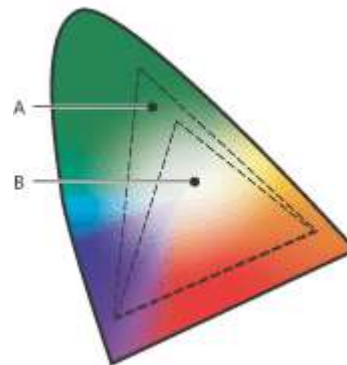
## sRGB IEC-61966-2.1

sRGB is the standard colour space for PC computer monitors and is the colour space assumed by many applications (including Web browsers and Photoshop). However, it has a limited gamut, sufficient for on-screen use (e.g. Web design, PowerPoint presentations), but unsuitable for quality printing, since it clips colours in the CMYK gamut.

## Adobe RGB (1998)

Adobe RGB (1998) has become the recommended RGB editing space for RGB files that are destined to be converted to CMYK for print output. It provides a much wider gamut and consequently it has a much better ability to capture very deep or bright colours.

The figure on the right shows the full colour gamut (billions of colours) visible to the human eye. **A** shows the typical **Adobe RGB (1998)** colour space and **B** the **sRGB** colour space.
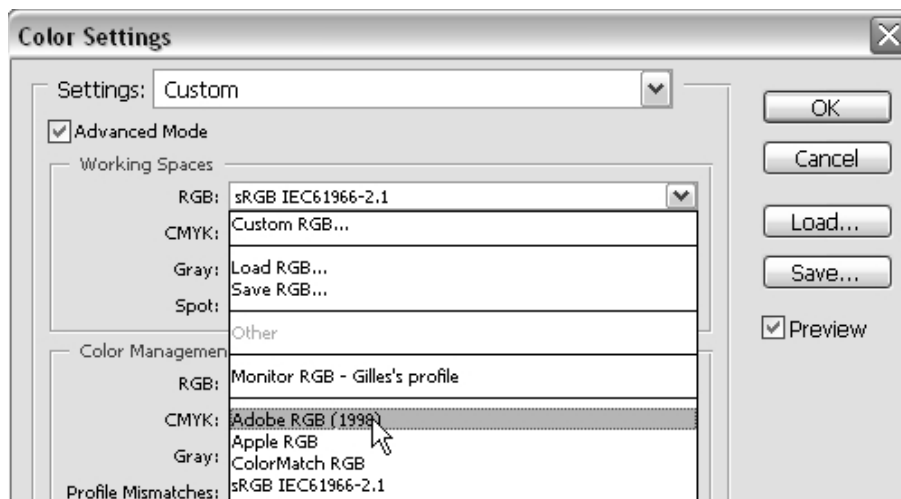
As you can see, **A** covers a greater range of colours than **B**.

There are other RGB colour spaces that have a much wider gamut (Wide Gamut RGB), however, these are intended for highly specialised applications.

To summarise, you should stick to **sRGB** for images intended to be used on the Web or for on-screen presentations, and convert to **Adobe RGB (1998)** for images intended for print (after conversion to CMYK)

**Chromatic diagram**

- To change the RGB colour space from sRGB to Adobe RGB, go to **Edit/Color Settings**. In the **Color Settings** dialogue box, in the **RGB** drop-down menu (under **Working Spaces**) select **Adobe RGB (1998)** as shown below:
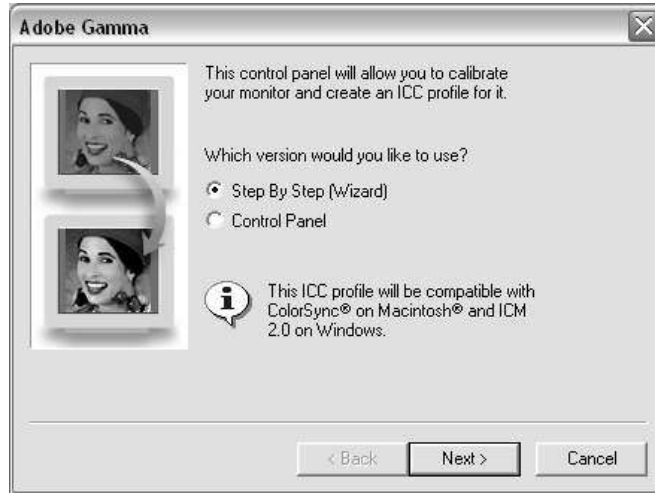
- To convert from RGB mode to CMYK, go to **Image/Mode** and select **CMYK Color** from the list.

# Monitor calibration

The **Adobe Gamma** utility comes bundled with Photoshop and can be used to calibrate a monitor's settings: RGB colour balance, brightness, contrast and white point (the point at which colour will be displayed as white).

To launch the **Adobe Gamma** wizard, go to **Settings/Control Panel** and double-click on the icon labelled **Adobe Gamma**.

The wizard will appear as follows:



Make sure the **Step By Step (Wizard)** radio button is checked and click the **Next** button to proceed.

Leave the default monitor profile selected unless you know of a better match for your screen, in which case click the **load** button and choose from the list displayed.

Click the **Next** button and follow the on-screen instructions to set the **brightness** and **contrast** of the monitor.

Again, click **Next** to display the **Phosphors** pop-up. This should be left unchanged, unless you know for certain that your monitor's phosphors differ from the default option.

Proceed by clicking the **Next** button. Uncheck the **View Single Gamma Only** box and set the **gamma** (mid-tone) brightness of your screen for each primary colour by following the on-screen instructions.

Assuming you are using a PC, from the dropdown menu, select **Windows Default**. There is also a **Macintosh** option. The **Custom** setting is only available to Macintosh users.

Having clicked **Next** to continue, leave the **Hardware White Point** as displayed unless you know it is incorrect. Continue to the next screen, leave **Adjusted White Point** as set and proceed to the final screen.  You have an option to view the screen with before and after settings, before clicking the **Finish** button to name and store your monitor's new profile.

See Ian Lyons' article, *Photoshop CS - Colour Management* (www.computer-darkroom.com/ps8_colour/ps8_1.htm) for a more detailed introduction to colour management.

# Task 1   Scanning an image

**Objectives**   To obtain a scan from a traditional film image.

**Comments**   It is important to set the scanning parameters adequately for the intended image output. For example if you want to make an A4 print, you will need to scan the original at a setting that provides enough information for a good print at that size. Conversely if you scan an image for a website less information will be required.

## Preparing to scan

**1.1**   Prepare the scanner:

➢ Check that the scanner is powered up (you should see a 'ready' blue light on the left of the scanner front panel) – if it is not press the **Power Save** button [1].   ⏻ 1

**1.2**   Prepare the original:

➢ Check the condition of the photograph handed out to you, handle it with care, by its sides (avoid touching the surface with your fingers) and check that it is clean – gently blow off any obvious dust or hair-like particles if necessary.

**Note**   This is the first step towards a quality scan. The more you keep the original image in good condition and clean, the better the digital image and the less retouching it will need.

**1.3**   Place the image in the scanner:

➢ Lift the front edge of the scanner.

➢ While holding it up, insert the photograph face up with its top edge alongside the top edge of the scanner holder, roughly in the centre.

➢ Return the scanner to its original position on the holder – you can see the image face up through the scanner glass.

## Starting the scanning process

**1.4**   Open the **HP Director** scanning software and set preferences:   2

➢ Click on the **HP Director** icon [2] on the **Desktop** – alternatively go to **Start** / **All Programs** / **HP** / **HP Director**.

➢ Click on the **Settings** menu at the top and on **Scan Settings and Preferences** / **Button Settings**.

➢ In the **Button Settings** dialogue box, select the **Scan Picture button (Director)** tab

➢ Look for the question **Where do you want to send the scanned image(s)?** and select **Save to file** from the dropdown box and click **OK**.

**1.5**   Open the **HP Scanning** program:

➢ In the **HP Director** window, click **Scan Picture** – this will open the **HP Scanning** window.

A preview of the scan will appear in the dialogue box. You can make adjustments to it before completing the final scan by dragging the black square handles at the corners and sides of the selection boundary in or out (see Figure 1).

**Note**   The HP scanning software offers a number of tools to edit the image at the scanning stage. For example, tools for adjusting the contrast and colours, resizing, sharpening, etc. However most of these adjustments can be done better, later, in a dedicated image editing software like Photoshop.

Three settings in particular concern us at this stage, those that tell the scanner:

- What type of output you want.

