

Digital Photography Fundamentals

Pacific New Media

David Ulrich
pacimage@maui.net
www.creativeguide.com
808-721-2862

KNOW YOUR CAMERA

A set of simple instructions for effective camera use.

File Size and Resolution

- Megapixel = million pixels.

Measurement of image: Height X Width in pixels. Example: 5 megapixel camera = 1920 pixels high X 2560 pixels wide = 14 megabytes.



- Resolution needs:

- 4 mpxl = web or 5X7 print
 - 6 mpxl = web or 8X10 print
 - 8 mpxl = web or 11X14 print
 - 12mpxl= web or 16X20 print

For professional quality, or magazine quality, over 10 mpxl is required.

- Camera Resolution

- RAW: Highest professional quality. Image processing in Adobe Photoshop or Lightroom required. Largest file size. 16 bit depth resolution (more pixel information).

- TIFF: Highest quality with no additional processing required. Standard cross-platform, high quality, photographic file. Large file size.

JPEG: Compressed file. Lower file size. Quality depends upon level of compression. High, Medium, and Low jpg quality. High jpg quality often the best compromise between quality and file size (more photos per card) for general picture-taking.

Camera compact flash cards available in 1-16 gigabytes. Use USB port and camera cable or compact flash reader (faster) to download images.

- Resolution requirements for publishing and printing:
 - Web publishing = 72 dpi (dots or pixels per inch)
 - Digital Printing = 240 dpi optimum for Epson
 - Laser or Offset Printing = 300 dpi average
 - For precise offset printing, dpi = 2x lines per inch = target dpi. Example:
 - Low end printing (newsprint) = 65-75 lines per inch X2 = 150 dpi average
 - Medium printing (newsletters, brochures) = 110-125 lpi X2 = 240 dpi average
 - High quality printing (four-color magazine) = 150 lpi X2 = 300 dpi average

Camera images can be sampled DOWN with no loss of quality. For example, 300 dpi > 72 dpi. Images cannot be sampled UP in resolution without significant quality loss. For up-sampling, use a third-party software solution such as Genuine Fractals or the "Stair step" interpolation Photoshop action (SI Pro 2.5) sold by fredmiranda.com (\$24.95 on-line).

Camera RAW format is an exception. Images can be up-sampled approximately 25-35% with high quality.

Camera Use

Fstops: Use smaller f stop for greater depth of field, such as f11 or f16.

Wider f stop for less depth of field, such as f3.5.

Shutter: Use faster shutter speed for stop-action, such as 1/250 or above.

Use 1/30 or faster for hand-holding a camera.
Use tripod or flash for low-light (under 1/30 sec).

Lens and Aperture: Factor of 1.6 translation of digital to traditional 35mm SLR lenses. Full frame digital camera = 35mm format

Multiply digital lens by 1.6 = traditional lens size.
For example: 18mm digital lens = 28mm traditional lens (average).

Default Settings for General Use

Metering modes: Use *P (Program Auto Exposure)* for most applications. This will allow the camera to give you the right exposure for your lighting conditions.

Manual: You set both the shutter and aperture
AV (Aperture priority for maximum depth of field
TV (shutter priority for “stop-action” faster shutter speed.).

Use “icon” modes for specific applications: portrait, close-up, landscape, or night-time (low-light). Most cameras have up to 20 different shooting modes, represented by icons.

For special situations, use the following exposure modes:

For portraits, with shallow depth of field (subject sharp, background out of focus) use *Portrait* mode.

For landscapes and scenics, with a large depth of field (foreground and background are sharp), use *Landscape* mode.

For sports and action photography, use *Fast Shutter mode* (will freeze rapid action.)

For blurred action, use *Slow Shutter mode*. (will give interesting effects of blurred motion.)

For night or indoors, use *Night or Indoor mode* (will give proper exposure for lower light.)

ISO: Use native 100 for maximum quality. Set your ISO to *Auto*. Will automatically adjust the for low or high light levels. (default.) “Push” ISO to 400 for low light situations, only when needed. With a higher ISO, most cameras introduce “digital noise,” or pixelated, uneven areas in the shadows of the image.

White point balance: Use automatic setting. Camera will sense light source. Set your White point balance to *Auto (AWB)*. Will automatically adjust the correct color for indoor, outdoor, or fluorescent lighting. (default).

Focus: Set your focus to *Autofocus (AF)*. (default)

Light Meter: Set your light meter to *Digital ESP or Matrix*

(default). Most cameras give a choice between *Matrix* (multi-point, Digital ESP) or *Spot* metering. Use *Matrix* for general picture-taking. For precise exposure control, use spot when necessary to isolate parts of the frame, i.e. a portrait that is back-lit, etc.

Flash: Use auto flash setting. Flash will fire when needed. To “fill” shadows in a contrasty scene, turn flash fully on or use “fill-in” flash mode, available on some cameras.

Optical zoom lens: Use as needed. Do not use digital zoom. It merely “crops” your photos in-camera.

Exposure Compensation: Most cameras will allow you to set the exposure + or - by a ratio of fractional or full f-stops. Watch your highlights! Many digital cameras tend to “blow-out” the highlights, resulting in washed-out light areas, and highlights with no detail. Many digital cameras benefit from setting your exposure compensation to a minus factor of 1/2 to 3/4 of a stop less light to accommodate highlights.

Optional

A brief explanation of “f-stops” and shutter speeds.

