Manage Image Elements and Formats

This course is based on the Adobe Photoshop CC course by Logical Operations

Pixels, Resolution, and Image Size

Pixels are tiny squares of color, or shades of gray, that together comprise an image. The number of pixels per unit that make up an image, usually measured in inches as ppi, determines the image resolution.

An image with a high resolution has more pixels per inch (ppi) than the same image with a lower resolution. The greater the number of pixels there are, the sharper the image will be, but the larger the file size as well.

Resolution clarity is specific to printed output and to viewing devices, such as computer monitors.

For print, a standard quality photograph will have 300 pixels per inch (300 ppi). The same picture intended for display on the web works well at 72 ppi.

Image Size Dialog Box

The **Image Size** dialog box has several options for modifying the size or resolution of an image.

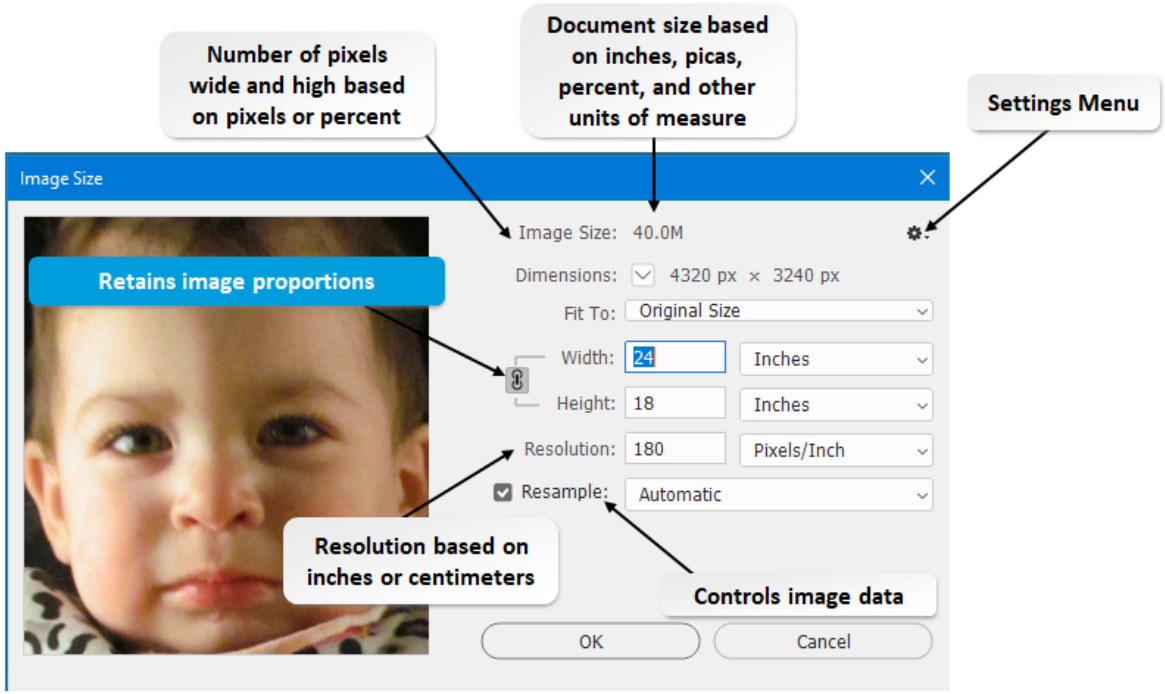


Image Size vs. Canvas Size

In addition to changing the size of your image, Photoshop lets you change the size of the canvas. The canvas is the layer on which your image is placed. This can sometimes be confusing, but think of the canvas as the picture frame around a picture. You can change the width and the height of the canvas layer to either increase the editable area around the image or decrease to crop an area around the image.

Resampling

Resampling, also known as interpolation, controls the amount of image data when you increase or decrease the resolution or the pixel dimensions of an image. Beginning with the original image that has a given number and color of pixels, an image can be resampled up or down sampled.

Resampling Option	Description
Resample Up	Photoshop resamples the image and adds pixels. The added pixels are given color values based on the color values of original pixels. Disadvantage: Resampling up can reduce the sharpness and detail of an image. The increased pixel count also increases the size of the file.
Downsample	Photoshop resamples the image and deletes pixels. This has little effect on image detail and clarity; think of thumbnail images as an example. The reduction in pixels reduces the size of the file.