- What resolution is required.
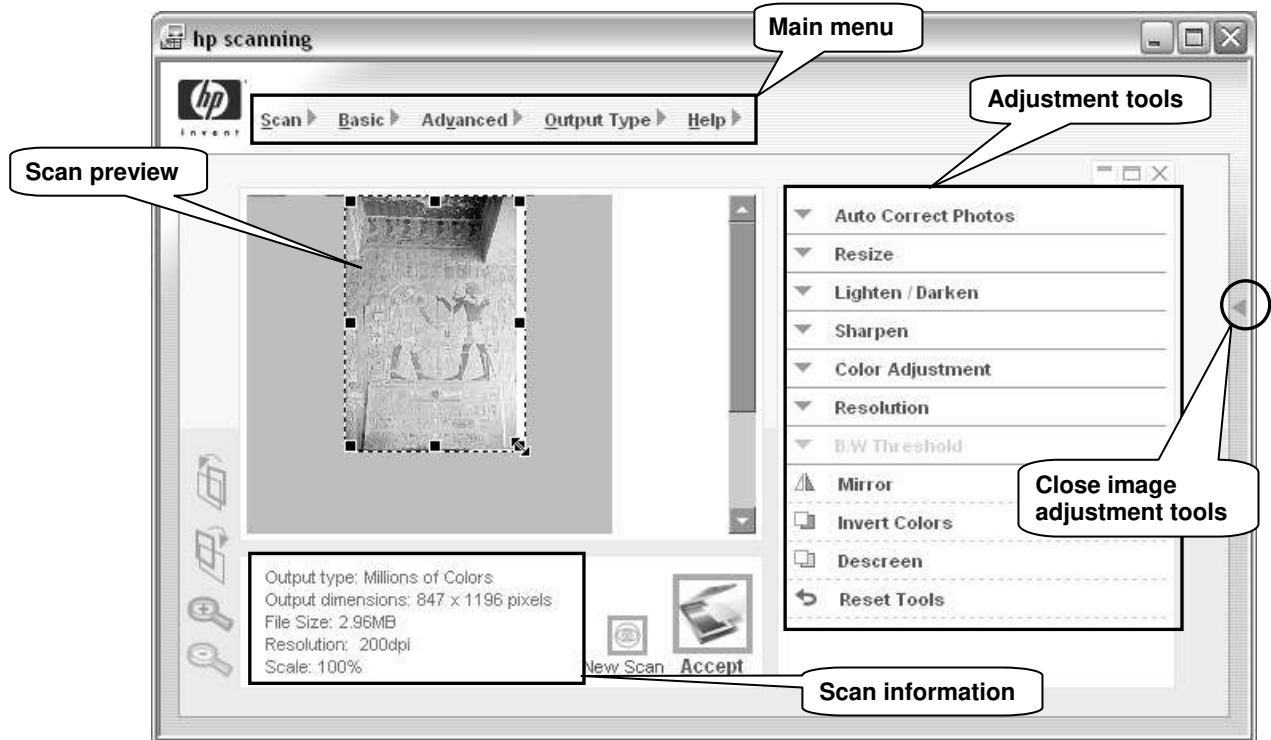
- What size the final image should be.



**Figure 1 - the HP Directory scanning dialogue box**

**Note** If you can't see the adjustment tools panel on the right, click on the **Open image adjustment tools** arrow [3] on the right side of the dialogue box.

**1.6** Set the output type:

➢ In the main menu, hover the mouse pointer on **Output Type** and select **Millions of Colors** (Figure 2):
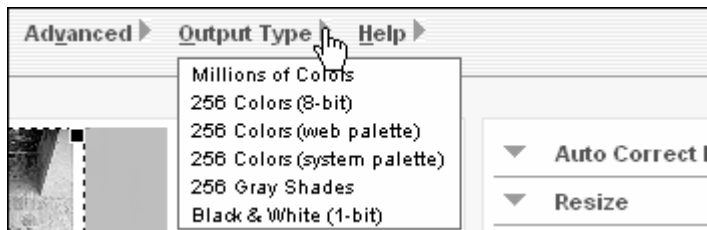


**Figure 2 - Output Type menu options**

- **Millions of Colors** is a 24-bit (ie 16.7 million colours) output suitable for colour photographs and drawings containing a lot of shading and tones, and intended for printing or displaying on a colour monitor set to millions of colours.

- The **256 Colors** options (8-bit, system palette and web palette) are suitable for colour images containing a limited number of colours, such as logos or drawings with large areas of the same colour, and/or requiring a small file size. Of the 256-colour output types, the 8-bit provides the best quality for a single image (the colour palette consists of 16 basic colours, plus 240 of the most commonly used colours in the image).

- **256 Gray Shades (8-bit grayscale)** is suitable for images to be printed to a black-and-white printer or to be saved as a black-and-white image.

- **Black & White (1-bit)** is suitable for black-and-white drawings without shading or for text saved as an image.

**Note** If scanning a black and white photograph original, you may get better results setting the output type to **Millions of Colors**. This gives you three times more information to work with than **256 Gray Shades**. While this introduces colour into the scan, you can convert it to black and white afterwards or desaturate in Photoshop.

**1.7** Set the scanning resolution and scale:

**Scanning resolution** and **scaling** are complementary settings which are normally dictated by the use to which the resulting scanned image will be put.

**Resolution** is particularly relevant to print output: it determines the number of pixels in a specific area and is usually expressed in pixels per inch (ppi) or dots per inch (dpi). For example, a resolution of 300 ppi is usually recommended for a high quality print on an inkjet printer.

**Scaling** allows you to control the pixel size of the scanned image. If it is destined to be viewed on a computer screen, then the pixel dimension is all you need to know, the resolution is irrelevant.

However, for print output you need to care both for the resolution and scale because together they help determine the real life dimensions of the image expressed in inches or centimetres. For example, for an 11.5 x 8 inch (roughly A4 size) print at 300 ppi, you would need to make sure the scanned image pixel size is 3450 x 2400 pixels.

For this task, we will assume that you want to use the present image in a PowerPoint presentation, so we will set the resolution to 100 and the scale to 150%.

➢ In the **Adjustment Tools** panel, click on **Resize** and then **Resolution** – alternatively you can use the main menu: **Resize** is in the **Basic** menu and **Resolution** in the **Advanced** menu. The HP scanning screen should now look like this:
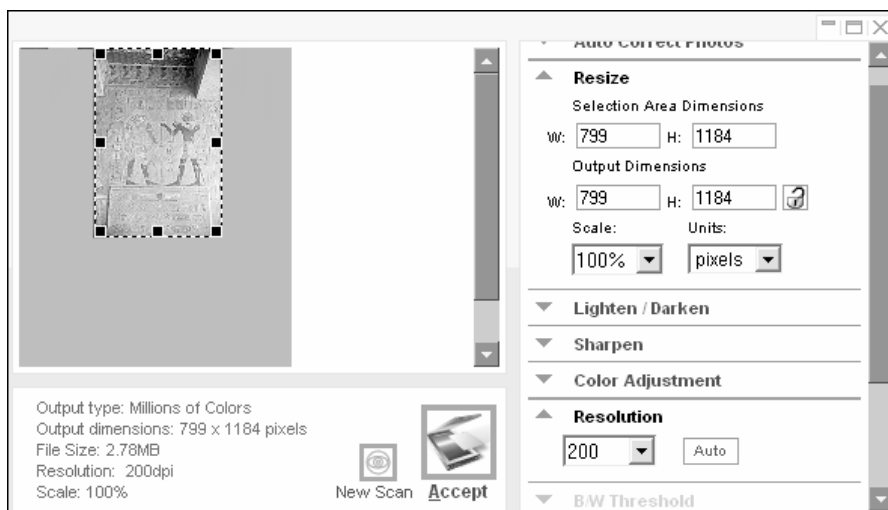


**Figure 3 - Resize and Resolution adjustment options**

➢ Set the **Resolution** to **100** – notice the changes in the **Resize Selection Area Dimensions** and **Output Dimensions** options (also reflected in the scan information details below the preview scan).

➢ Now set the **Resize Scale** to **150%** – notice the change in the **Output Dimensions** width and height fields. These are the dimensions we are interested in because they show the number of pixels you have to play with.

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The **Output Dimensions** in the **Resize** menu should be something like 600 pixels in width x 900 pixels in height (or thereabouts).

**Note** If in doubt as to the pixel dimension and/or resolution that you need, aim to get a high quality scan – as a rule of thumb, 3500 x 2500 pixels will allow you to comfortably print up to A4 (even A3 size) on an inkjet printer. From this master version you can then make smaller ones for using on the web or in PowerPoint.

**1.8** Start scanning:

➢ Click on the **Accept** button [4].

The scanner will start scanning – depending on the resolution, this may take some time.

➢ When asked if you want to scan another image, select **No**.

**1.9** Next, you will be prompted to save your scanned image:

➢ In the **Save in** field, navigate to the course folder located on **C:\Users\Scanning\**.

➢ In the **File name** field type in *egypt150*.

➢ In the **Save as type** field, select **Tiff Image (*.tif)** – TIFF is an uncompressed file format that is best for maximum image quality (file formats are explained in detail later).

**Note** The software that comes with scanners varies depending on the manufacturer and the price of the scanner (high-end professional scanners tend to come with more sophisticated and better software).
**Whatever software comes with your scanner, make sure you read the instructions carefully to make the most of it.**

# Task 2  Getting started with Photoshop

**Objectives**  To open an image and learn to use some basic tools and menus.

**Comments**  Photoshop contains many useful tools that make working with images easier. This section introduces some of these tools.

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**2.1**  Start Photoshop and open the image you just scanned:

  ➢ Go to **Start** / **Programs** / **Web Graphics** / **Photoshop CS2** / **Adobe Photoshop CS2**.

  ➢ Click **No** to the question '**Do you want to customize your color management settings now?**'

  ➢ Go to **File** / **Open** and, in **C:\USER\Scanning\** open the file:  **egypt150.tif**.

**2.2**  Make a copy of the image:

  ➢ Go to **Image** / **Duplicate**.

  ➢ Accept the suggested file name (**egypt150 copy**) and click on **OK**.

  ➢ Close the original image by clicking the **Close** icon [5] in the top right corner of the **Image Window**.

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**Note**  It is good practice to work on a copy rather than on the original version of a photograph, so that you have a backup in case something goes wrong!

## The View menu

The **View** menu contains various utilities that make working with Photoshop easier.

**2.3**  Go to the **View** menu and select the following options (selected options have a tick mark next to them):

  • **Rulers** (it may already be selected) – to display rulers along the top and left edge of the **Document window**.

  • **Show**/**Grid** – to display a grid on the image (grids are useful for aligning elements).

    To alter the grid spacing go to **Edit** / **Preferences** / **Guides, Grids & Slices**.

  • **Show** / **Guides** – guides can then be positioned anywhere in the image area and used for the precise positioning and alignment of image elements

**Note**  You can switch grids and guides on and off by (de)selecting **Extras** in the **View** menu, or using the keyboard shortcut **<Ctrl> + <H>**.

**2.4**  The '**Snap to**' behaviour is particularly useful for precise aligning or positioning of image elements (eg text, cropping marquee, etc):

  ➢ Go to **View** / **Snap to** to specify the elements (eg **Guides**, **Grid**, **Document bounds**, etc) to which you want to snap when snapping is enabled.

**Note**  However, sometimes snapping prevents you from correctly placing elements, so it is important to be able to switch it on and off quickly. Use the keyboard shortcut **<Ctrl> + <Shift> + ;** to enable or disable snapping – alternatively go to **View** / **Snap**.

## The Document window

**2.5**  Change the ruler unit:

  ➢ Right-click anywhere on the left or top ruler to open the context menu and select a different unit than the one selected – settle for **Pixels** in the end (Figure 4).
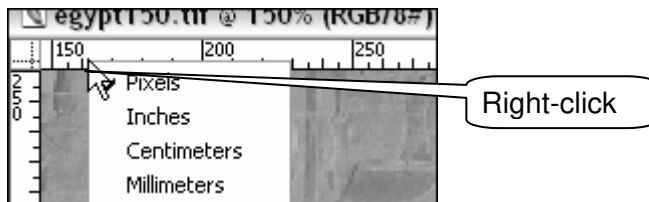
**Figure 4 - changing the ruler unit**

**2.6** Insert guides:

➢ Click and hold anywhere in the top ruler, and drag down the mouse cursor until you see a horizontal blue line.

➢ Similarly add a vertical guide starting in the left ruler and dragging to the right.

➢ To reposition a guide, select the **Move Tool** in the **Toolbox**, then grab a guide and move it up or down, or left or right.

**Note** To enable or disable guides quickly, use the keyboard shortcut **<Ctrl> + ;**.

**2.7** The **Status bar** at the bottom of the **Document window** provides useful information:

➢ Click anywhere in the status information box containing size/dimension/etc information, and keep the mouse button down.

➢ This will bring up a scaled preview showing the size and position the image will print with the current page setup (Figure 5).
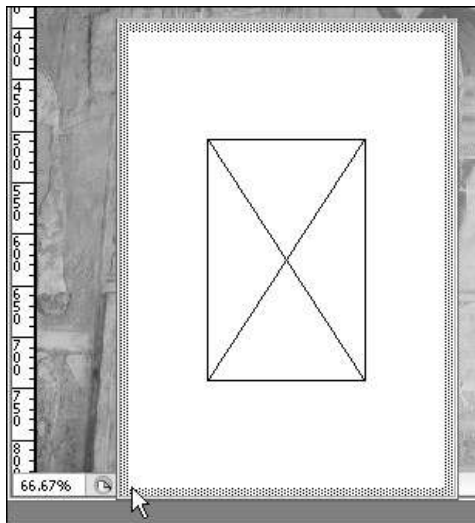


**Figure 5 - scaled preview in the Status bar**

**Note** To check or change the page setup, go to **File** / **Page Setup**. The default page setup should be A4 portrait.

**2.8** Try the same thing but this time pressing the **<Alt>** key as you left-click in the status information box. This will display the image dimensions, the colour mode and resolution (Figure 6).

**Figure 6 - image information in the Status bar**

**2.9** Finally, click on the arrow next to the status information box (Figure 7), select **Show** and try the different options:



Status information options

**Figure 7 - accessing the status information options**

- **Version Cue**: a tool for working collaboratively on projects – not relevant to most users.

- **Document Sizes**: the first figure shows the file size of a flattened version of the image. The second, the size if saved with all the layers.

- **Document Profile**: the current profile (colour mode and pixel bit depth) assigned to the image.

- **Document Dimensions**: the image dimensions expressed in the unit set for the rulers.

- **Scratch Sizes**: the first figure displays the amount of RAM memory used. The second shows the total RAM available to Photoshop.

- **Efficiency**: summarises how efficiently Photoshop is working.

- **Timing**: shows the time it took to complete the last operation. Reset every time you change tools or execute a new operation.

- **Current Tool**: displays the name of the tool currently selected.

- **32-bit exposure**: Option for adjusting the preview image for viewing 32−bits-per-channel high dynamic range (HDR) images – not relevant to most users.

## Zooming in and out of an image

**2.10** Using the **Zoom Tool**:

➢ In the **Toolbox**, select the **Zoom Tool** [5] – as you hover the mouse pointer over the image notice how it changes into a magnifying glass icon with a **+** sign inside.

 [6]

➢ To zoom in:
- either click on the image repeatedly until you reach the desired level of magnification (up to 1600%),
- or drag the magnifying glass to delimit the area you wish to magnify.

➢ To zoom out, hold down the **<Alt>** key (notice how the plus sign in the magnification glass icon changes to minus) and click on the image until you reach the desired level of magnification (down to 0.4%).

**Note**  When viewing an image at 100% magnification, one image pixel fills one screen pixel.

## Viewing an image full screen

**2.11**  Photoshop allows you to view images in their own window (default) or to fill the entire screen. You can also hide the menu bar, title bar, and scroll bars, giving you more screen space:

➢ Press the **F** key on the keyboard and notice how the screen changes to **Full Screen Mode with Menu Bar**. Press it again and the screen changes to **Full Screen Mode**.

➢ Press the **F** key a third time to come back to the **Standard Screen Mode**.

**Note**  You could use the **Screen Mode** options in the **Toolbox**, or the **View** / **Screen Mode** menu options instead.

# Task 3 Cropping and correcting perspective problems

**Objectives**    To crop an image and straighten out keystone distortion.

**Comments**    Cropping consists of selecting the area of an image that you want to keep and eliminating the outer crop area. The Photoshop crop tool also allows you to correct perspective problems (keystone distortion) such as the vanishing vertical edges of a building photographed from ground level.

## Simple cropping operation

**3.1**    Define the crop area:

    ➢ In the **Toolbox**, select the **Crop Tool** [7].

    ➢ Click in the top left corner of the area you want to select and drag towards the bottom right to mark out the area that you want to keep (crop marquee). Notice how the area outside the crop selection dims.

    ➢ Adjust the crop marquee to cover an area similar to that in Figure 8:

        • To <u>scale</u> the crop marquee grab and drag one of the handles – to constrain the proportions, hold down **<Shift>** as you drag a corner handle.

        • To <u>reposition</u> the crop marquee, place the cursor inside the marquee – it will change to a black arrow – and drag.
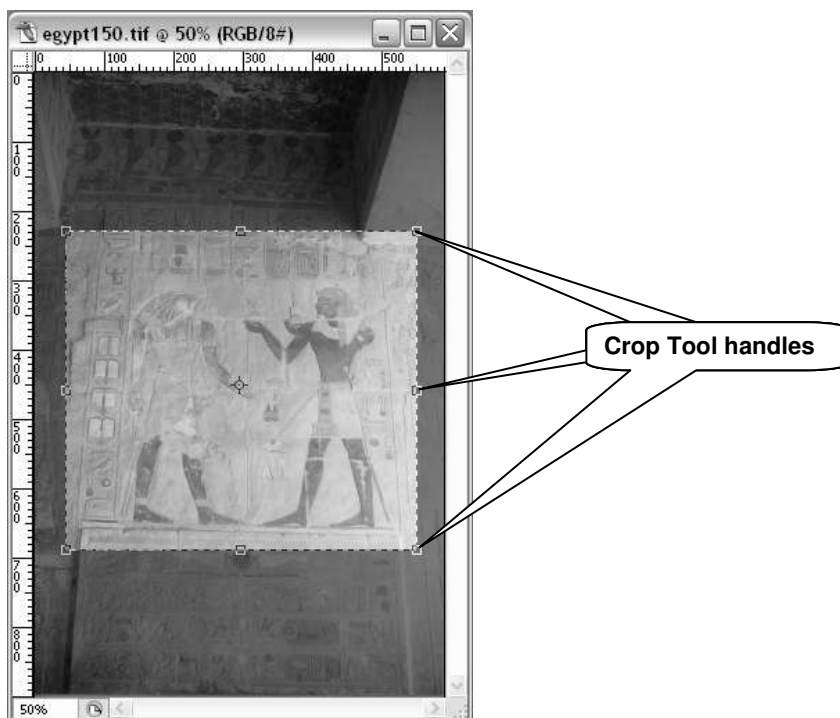


**Figure 8 -  the crop marquee in the image window**

**Note**    You can also <u>rotate</u> the crop marquee. Place the cursor just outside one of the corners until it changes into a curved arrow, then click and drag. To move the centre point around which the crop marquee is rotated, click and drag the centre point around which the marquee rotates.

**3.2**  Commit the crop:

➢ When you are satisfied with the position and size of the crop marquee, click the **Commit** button [8], press **<Enter>**, double-click in the crop marquee, or right-click and choose **Crop** from the context menu.

**Note**  Until the cropping operation has been either committed or cancelled, no other tool or menu can be used. To cancel the cropping operation, press **<Esc>** or click the **Cancel** button [9] in the **Options bar**.

## Cropping with perspective correction

**3.3**  Define a new crop area:

➢ Undo your previous crop – either use **Edit** / **Undo Crop**, or the **History palette**.

➢ Define another crop marquee, this time making sure you include the vertical lines on either side of the characters, as well as the horizontal line below their feet, as shown in Figure 9.