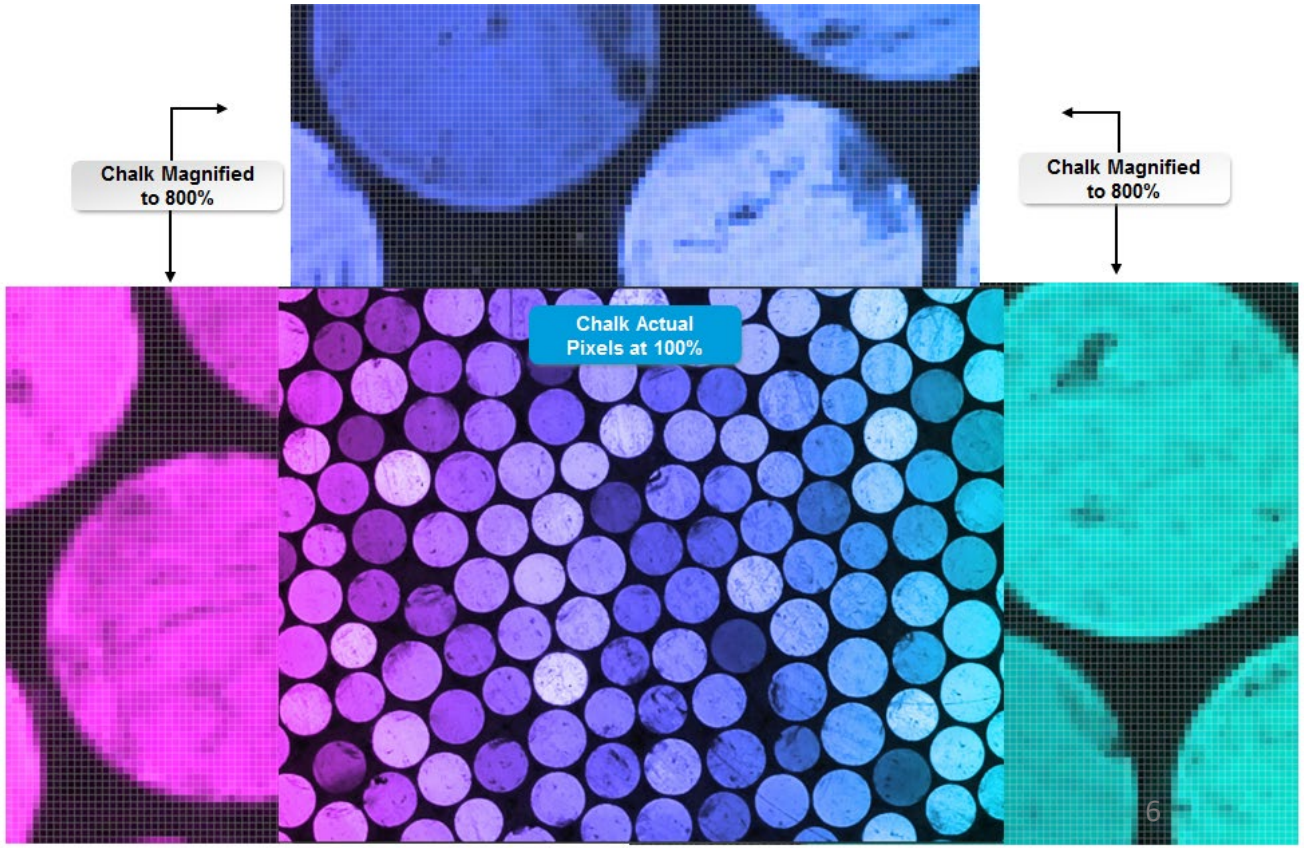
Resampling Option

Resampling Option	Description
Nearest Neighbor (hard edges) Interpolation	The simplest method, it increases the size of a pixel, and uses the color of the nearest pixel. The effect is similar to zooming in to enlarge and view a small area of an image (the eye, for example); the color remains true, even though the image itself is blurred. This method is not recommended for enlarging photographs because stretching the pixels produces jagged images.
Bilinear Interpolation	A method of determining the color value by averaging the color values of surrounding pixels. It produces fairly smooth edges for medium-quality results, but may not be suitable for photographic images.
Bicubic Interpolation (smooth gradients)	A method that employs a detailed examination of surrounding pixels and then creates new pixels based on the average value of what it finds. This method produces smoother edges and gradations than either of the other two methods. It is commonly used by image editing software and digital cameras for resampling images.
Bicubic Smoother (enlargement) **Bicubic Sharper (reduction)**	Both employ the bicubic method with more refined algorithmic calculations. **Bicubic Smoother** further smooths out the edges of an image. It is recommended for enlarging images. **Bicubic Sharper** employs sharper edges and is recommended for reducing image size.
Preserve Details	When the **Preserve Details** method is chosen, a **Reduce Noise** slider is displayed. Use the slider to smooth out noise as you upscale the image.

Raster Image

A raster image, also known as a **bitmap**, is made up of pixels, with each pixel occupying a specific location and having a specific color. The color and intensity of each pixel has variations that occur across a span of pixels; the eye sees this as the rendered image. Raster images are typically photographic images.

Scaling a raster image well beyond its original size causes the pixels to stretch, which can result in image distortion and a jagged appearance. This distortion is known as pixelation



Pixelation: Image distortion that results from pixels being stretched as the result of a raster image being enlarged beyond its viewable size.

Vector Image

A vector image is a graphic type based on a mathematical formula that defines points, called vectors, along a shape or path. Vector images are made up of lines, curves, colors, and position properties. Unlike the pixelation that can occur in raster images, vector images are scalable and resolution independent so they can be resized without corrupting image quality-and their file size remains the same.

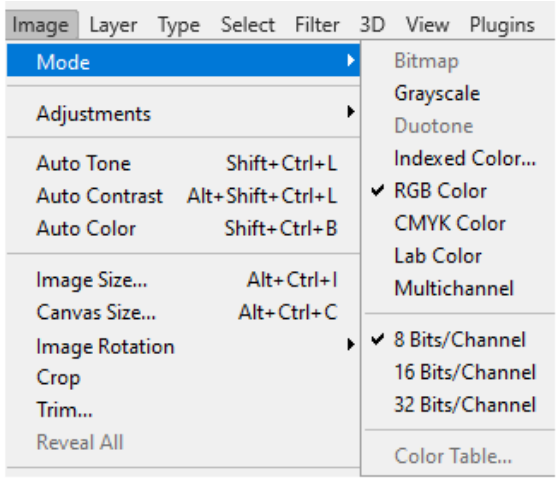
Best Suited for the Web

Vector graphics are well suited for the web. They have a smaller file size than that of raster graphics, which saves download time. And they do not depend on monitor resolution, so clarity is not an issue.

A vector graphic has lines, curves, colors, and position properties.

Color Modes

Like most image editors, Photoshop is designed to work with raster files by using the **RGB Color** mode, but it also allows you to work with other color models, such as **CMYK**. Digital cameras produce images in the RGB color mode. Printers produce output in the CMYK color mode. To determine or select a color mode, select **Image → Mode** from the Menu bar.