**3.4**  Correct the keystone distortion:

➢ In the **Options bar** that appears at the top of the screen when you choose the **Crop Tool**, tick the **Perspective** box (Figure 3-2).
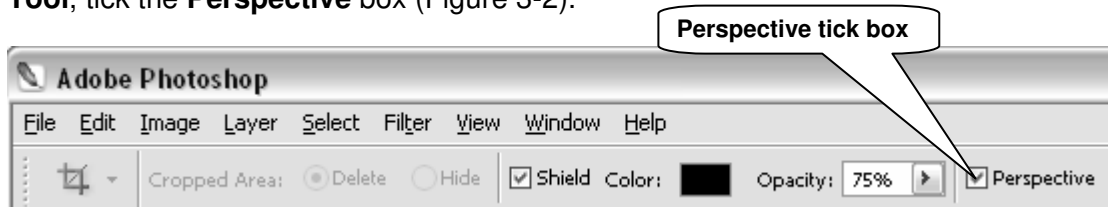


**Figure 9 - the crop tool option bar**

➢ Click the top left corner handle and drag it to the right until the left marquee border is <u>parallel</u> to the vertical line in the image (Figure 10).
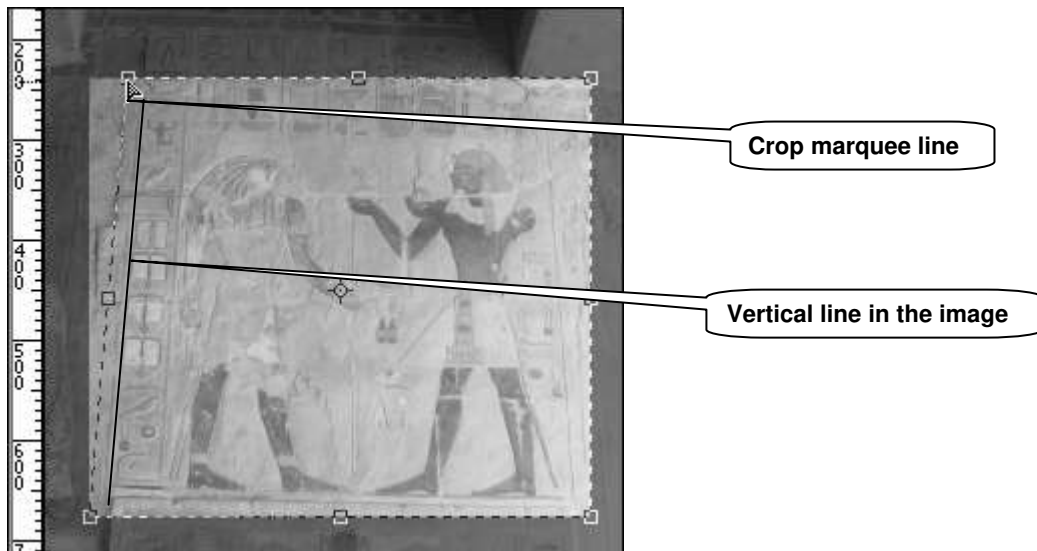


**Figure 10 - correcting perspective**

➢ Repeat, using the other corner handles to level the bottom and top horizontal marquee borders with the horizontal lines in the image, and the right marquee border with the right side vertical line in the image.

➢ Once you are satisfied with your selection, commit the crop.

Your image should now have perfect vertical and horizontal lines, as illustrated in Figure 11:



**Figure 11 - cropped image after perspective correction**

| Note | This operation can be fiddly, particularly with images that do not have clear vertical and horizontal lines. Trial and error and a little patience should overcome any difficulty! |
| --- | --- |

## Saving the cropped image

**3.5**    To save your image:

➢ Go to **File** / **Save As**.

➢ In the **Save In** box of the **Save As** window, go to **C:\USER\Scanning**\, in the **File Name** box replace the suggested file name with *egypt_mural* and in the **Format** box select **TIFF(\*.TIF)**.

➢ Click on **Save**.

➢ In the **TIFF Options** pop-up window, leave the options as they are and click on **OK**.

# Task 4   Adjusting overall tone and colour

**Objectives**   To make basic image corrections using Photoshop's image correction tools.

**Comments**   Once you have cropped your image, the next thing you will want to do is improve its appearance. For example it may lack contrast, have a colour cast, be too bright, or displays any combination of these faults.

## Interpreting an image

**4.1**   Before making any adjustment, it is important to be able to analyse the image you are working on.

We can use our eyes to make subjective judgements about how the picture looks, but for more useful and objective information we can also use the image histogram.

➤ In the **Window** menu, select **Histogram**. Then open the palette menu and select **Expanded View** (see Figure 121 below):
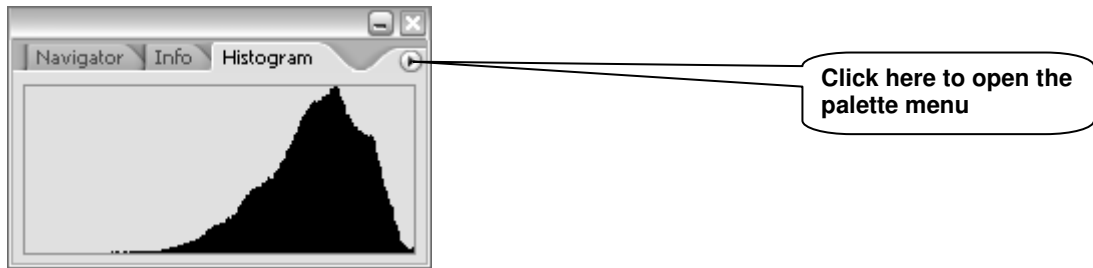


**Figure 12 - expanding the view of the Histogram palette**

The **Expanded View** displays some extra options (Figure 13):
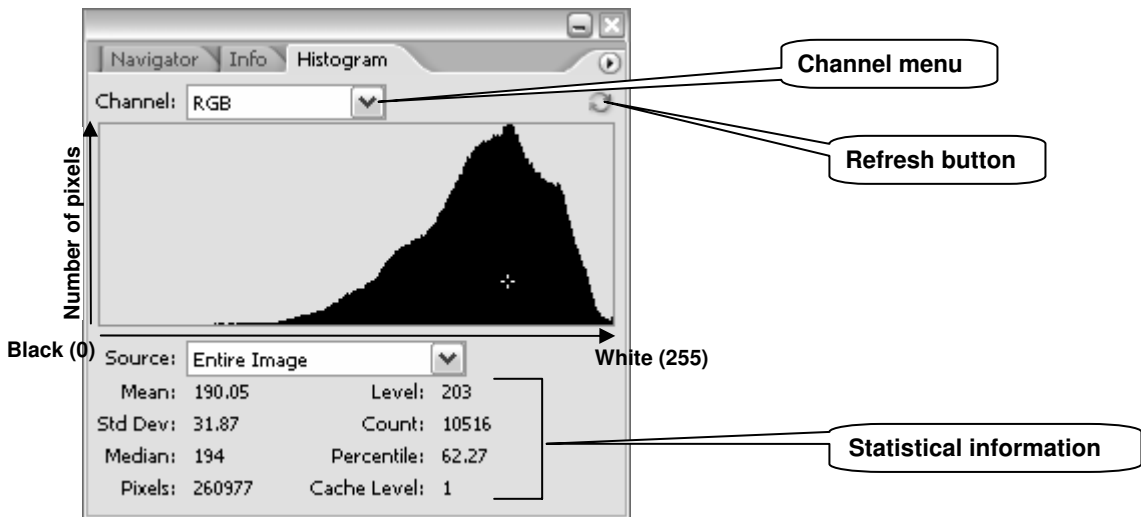


**Figure 13 - the Histogram palette Expanded View**

The histogram shows the shades of tones (pixels) that make up an image and their distribution for all 3 channels at once (**RGB**) or individual channels.

➤ What does the information provided by the **Histogram palette** tell you about the current image?

## Adjusting brightness and contrast with Levels

**4.2** Open the **Layers** palette if it is not already open – go to the **Window** menu and select **Layers**.

**4.3** Resetting the input shadow and highlight levels:

➢ At the bottom of the **Layers  palette**, click on the **Create new fill or adjustment layer** icon [10] and select **Levels** to open the **Levels** dialogue box (Figure 14):
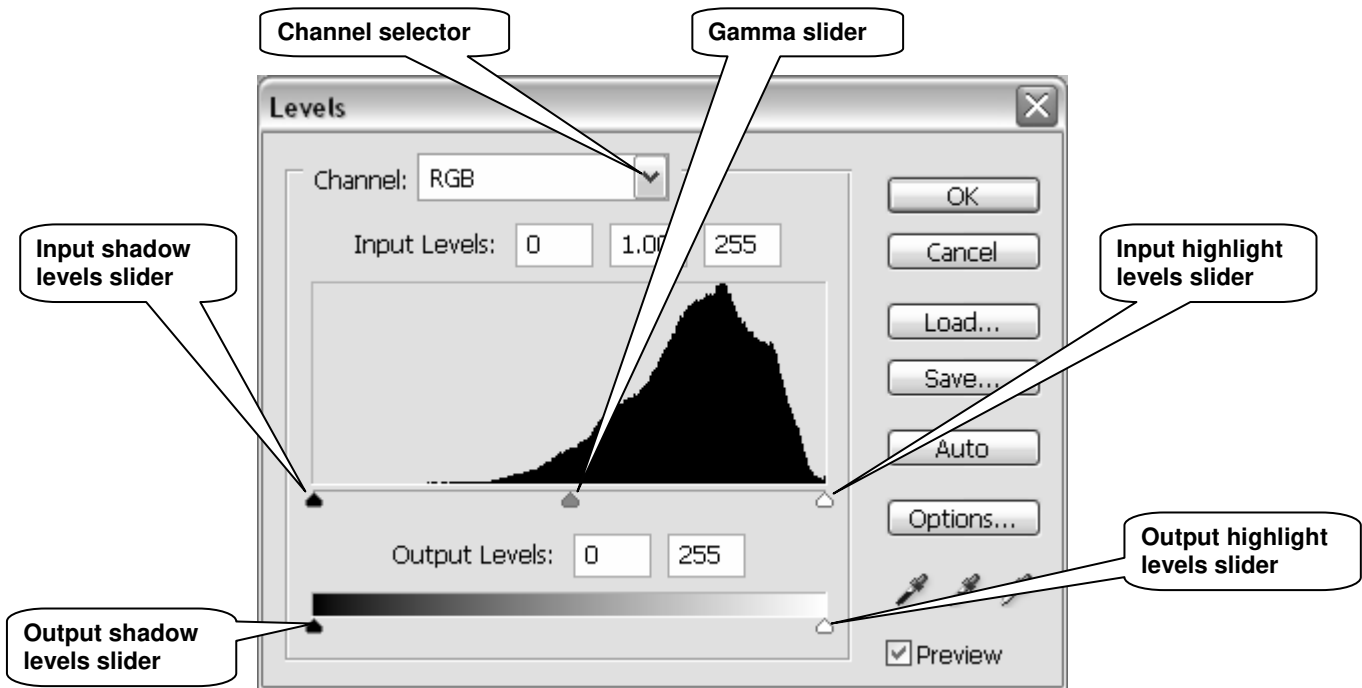


**Figure 14 - the levels dialogue box**

### Input Levels

- The **Input Levels** sliders and entry boxes allow you to increase the contrast by adjusting the input **shadows** and **highlights**.

- The **Gamma** and entry box allow you to adjust the relative image brightness between the shadows and highlights (drag the slider left to lighten and right to darken the image).

### Output Levels

The **Output Levels** sliders allow you to reduce the tonal range (contrast) in an image. It is best not to touch these because they inevitably result in loss of data in the shadows and highlights – unless you deliberately want to reduce the output contrast.

The histogram in Figure 14 shows that the image has limited contrast; in other words we have no dark blacks or bright whites. So the first adjustment we are going to make is reset the darkest shadow and lightest highlights points for each of the RGB colour channels:

➢ Make sure the **Preview** box in the bottom right is checked so you can see the changes taking place.

➢ In the dropdown **Channel** selector, select **Red**.

➢ Holding down the **<Alt>** key, first drag the **Shadows input slider** to the right and set it just before you see some shadow detail in the image. Then drag the **Highlights input slider** to the left and set it just before you see some highlight detail.

> ➢ Repeat the previous step for the **Green** and **Blue** channels and click **OK** once you are satisfied.

Notice how these changes have affected the **RGB** histogram in the **Histogram palette** (Figure 15):
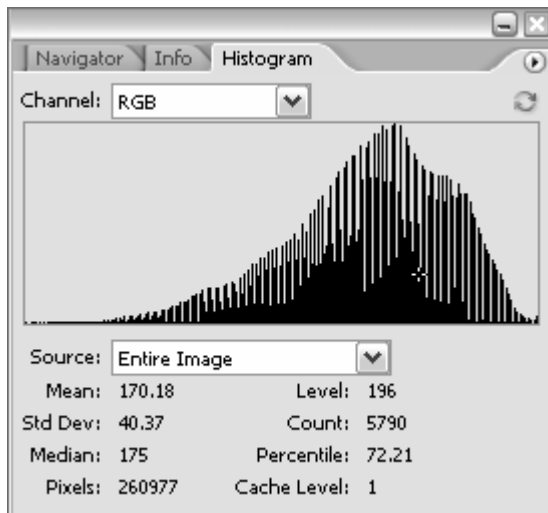


**Figure 15 - Image histogram after Levels changes**

You should now have a better spread of pixel levels between shadows and highlights, but notice how some information has been lost at some levels (hence the comb-like effect).

## Adjusting the colour balance with Levels

**4.4** In the previous task, we used the **Levels** adjustments on individual channels to correct the overall contrast of the image. We are now going to use the same tool to correct colour casts.

> ➢ Re-open the **Levels adjustment layer** you created in the previous task by double-clicking on its thumbnail in the **Layers** palette (Figure 16):
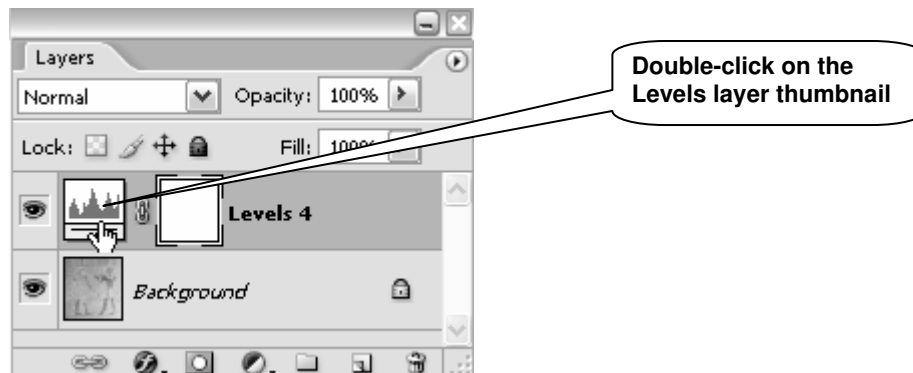


**Figure 16 - re-open the Levels layer**

At this point you need to decide whether your image has a colour cast and if yes, which colour. So let's say your picture looks too red:

> ➢ Go to the **Channel** menu and select the **Red** channel.

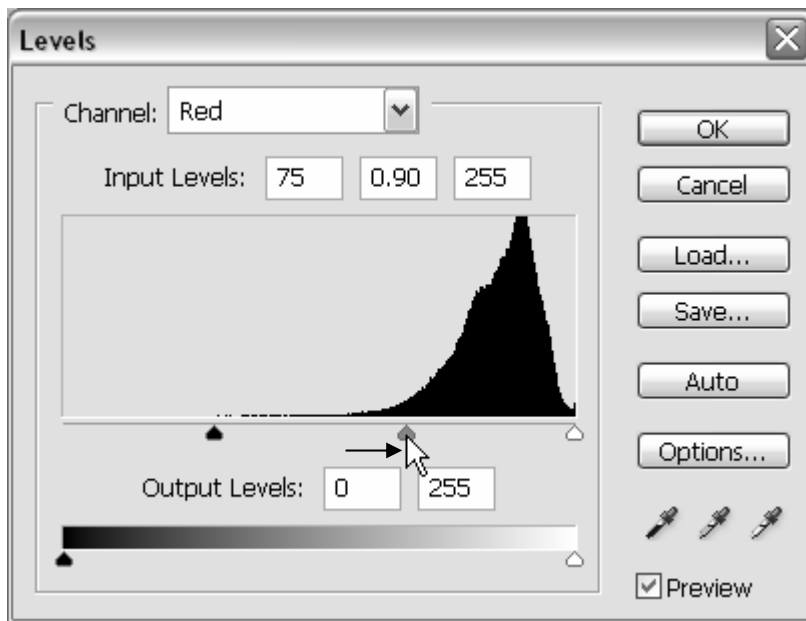> ➢ Move the **Gamma slider** slightly to the right as in Figure 17:

**Figure 17 - correcting a red cast using Levels**

If your image has a different colour cast, use the following table to decide which channel to use:

| Colour cast: | Use the colour channel: | Move the Gamma slider: | Colour added: |
|---|---|---|---|
| Red | Red | Right | Cyan |
| Green | Green | Right | Magenta |
| Blue | Blue | Right | Yellow |
| Cyan | Red | Left | Red |
| Magenta | Green | Left | Green |
| Yellow | Blue | Left | Blue |

**Note**   When dealing with black and white photographs, you don't need to adjust each colour channel separately. To correct the overall contrast and brightness you can use the composite **RGB** channel instead. Use the **Input Levels** to improve the overall contrast, and then the **Input Gamma** to correct the brightness.

## More colour adjustments with Hue/Saturation

**4.5**   The **Hue/Saturation** dialogue box allows you to adjust the **hue** (colour), **saturation** (colour intensity), and **lightness** of the entire image or of individual colour components in an image.

➢ Click on the **Create new fill or adjustment layer** icon [11] at the bottom of the **Layers palette** and select **Hue/Saturation** to open the corresponding dialogue box (Figure 18):
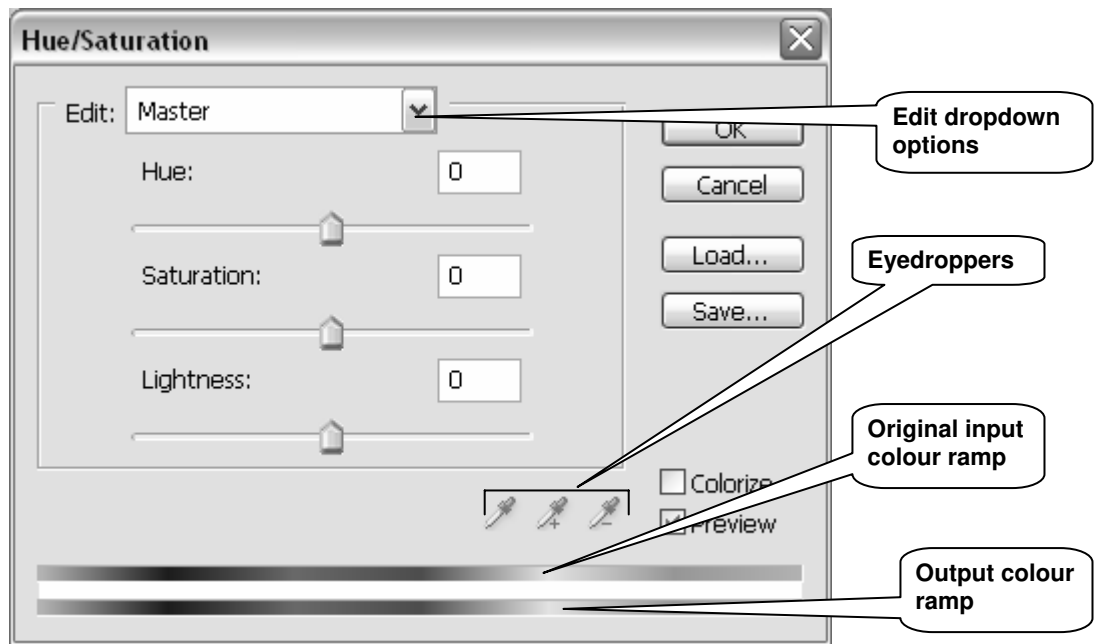
[11]

24

**Figure 18 - the hue/saturation dialogue box**

The two colour spectrum ramps at the bottom of the **Hue/Saturation** dialogue box provide a visual clue as to how the colours are being mapped from one colour to another.

The **Edit** dropdown menu at the top defaults to **Master**, which means any adjustment will affect all the colours in an image. The other six options (eg **Reds**, **Greens**, **Blues**, **Cyans**, etc.) allow you to narrow the **Hue/Saturation** adjustments to predefined colour ranges. You can also redefine these ranges using the eyedroppers or markers between the colour ramps.