R G B

C M Y K

RGB vs CMYK

RGB

The RGB Color System is Additive

R G B

Used for Digital and Web Media

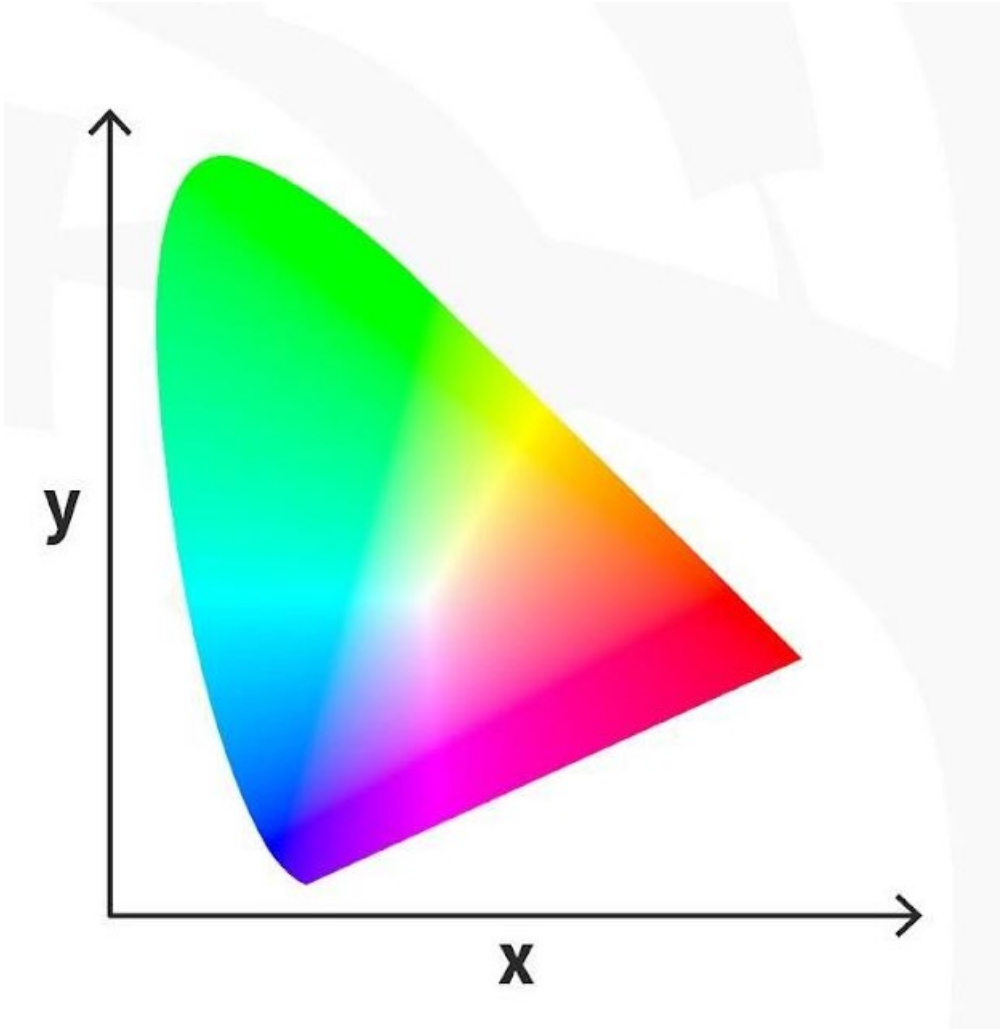
CMYK

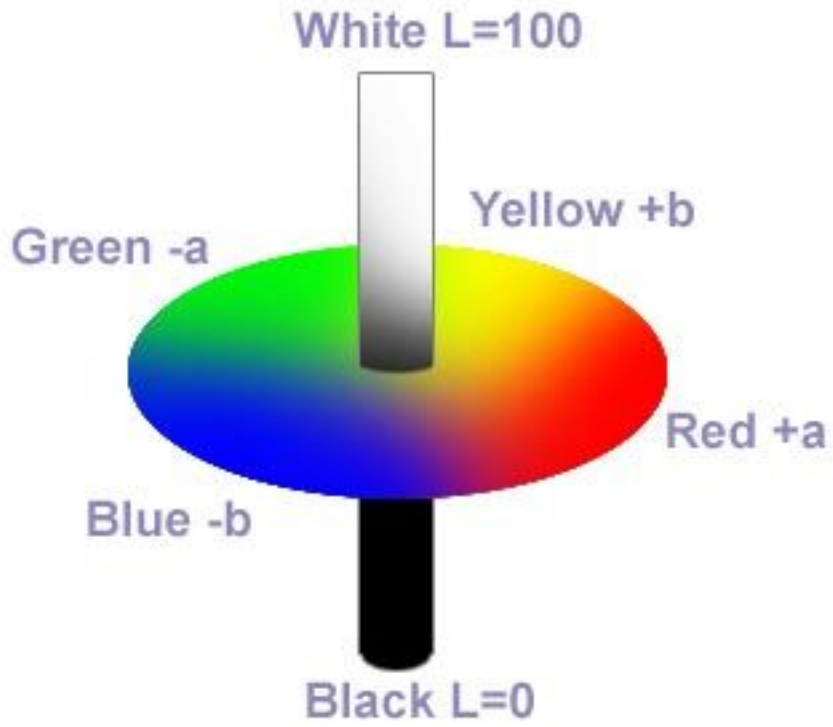
The CMYK Color System is Subtractive