➢ In the **Edit** dropdown menu box, select **Reds** to start with.

➢ Adjust the **Hue**, **Saturation** and **Lightness** by dragging the sliders left or right or by entering a value in the corresponding box (**-180** to **+180** for **Hue** and **–100** to **+100** for **Saturation** and **Lightness**).

➢ Repeat with other colours – notice that some may have little effect, which indicates that these colour ranges are not present in the image.

➢ Click **OK** once you are satisfied with the results.

# Task 5   Sharpening an image

**Objectives**   To sharpen an image.

**Comments**   Photoshop provides four sharpening filters – **Sharpen**, **Sharpen More**, **Sharpen Edges** and **Unsharp Mask**. **Unsharp Mask** is the one that gives you the most control.

The **Unsharp Mask** works by increasing the contrast between pixels. Unlike tone and colour adjustments, **Unsharp Mask** is applied to the **Background** layer (or even better a copy of the **Background** layer), that is the layer containing the original image.

## Creating a Background copy

**5.1**   Create a copy of the **Background** layer:

➢ In the **Layers** palette, drag the **Background** layer onto the **Create a new layer** icon [12] to make a copy of it. It will appear as a new layer as showed in Figure 19:
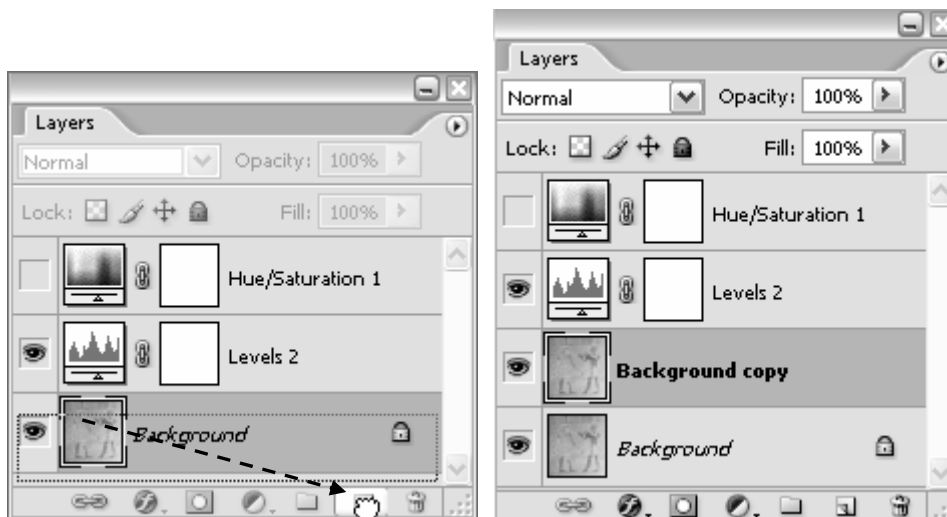
 [12]



**Figure 19 - creating a copy of the Background layer**

Creating a copy of your background image protects the original image because it is easier to delete a layer rather than undo changes to the background image.

## Applying the Unsharp Mask

**5.2**   Sharpen the image:

➢ Make sure the **Background** copy layer is selected

➢ In the Photoshop **Filter** menu, choose **Sharpen** / **Unsharp Mask**.

In the **Unsharp Mask** dialogue box (Figure 20) you can set three parameters:

- **Amount** controls the amount of sharpening applied to the edges (**1%** to **500%**). Values up to **50%** produce subtle effects; values between **50%** and **250%** produce moderate effects.

- **Radius** controls the depth of pixel along the high-contrast edges that are changed. Values of up to **2.0** produce acceptable sharpening.

- **Threshold** sets a level for the minimum amount of contrast between pixels an area must have before it will be modified. Use a low value to apply the filter more generally throughout the image.
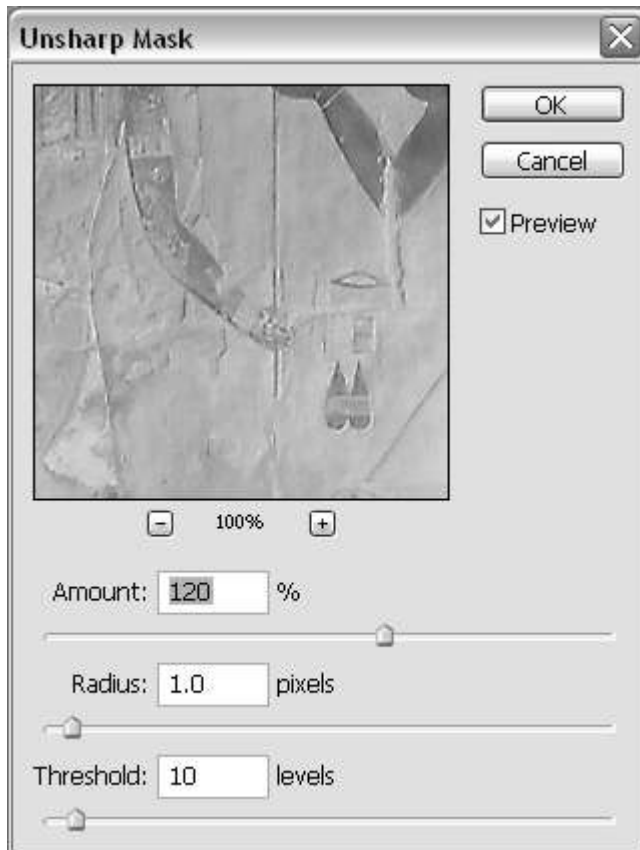


**Figure 20 - the Unsharp Mask dialogue box**

➢ Experiment with the different settings described above and observe the changes to the image.

As a general rule, apply an amount of between **200%** and **300%**, a radius of between **0.5** and **2.0**, and a threshold of between **0** and **10**.

**Note** Sharpening for output should be applied at the end of a Photoshop session and after the image has been resized to the final print size.

## Saving the image in the Photoshop format

**5.3** Save a copy of your image in the Photoshop format.

➢ Go to **File** / **Save As**.

➢ In the **Save In** box of the **Save As** window, go to **C:\USER\Scanning\**, keep the **File Name** (it should be **egypt_mural**), and in the **Format** box select **Photoshop(*.PSD,*.PDD)**.

➢ Click on **Save**.

**Note** The reason for saving in the Photoshop format is that it will preserve all the layers, which will allow you to make further changes to them at a later stage.

**5.4** Make a copy of **egypt_mural.psd**:

➢ Choose the **Image** / **Duplicate** command and accept the suggested name **egypt_mural copy**.

➢ Close **egypt_mural.psd**.

## Flattening an image

**5.5** You are now going to 'flatten' the image (that is, merge the layers) and save this new file as a **TIFF** image.

➢ Click on the black pointed arrow in the top right hand corner of the **Layers** palette and click on **Flatten Image** in the pop-up box (Figure 21):



**Figure 21 - flattening an image**

**Note** You could also use **Flatten Image** in the **Layer** menu.

➢ Go to **File** / **Save As**.

➢ In the **Save In** box of the **Save As** window, go to **C:\USER\Graphics\**, in the **File Name** box replace the suggested file name with *egypt_mural*, and in the **Format** box select **TIFF(*.TIF)**.

➢ Click on **Save**.

➢ In the **TIFF Options** pop-up window, make sure **IBM PC** is selected and that **LZW Compression** is unchecked.

➢ Click on **OK**.

# Task 6   Resampling an image

**Objectives**   To resize and/or resample an image.

**Comments**   There are times when you will want to modify the size of an image. When preparing an image for screen display, you do this by resampling – or interpolating – the image.

---

**6.1**   Make a copy of **egypt_mural.tif**:

➢ Open **egypt_mural.tif** (it may already be opened).

➢ Make a copy of it using the **Image** / **Duplicate** command and give it the name *resample*.

**6.2**   Set the rulers:

➢ In the **View** menu, select **Rulers**.

➢ Next right-click anywhere on the ruler and select **Pixels**.

**6.3**   Prepare to resample the image:

➢ Go to **Images** / **Image Size** to open the **Image Size** dialogue box (Figure 22).
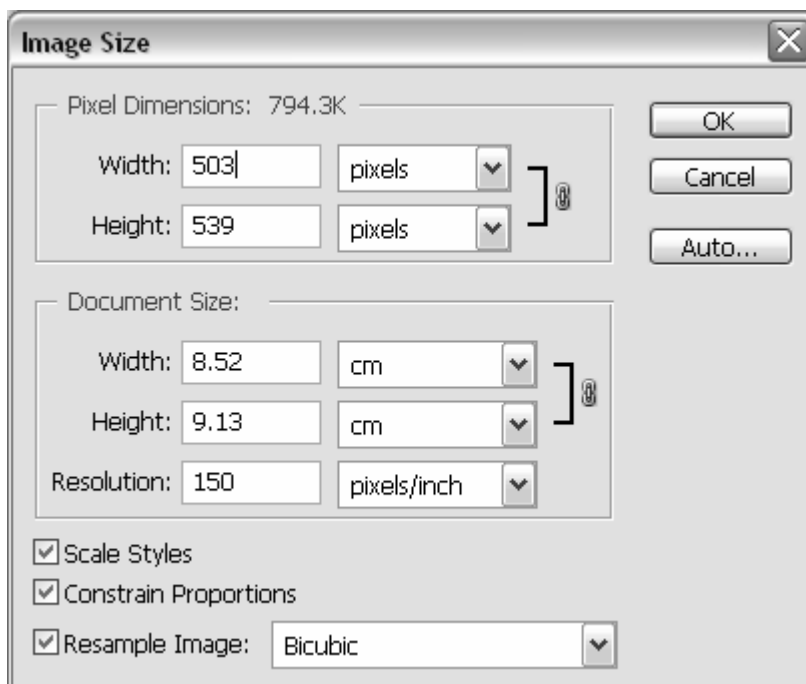


**Figure 22 - the image size dialogue box**

➢ Select **Resample Image** at the bottom if it is not already selected.