C M Y K

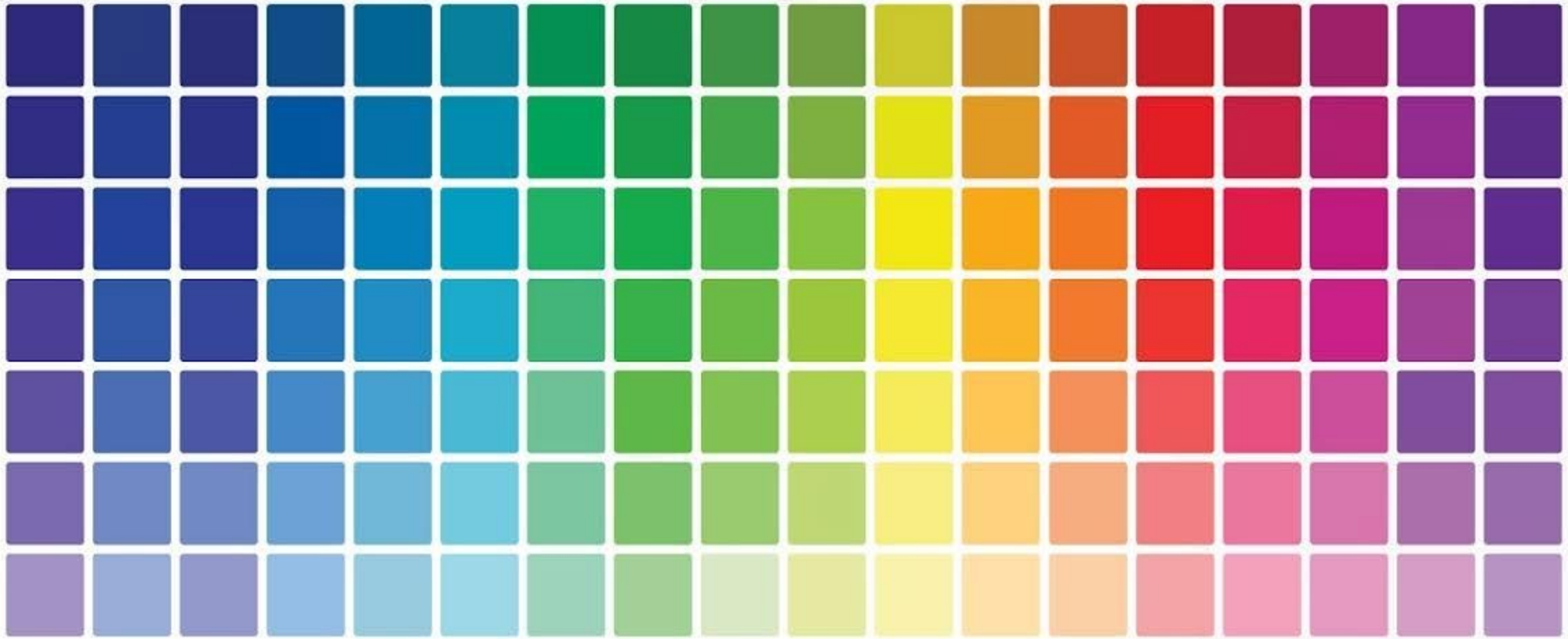
Used for Print Media

LAB Colour





Index



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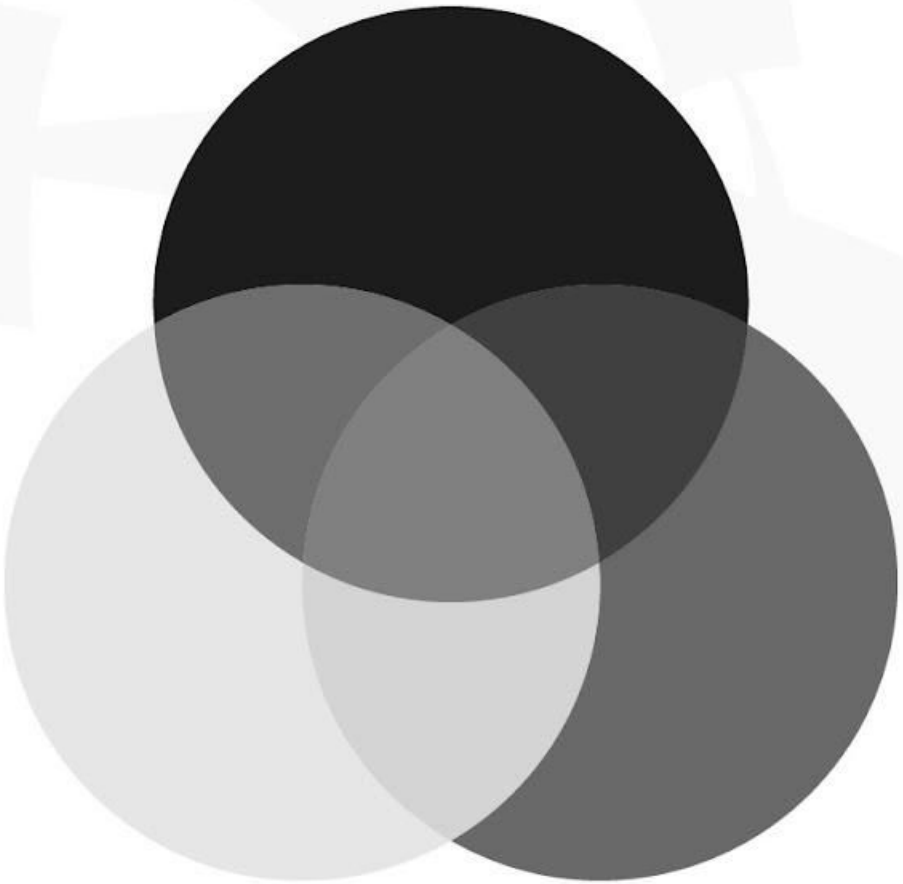
Greyscale



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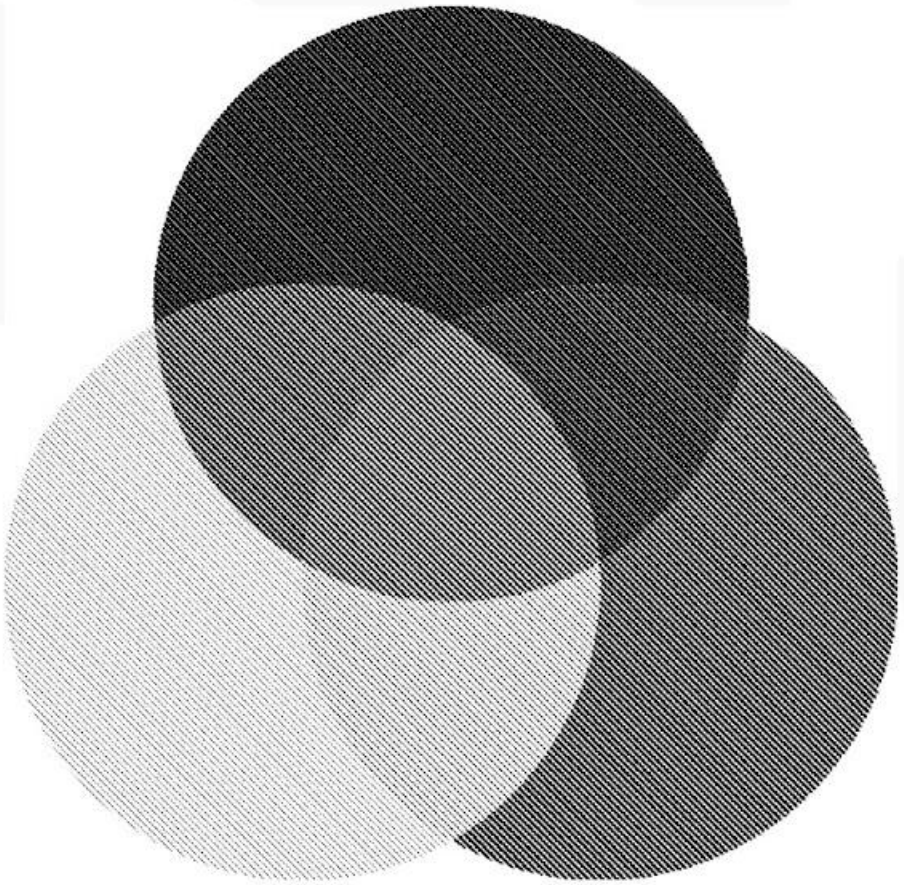
Bitmap



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LAB
RGB
CMYK
Index
Greyscale
Bitmap

Color Mode	Description
RGB	RGB is a device-dependent color model that uses three colors, or channels, to reproduce colors on screen. Individual pixels are composed of a mixture of three colors: red, green, and blue. Each color has a value that ranges from 0 to 255. Zero represents black; 255 represents white. For example, a pixel with values of 0 for red, 0 for green, and 255 for blue, will appear as pure blue. Individual devices reproduce an RGB value differently, and can vary from manufacturer to manufacturer. The **RGB Color** mode in Photoshop varies according to the working space setting that you specify in the **Color Settings** dialog box. The default is standard **RGB (sRGB).**
CMYK	CMYK has four channels to represent color: Cyan, Magenta, Yellow, and Black. The combination of CMYK colors can result in more than four billion available colors. Because it is a subtractive process, each additional color means more light is removed, or absorbed, to create colors. When you bring a CMYK image into Photoshop, keep in mind you are actually viewing it in RGB mode on your monitor, so the printed output may not look exactly like what you see on screen. CMYK is used by most printers and in the printing process.
Lab Color	The **Lab Color** mode defines colors mathematically and is based on how humans perceive color. The color components L, A, and B denote: • A luminance component ranging from black to white • A chromatic component ranging from green to red • A chromatic component ranging from blue to yellow **Lab** is device-independent.
Indexed Color	**Indexed Color** uses a single channel to represent color. A color table is used to determine the available colors.
Multichannel	**Multichannel** has 256 levels of gray in each channel. This mode supports many file formats and is used for specialized printing.
Bitmap	**Bitmap** is a single channel mode that results in two shades of brightness: black and white, and does not contain any intermediary gray level. Bitmap is used for line art and simple illustrations.
Grayscale	**Grayscale** has a single 8-bit channel that results in 256 brightness levels ranging from 0, for pure black, to 255, for pure white.
Duotone	**Duotone** is a single 8-bit channel mode that uses two, three, or four inks to print certain tones of the image in different colors. It is typically used to print tinted images and images with special ink requirements.

Color Settings

Color settings control the gamut of colors that Photoshop uses, displays, and prints. If you open an image in Photoshop with an embedded color profile that doesn't match the Photoshop color profile, Photoshop determines how to deal with it—often using the embedded information. However, new files that you create in Photoshop will adopt the color profile that you choose in the **Color Settings** dialog box, so it's important to know what is available and recommended.

Adobe Photoshop's default is standard RGB (sRGB). Like RGB, sRGB uses three colors, or channels, to reproduce colors on screen—red, green, and blue. Although sRGB has a smaller gamut of colors than RGB, the difference is negligible, as the RGB gamut merely stretches colors. And because most electronic manufacturers rely on the sRGB model, it is the one that works best for digital and web images.

Save Options

When you save a document, you can save it to the Adobe cloud or to a drive on your computer. Saving the file to the cloud allows you to access it from any device where you have Photoshop installed. If you select to save the file to your computer, you can save it to an internal or external drive directly connected to the computer, or a remote drive on your network. If you save the file to the local computer, it won't be easily available on another computer unless you use a removable drive. If you later change your mind about where to save it, you can select the other option.

In the **Save As** dialog box, you can specify the file type, color options, and other features to save with the document. You can also select to save the file as a copy, thus preserving the original file. If you select the **Save a Copy** option, the file name includes "copy" just before the file extension.

Cloud Documents

Files saved in Adobe's cloud space can be opened and edited in compatible Adobe apps. Cloud documents are considered cloud-native files. Benefits of saving files as cloud documents include the ability to access files from any device, including iPads.

File Formats

Graphic images tend to have a large file size, depending on the complexity of features that have been applied, and often require compression, especially for downloading to the web. File formats compress files differently. Photoshop's default file format is PSD. The most common graphic file formats are GIF, JPEG, and PNG.

File Format	Description
PSD	Default Photoshop file format. Supports all Photoshop features and is most compatible with other Creative Cloud programs.
GIF	Graphic Interchange Format, used for web and online services. It minimizes file size and electronic transfer time.
JPEG	The Joint Photographic Experts Group format, like GIF, is suitable for web display and online transfer. Because it retains millions of colors and shades, JPEG is a good choice for photographic images.
PNG	Portable Network Graphics format is similar to GIF, as it is effective for web and online display. PNG supports more color modes than GIF, as well as 24-bit images. It is not supported by some older web browsers.