**Note**   When **Resample Image** is selected, the **Pixel Dimensions** box, at the top, becomes active. This allows you to change the pixel dimensions of the image.

➢ Check that **Constrain Proportions** is also selected.

## Resampling up

Interpolating up is a process that consists of adding new information (pixels) to an image in order to increase its dimensions or resolution, or both. The file size increases as a consequence. This process is useful in cases where you cannot rescan the original at the correct settings.

**6.4**   Increasing the **Pixel Dimensions** of the image:

➢ Select **Bicubic Smoother** as the interpolation method from the drop-down list next to the **Resample Image** check box.

**Note**   **Bicubic Smoother** is the ideal choice when making the image bigger.

➢ If you want to increase the physical dimensions of the image without changing the resolution, enter a higher value (for example *800*) in the **Pixel Dimensions Width** box.

Observe the changes in the **Document Size** options: the **Width** and **Height** have increased, but the **Resolution** is unchanged.

➢ Click **OK** and look at your resampled image.

➢ Undo the changes that you have just made (Hint: use **Edit** / **Undo Image Size**).

**6.5**   Increasing the image **Resolution**:

➢ Return to **Image** / **Image Size**.

➢ If you want to increase the image resolution without changing its physical dimensions, enter a higher value in the **Resolution** box (for example *300*).

Observe the changes in the **Pixel Dimensions** options: the **Width** and **Height** have increased accordingly.

**Note**   There is a simple rule to help you calculate the relationship between pixel dimension, resolution and physical dimension:
pixel dimension = physical dimension (inches/centimetres) x resolution (points per inch/centimetre)

➢ Click on **OK** and look at your resampled image.

➢ Undo the changes that you have just made.

**Warning!**   Resampling up is a compromise solution since all you do is add pixels to the image without increasing the quality and detail. You may need to use the **Unsharp Mask** filter to compensate for blurring which may occur due to the interpolation process. You will obtain better results if you can rescan the image at the right size and resolution for its intended use.

## Resampling down

Interpolating down consists of discarding pixels and results in a smaller file size. There are two ways of achieving this: either by decreasing the resolution or by decreasing the dimensions of the image.

**6.6**   The procedures are the same as for resampling up:

• If you want to reduce the file size and the total number of pixels while retaining the physical dimensions, enter a lower value in the **Resolution** box,

• If you want to reduce the physical dimensions while keeping the same resolution, enter a lower value in either the **Document Size Width** or **Height** entry box

Interpolating down is particularly useful when you want to create a **thumbnail** image for a Web page.

**Note**   A thumbnail is a small image that downloads quickly and can link to another page containing the full size image. The advantage of using thumbnails for large images is that users of your site can decide whether to view the larger images (and therefore wait for them to download) or not.

➢ Open the **Image Size** dialogue box again, make sure the **Resample Image** check box is selected and select **Bicubic Sharper** from the dropdown list.

**Note** With Bicubic Sharper, the scaled down image will retain more detail and sharpness.

➢ Set the **Pixel Dimensions Width** to **150** and observe the changes to the **Document Size** dimensions. Click on **OK**.

**6.7** Save the thumbnail image:

➢ Go to **File** / **Save As**. Enter *egypt_mural_thumbnail* in the **File name** box and choose **JPEG (*.JPG; *.JPE)** in the **Format** box. Make sure you are saving in **C:\USER\Scanning**\, and click on **Save**.

➢ In the **JPEG Options** dialogue box (Figure 23), move the **Quality** slider in **Image Options** from **small file** to **large file** (alternatively you could use the entry box or the dropdown menu).
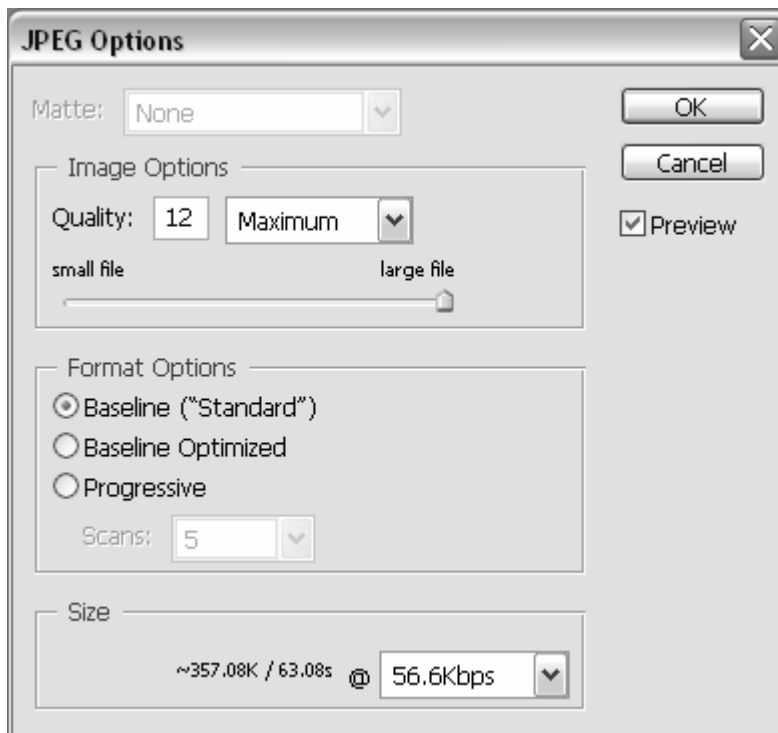


**Figure 23 - JPEG saving options**

➢ Under **Format Options**, select **Baseline ("Standard")**.

**Note** **Baseline ("Standard")** is the most universally understood JPEG format, **Baseline Optimised** will often produce a slightly more compressed sized file, but some web browsers may not be able to read it correctly, **Progressive** creates a file that will download in an interlaced fashion – the image downloads in a series of passes and appears blurry at first, until it gradually comes into focus.

Notice the changes in the **Size** box at the bottom, it tells you how long your file will take to download at different connection speeds – select **56.6Kbps** which is the most common telephone modem connection speed.

➢ Settle for a high quality (for example **10**) image and click on **OK**.

**Note** JPEG is a compressed format widely used for Web images. We cover image formats in more details in Task 6Task 7.

## Checking the print size of an image

You can also use the **Image Size** dialogue box to check the print size of an image at different resolutions without resampling it.

➢ Reopen **egypt_mural.tif** if you closed it and go to **Image** / **Image Size**.

➢ In the **Image Size** dialogue box, uncheck the **Resample Image** option – the **Pixel Dimensions** options will grey out and become un-editable (Figure 24):
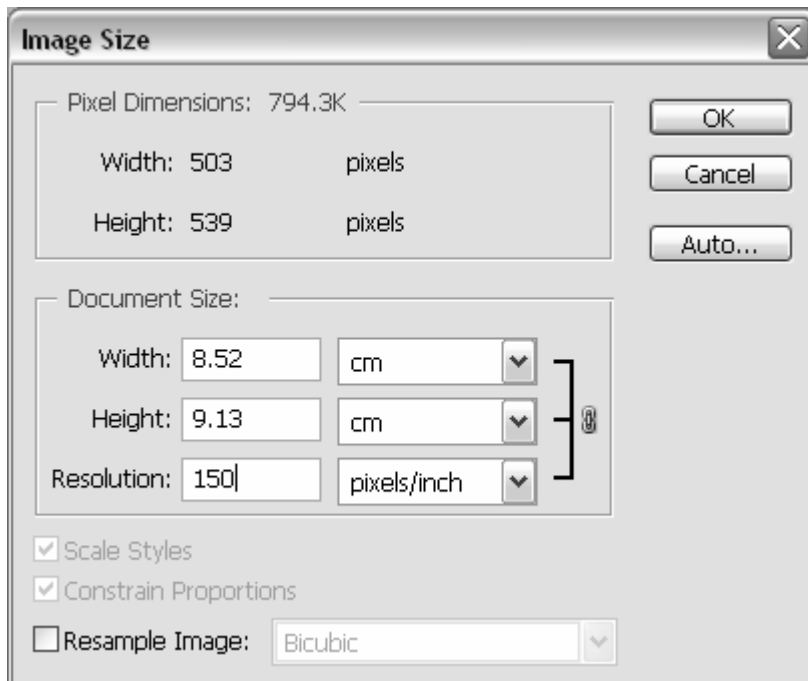


**Figure 24 - Image Size dialogue box with Resample Image option off**

➢ Change the **Resolution** (for example try 225 and 300 pixels/inch) to see the changes to the **Document Size Width** and **Height**. This is useful to check the size of a print out of your image at different resolutions.

➢ Go to **File** / **Print with Preview** to get an idea of the print size in relation to an A4 sheet of paper.

**Note**   If you find image sizing confusing, use the **Resize Image Assistant** wizard located in the **Help** menu to guide you. It can be used to resize images both for print and for the web.

# Task 7   Optimising an image to a suitable format

**Objectives**   To save an image in a suitable format for its intended purpose.

**Comments**   There are many image/graphic file formats to choose from. However you don't need to know them all. On this course you have used three different formats so far (**TIFF**, **Photoshop** and **JPEG**). We will introduce a fourth one, **GIF,** which is a popular format for screen display.

Let's start with a brief summary of four common file formats used on this course:

- **TIFF:** The most common cross-platform format for images. **TIFF** is the format of choice for scanned images and archival purposes because it keeps all image data intact. The downside is the large file size that makes it unsuitable for the Web.

- **PSD:** This is Photoshop's own file format. For flexibility in what you can do with the file in the future (all layers are preserved), it's a good idea to save a working copy of your image in this format.

- **JPEG:** This is one of two standard compression formats used for preparing images for the Web (the other one being **GIF**). It offers a smaller file size than **TIFF** and is the format of choice to compress photographic images for the Web.

- **GIF:** This is the other image file format used for preparing images for the Web. It is mostly used for saving logos, typography, etc. It is an 8-bit colour display mode that indexes specific colours to each of the 256 (or fewer) numeric value.