File Formats

Printed media requires a different quality of output than that of the web. It also has different preparation requirements for output to a commercial printer compared to output to a local printer. File formats designed for print include EPS and TIFF.

File Format	Description
EPS	The Encapsulated Postscript file format is compatible with the majority of layout programs, and can be used for both vector and raster graphics. However, it does not support layers. EPS files with vector graphics are rasterized by Photoshop to convert vectors to pixels.
TIFF	The Tagged-Image File Format supports only raster graphics, but it can be used on both the Windows and Mac platforms. A Photoshop file saved in TIFF format enables you to specify the type of compression, whether to preserve image resolution information and transparency or not.

Apply Design Principles, Elements, and Graphic Composition

Graphic Design Elements and Principles

Design Principle	Description
Emphasis	The part of the design that catches the viewer's attention. The artist will usually make one area stand out by contrasting it with other areas. The area will be different in size, color, texture, shape, etc.
Movement	The path the viewer's eye takes through the artwork, often to focal areas. Such movement can be directed along line edges, shape, and color within the artwork.
Balance	The equal distribution of visual weight in a design.
Unity	The feeling of harmony between all parts of the artwork creating a sense of completeness.
Color	Used to unify, separate, emphasize, and decorate. Color intensity, saturation, shade, and texture can be used to design a page effectively.
White Space	The area on a design that contains no content. When used appropriately, it helps to reduce clutter.
Alignment	Creates order and organization among elements.
Line	A mark with greater length than width. Lines can be horizontal, vertical, or diagonal; straight or curved; thick or thin.
Contrast	Emphasizes or highlights key elements within your design. The greatest contrast is achieved when two elements are total opposites.
Rule of thirds	Allows you to achieve a visually appealing balance by dividing your layout into three equal parts.
Proximity	By grouping similar elements together or in close proximity, you create a relationship between those elements.

Background Graphics

Background graphics are a very important part of the visual appeal of a design. The background generally sets the stage for the theme of the design. When it comes to the background, there is the body background and the content background, which can be combined to form the three most commonly used background structures. There are also other background options.

Background Structure	Description
Content and Body Background Layered	The body background is at the bottom and the content background is layered on top of that.
Content Directly on Body Background	The content is laid directly on the body background, which is usually made up of images, textures, and illustrations.
Body and Content Backgrounds Combined as One	This is the most simple structure in which the content itself forms the background.
Header Backgrounds	A web page has a lot of leeway in terms of where the background design can be placed. Header and wrapper backgrounds offer a lot of flexibility. The header can flow seamlessly into the content or it can have a sharp boundary.
Wrapper Backgrounds	The wrapper can flow over from a standard layout, adding feeling and personality. Some graphics can be allowed to bleed into or extend through the content area.
Full-Body Backgrounds	Full-body backgrounds work well, provided they don't take away emphasis from the content, and highlights or bevels are used for color separation.

Background Graphics

Header flows seamlessly

Text is contrasted enough with background to be legible

Full body background does not interfere with graphic elements

Graphic stands out from background graphics

Font Classification, Size, Type, and Color in Graphic Design

Typographical Element	Description
Connotations	It is important to ensure that the typeface matches the subject and the setting of the design; otherwise, the viewer could become confused and conflicted.
Utility	The typeface must be readable, and if there is any doubt at all about readability, then do not use the typeface. The rule of thumb is to choose a typeface that makes good use of space, balancing between positive and negative use of space.
Diversity	Variation in the typeface is a key way to differentiate between the importance of various parts of the text on a page. Using italics, bold, and bold italic in the right way can strengthen the message being conveyed.
Space	Give text space to breathe. Text should not be squashed together. Headlines need to have ample space before the body begins and there should be an appropriate amount of space between letters, words, lines, and paragraphs. Margin space between blocks of text is also important.
Color	While color and text might seem like separate things, they need to be considered together. The key here is to contrast the color and type of text with the color on which the text appears. Avoid putting light-colored text on a light-colored background and vice versa. Imagery behind text is also an important consideration.

Font Classification, Size, Type, and Color in Graphic Design

The typography used in graphic design has a significant effect on the final impact of that design with the viewer. No matter how incredible the images and layout of the design might be, a poor choice in typography can be ruinous. There are a number of aspects of typography to consider when choosing what works best in your design.

Visual Hierarchy

Visual hierarchy is critical in design because it is the basis of communication between the designer and the target audience. Because people generally process things visually, they tend to see relationships between, and categorize, the things they see. For this reason, it is important for designers to arrange objects in such a way that they are visually appealing.

Visual Hierarchy Element	Description
Size	One of the most effective ways to create a visual hierarchy in design. Use size to convey importance, making more important design elements larger and less important design elements smaller.
Color	Color can be used in two ways: as an organizer tool and as a personality tool. Use of color in certain ways can demand attention, bring emotional appeal, affect brand, create symbolism, and classify information.
Contrast	Contrast is used to show the relative importance between different design elements. This can include intense changes between the size of the text or colors used.
Alignment	Use alignment to create order between the various elements on the page. Alignment can come in the form of separate columns or can be more complex, such as where information is positioned on a page to gain attention.
Repetition	Assign meaning to an element compared to other elements on a page by being repetitive in its appearance. This allows the viewer to pay particular attention to those elements that are not repetitious.
Proximity	This is a way to separate elements from each other. A designer can use proximity to create sub-hierarchies. This is the fastest way to associate content that is similar.
Density and Whitespace	Finding a balance between packing elements too densely and spacing them out too much is crucial. The key is to ensure the page is not too cluttered and the elements retain their relationship to one another.
Style and Texture	The use of style and texture on a page to create feeling, and via that feeling, create a hierarchy of the elements.

Work with Digital Devices

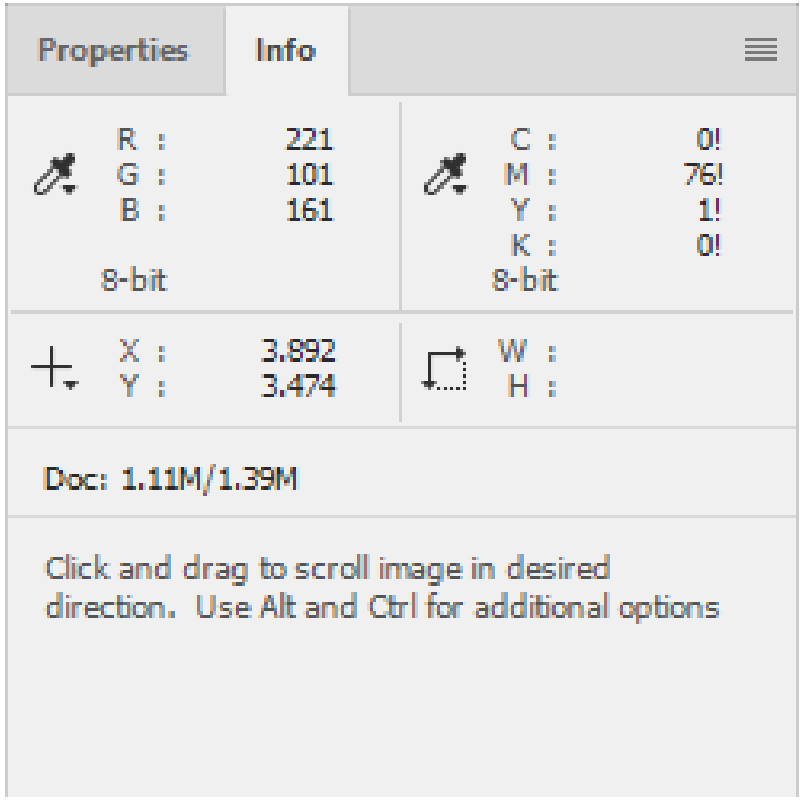
Digital Image Fundamentals

Would it surprise you to learn that your digital camera doesn't shoot colors? That's because digital devices capture two values: 0 and 1, or black and white. All color is created by an output device such as a monitor or printer.

At its most basic level, a digital camera, using an image sensor called the charge coupling device, converts the analog light that comes into your camera into pixels, thereby recording an image as digital data. You'll recall that pixels are square units of grayscale information. In the digitizing process, the camera captures the grayscale data that combines to produce the color channels of red, green, and blue (RGB).