**7.1**   Open your **egypt_mural_after.tif** again if it's not already open.

➢ Go to **File/Save for Web** to open the **Save For Web** dialogue box (Figure 25) and click on the **4-Up** tab in the top left corner if necessary.



**Figure 25 - the Save For Web dialogue box**

## Saving as a GIF

**7.2** In the **4-Up** view, select one of the preview images and set the format to **GIF** (Figure 26)

**File format dropdown**

**Preset file format dropdown**

**Colour reduction algorithm**
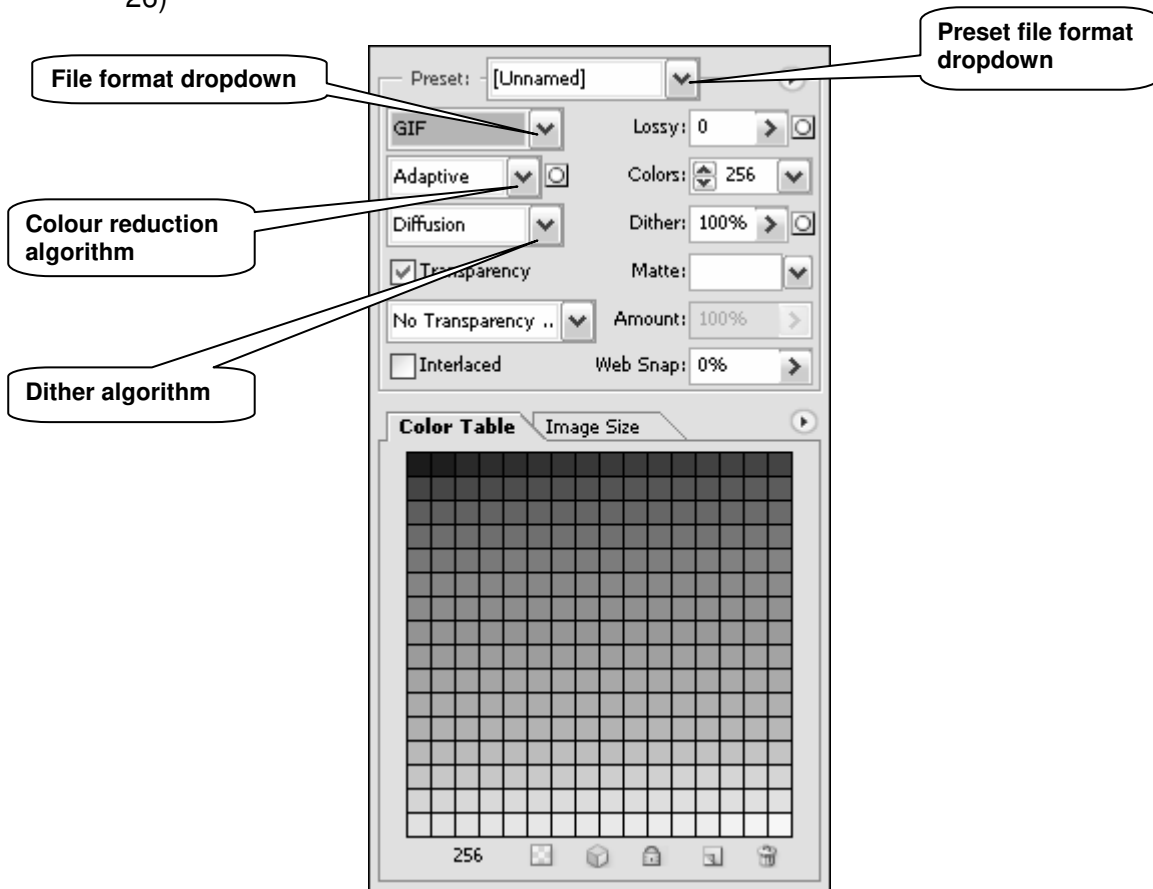
**Dither algorithm**

**Figure 26 - saving options for GIF format**

➢ Try out the various options (**Lossy**, **Colors**, **Dither**, etc.) and observe the changes to the GIF preview image – it may help if you zoom in using the **Zoom Tool** [13] in the top left.

13

Notice the changes to the file size at the bottom of the selected preview image as you change the settings.

## Saving as a JPEG

**7.3** Select the top right image and select **JPEG** from the format dropdown box (Figure 27):

**File format dropdown**

**Preset file format dropdown**

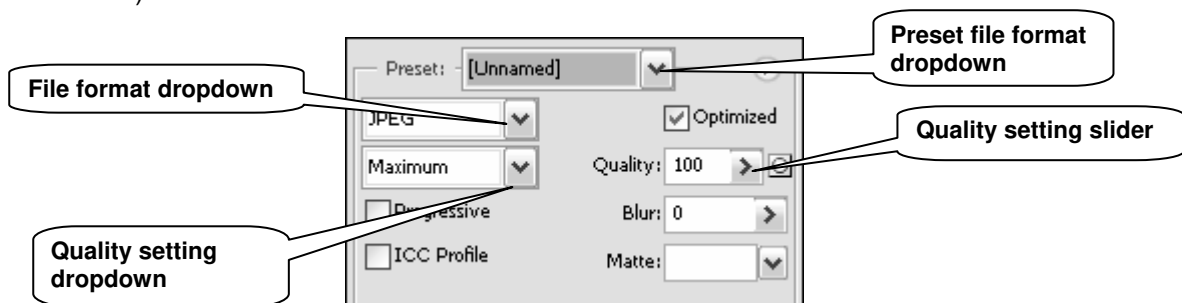**Quality setting slider**

**Quality setting dropdown**

**Figure 27 - saving options for JPEG format**

➢ Then set the quality to **Maximum** (**100**).

➢ Select the bottom left image then select **JPEG** as format and set the quality to **High** (**60**).

&#10148; Repeat for the bottom right image, setting the quality to **Low** (**10**)

Notice that the more compressed the image is, the lower the quality, file size and download time:

| Format | File size | Download time |
|---|---|---|
| TIFF | 794K | N/A |
| JPEG Maximum quality | 336.5K | 62s @ 56.6Kps |
| JPEG High quality | 81.47K | 16s @ 56.6Kps |
| JPEG Low quality | 22.41K | 5s @56.6Kps |

&#10148; Use the **Zoom Tool** in the top left corner to magnify the four images and compare the differences in quality.

You can probably see that there is not that much difference in quality between the original image, the **JPEG 100 quality** and the **JPEG 60 quality**. For this reason, if file size and download time are important criteria then the **JPEG 60 quality** would be a good option. If quality were the most important criterion, then you would optimise your image at **Maximum** quality.

# Appendix A   Resolution and image size for printing

| Pixel size | Megapixels | RGB size (MB) | CMYK size (MB) | Print size at: | |
| --- | --- | --- | --- | --- | --- |
| | | | | 150 ppi | 300 ppi |
| 1600 x 1200 | 2 | 6 | 7.5 | 11 x 8 inch (28 x 20 cm) | 5.5 x 4 inch (14 x 10 cm) |
| 2400 x 1800 | 4.3 | 12.5 | 16.5 | 16 x 12 inch (40 x 30 cm) | 8 x 6 inch (20 x 15 cm) |
| 3000 x 2000 | 6 | 17.5 | 23.5 | 20 x 13 inch (51 x 33 cm) | 10 x 6.5 inch (25 x 16.5 cm) |
| 3500 x 2500 | 8.75 | 25 | 33.5 | 23 x 17 inch (58.5 x 43 cm) | 11.5 x 8.5 inch (29 x 21.5 cm) |

**Table 1 – comparison of pixel resolution, megapixels, megabyte file size and print output dimensions at different resolutions in inches (and centimetres)**

| Output use | Screen ruling | x 1.5 Standard quality output resolution | x 2 High quality output resolution |
| --- | --- | --- | --- |
| Newspaper | 65 – 100 lpi | 97 – 150 ppi | 130 – 200 ppi |
| Books | 120 – 150 lpi | 160 – 225 ppi | 240 – 300 ppi |
| Colour magazine | 150 – 175 lpi | 225 – 262 ppi | 300 – 350 ppi |
| Art book/magazine | 175 – 250 lpi | 262 – 375 ppi | 300 – 500 ppi |
| Photo quality inkjet printer | 150 – 300 lpi | 225 – 450 ppi | 300 – 600 ppi |

**Table 2 – rule of thumb screen resolutions for common print devices at lpi x 1.5 and x 2 quality factors**

**Example**

Say you want to print a high quality A4 photograph on an inkjet printer:

   A4 size = Width 8.268 x Length 11.693 inches (21 x 29.7 cm)

   Printer resolution = 200 lpi

   Quality factor = x 1.5

Print length x Printer resolution x Quality factor = number of pixels required in length

   11.693 x 200 x 1.5 ≈ 3500 pixels in length

Print width x printer resolution x Quality factor = number of pixels required in width

   8.268 x 200 x 1.5 ≈ 2480 pixels in width

# Appendix B   Further resources

## Digital imaging

- TASI (Technical Advisory Service for Images)
  http://www.tasi.ac.uk

- Internet for Digital Photography
  http://www.vts.rdn.ac.uk/acl/tutorial/digiphoto

- Cornell University Library – Digital Imaging Tutorial
  http://www.library.cornell.edu/preservation/tutorial/contents.html

## Scanning

Apart from the TASI website, you may find the following site very useful for all scanning issues:

- A few scanning tips, by Wayne Fulton
  http://www.scantips.com

## Photoshop tutorials

These tutorials cover most things you can do in Photoshop, including some useful tutorials on image enhancement and restoration:

- Adobe's Photoshop tutorials
  http://www.adobe.com/products/tips/photoshop.html

- Janee's Photoshop tutorials
  http://myjanee.home.insightbb.com/tutorials.htm

- 'Computer Arts' Photoshop tutorials
  http://www.computerarts.co.uk/tutorials/2d/