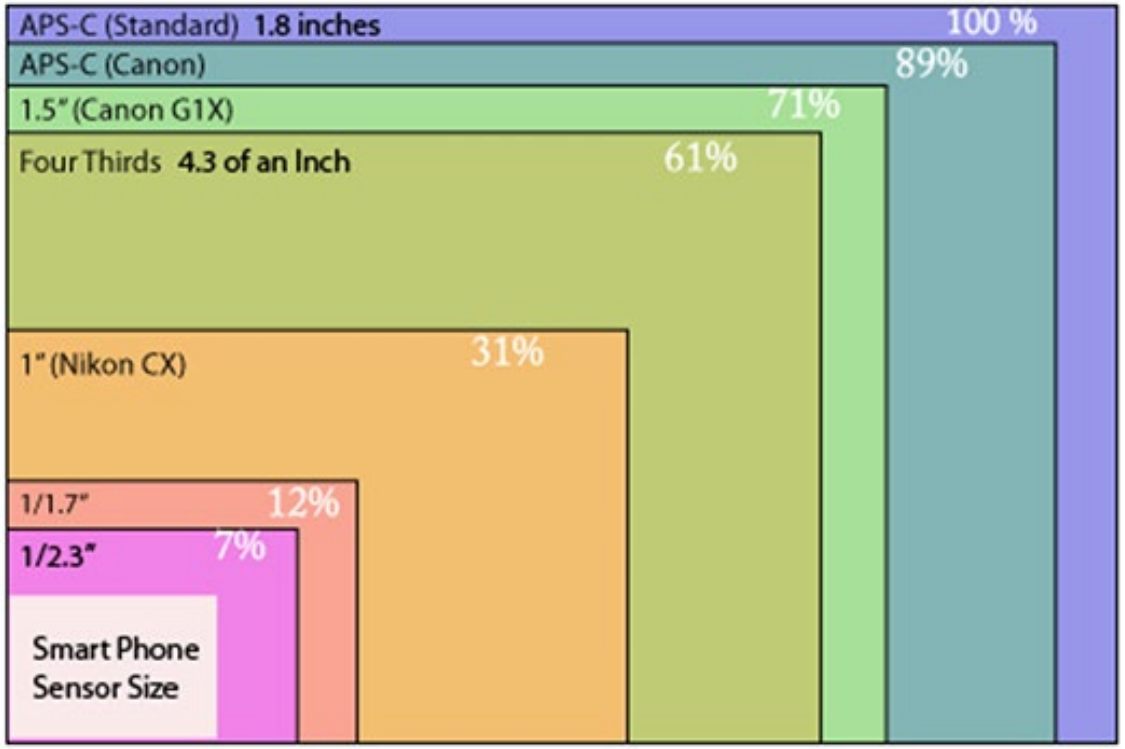
Photoshop Info Panel

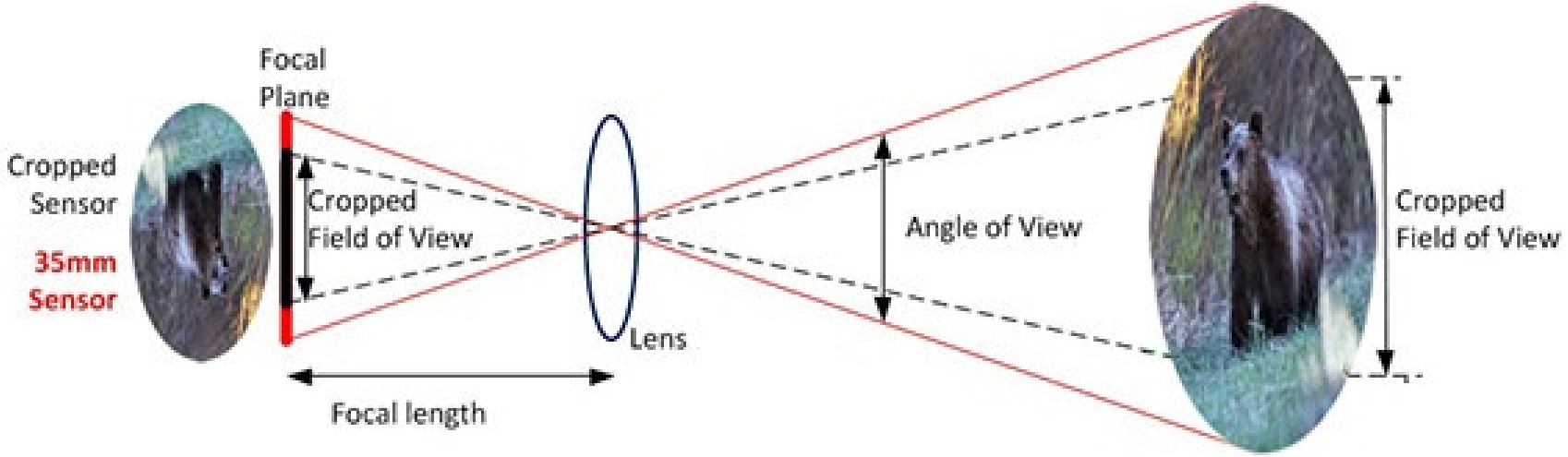
The exact grayscale value of any area of an image is displayed in the Photoshop **Info** panel. The Info panel displays the numerical breakdown of grayscale channels produced by digitizing the image.



Sensor Sizes and Crop Factors

	MEDIUM FORMAT	FULL-FRAME	APS-C	MICRO 4/3	1"	1/2.55"
PICTURE						
SENSOR SIZE	53.0 X 40.20 MM	35.00 X 24.00 MM	23.6 X 15.60 MM	17.00 X 13.00 MM	12.80 X 9.60 MM	6.17 X 4.55 MM
CROP FACTOR	0.64	1	1.52	2	2.7	5.62
CAMERA						





CAMERA SENSOR SIZE CHART

FULL FRAME
36.00 x 24.00 mm

APS-H
29.90 x 18.60 mm

APS-C
23.60 x 15.60 mm

APS-C (CANON)
22.20 x 14.80 mm

1.5”
18.70 x 14.00 mm

4/3” (MFT)
17.30 x 13.00 mm

1”
12.80 x 9.60 mm

1/1.2”
10.67 x 8.00 mm

2/3”
8.80 x 6.60 mm

1/1.7”
7.60 x 5.70 mm

1/2.3”
6.17 x 4.55 mm

1/3.2”
4.54 x 3.42 mm

Digital Photography Concepts

Terminology	Description
Aperture	An aperture is an iris-like opening inside the camera lens that can be adjusted larger and smaller. A larger aperture allows in more light. Aperture is based on ratios called F-stops. An F-stop of F16 is a much smaller aperture (opening) than that of F4.
Exposure	Exposure refers to the changes made to aperture and shutter speed to adjust for light.
Mode	The mode setting you select. Auto mode: The camera makes all decisions (shutter speed, aperture, light metering.) Program mode: The camera makes most decisions but you have some flexibility regarding shutter speed and aperture. Shutter priority: You select the shutter speed, and the camera adjusts to the corresponding aperture. Example: to blur or freeze a subject in motion. Aperture priority: You select the aperture (depth of field) and the camera adjusts to the corresponding shutter speed. Example: to focus on a particular depth of field and blur out areas outside that depth of field. Manual mode: You select all camera settings to determine exposure.
Megapixels	Equal to one million pixels, the number of megapixels contributes to image resolution and print size. Digital camera specs include the number of megapixels they are capable of producing. For example, to print a 4×6-inch image with high quality resolution, a camera would have to have at least 2 megapixels. A larger print, such as 16×20-inch, would require at least 8 megapixels. Most camera models today have a minimum of 10 megapixels.
Light meter	Measures the light in your scene to calculate a shutter speed and aperture.
Focus	Based on depth of field. A camera will normally take in more than one depth of field. Changing aperture and shutter speed determines the depth at which the camera uses a sharp focus, and where focus can be blurred.
Zoom	The focal length that brings images closer into view.
Flash	A burst of light used to compensate a dark or dim setting.
Shutter speed	The length of time light is allowed into a camera. Measured in seconds, or fractions of a second, shutter speed can be as slow as 1/15 of a second, or as fast as 1/16,000 of a second. The longer the shutter is open, the more light will get into the camera.

Scanning Basics

If you've ever seen or used a scanner, chances are it was of the flat-bed variety, in which you lift the cover and place a document on the glass plate. While you wouldn't think that a scanner has much in common with a digital camera, they both operate on the same principle that uses an image sensor, or charge coupling device, and analog light reflected on a static, flat image (a document or photo) that is converted into pixels, thereby reproducing a digital picture of the image.

Scanner	Digital Camera
Captures 2D static displays.	Captures 2D and 3D, static and motion displays.
Has a built-in light source.	Depends on an external light source.
Has a static focal length.	Has adjustable focal lengths.
Has a set media speed.	Has adjustable media speeds.
Limited types available; the most common is a reflective flatbed type. There are also sheet-fed, hand-held, and drum scanners.	Available in a wide variety of types and models. Common types include single-lens reflex (SLR) with a fixed lens, and digital SLR with interchangeable lenses.
Images are stored in an external device, such as a computer.	Images can be stored in a camera and transferred to a computer or other output media.

Adobe Bridge Photo Downloader

Transferring photos from your camera is easily managed by using the Adobe Bridge Photo Downloader. Not only is it fast, but it also gives you the flexibility to rename files, organize them by date, save copies to a different location, delete photos from the camera (or memory card), and more.

From the Adobe Bridge **File** menu, select **Get Photos from Camera**. In the **Adobe Bridge - Photo Downloader** dialog box, select your preferences and then select **Get Media**. The transfer progress is displayed so you can see how much of the transfer is completed.