The camera has two methods of controlling the exposure (the amount of light). The first is the shutter speed (how long the shutter is open.) Shutter speeds on your camera range from 15 second to 1/2000 of a second. If you want to control the shutter speed, use *Shutter Priority* (TV) exposure mode. Just set your shutter speed and the camera will adjust automatically.

A guide to shutter speeds:

For blurred motion, use 1 second to 1/4 of second.

For stopping action, use:

1/30 minimum for hand-holding your camera

1/60 for portraits or light movement

1/125 for average human interest or street scenes

1/250 for fast-moving subjects: bicycles, cars, etc.

1/500 for fast action like sports or anything moving very fast.

The second method the camera has for controlling light is the f-stop, or aperture of the camera. The aperture is like the pupil of your eye. It will open-up to allow more light in or close down to allow for less light. The lower the f-stop (F2) — more light will come in and you will get shallow depth of field (narrow focus.)

Here is a guide to f-stops.

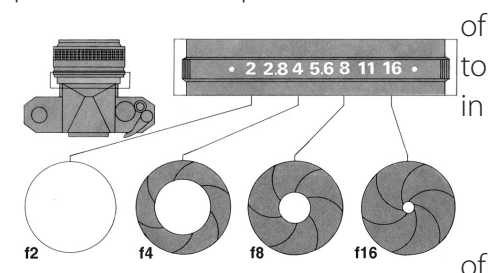
F2.6 – F4 – wide open. Shallow depth of field. Subject will be sharp, background will be out of focus.

F 4 – F 5.0 – halfway open. Moderate depth of field.

About half of your foreground background will be sharp focus.

F5.6 – F8 – closed down. Great depth of field. Your entire picture, foreground to background, will be in sharp focus.

There is a relationship between shutter speeds and f-stops.



For faster shutter speeds, you need to open the aperture (for example, F2.6 , depending on the light). For slower shutter speeds, you need to close the aperture (for example, F4.9).

Experiment with different exposure modes and f-stop/ shutter combinations, There is no right answer, no “right” way. Each setting gives a different effect and can be used creatively. Please experiment.

Taking Pictures

Learn the location of your zoom lens, your shutter release button, and your viewfinder. Practice before you take pictures. Hold your camera steady; relax, breathe deeply, squeeze the shutter gently.

Review your images on the view screen after taking pictures. This will help you improve your next shot. Use the histogram if necessary.

Keep your camera and your lens clean. If your lens gets dirty or smudged, use lens cleaning fluid and lens tissue only (can use eyeglass cleaner and tissue), and wipe gently. Do not wipe with a cloth or T-shirt. If you get salt water on your lens, clean your lens immediately.

Be Creative

Encourage your own creativity and your confidence. Experiment freely. Everyone is creative. As the painter Pablo Picasso once said: “Every child is an artist. The problem is how to remain an artist once he grows up.”

Principles for Better Pictures

THE FRAME



Bryan Miller
Age 12
Maui, Hawaii

Pay attention to the frame of your pictures. Use the edges, try new things — get close, go far. Place the subject off-center. Think about the entire frame in the viewfinder, and make sure there are no distracting elements.

Shoot from the eyes, and the hip. Experiment with taking pictures WITHOUT looking through the viewfinder. Avoid

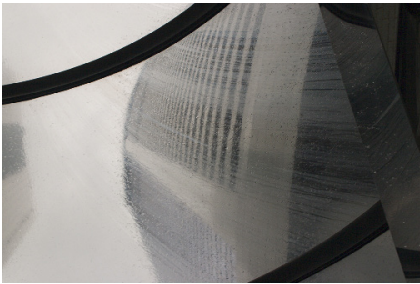
the disease common to the beginning photographer known as *centeritis*, where the subject is placed dead-center and the rest of the frame is empty. Use the entire frame, use the



edges as part of the composition, and make certain that everything in the frame contributes to your picture. Review your photos on the camera viewing screen, and make several shots to improve the composition.

Wider zoom lenses give more space in the image and offer greater depth of field. Longer zoom lenses help you get close and fill the frame.

Find a point of view that “fits” the subject and your concept. Lower points of view make the subject appear

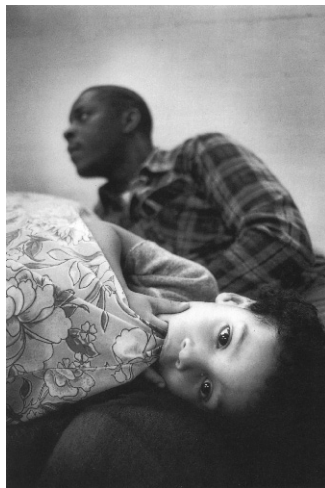


Ming Ho Age 5, Hong Kong

larger than life, more dominant. A higher camera angle flattens space and becomes more of a design or pattern. Experiment with unique and innovative points of view. Lie on the ground, stand on a table, climb a tree, photograph from a moving car. Try different viewpoints of the same subject. Look for interesting designs and patterns. Take lots of pictures of the same thing. You’ll learn a lot about what makes a good picture. Find unusual perspectives.

CONSIDER THE BACKGROUND

Look carefully at both the foreground and background. Try to avoid distracting elements behind or in front of the subject. Keep your backgrounds simple — and avoid having trees or telephone poles “growing” out of someone’s head. For landscape or long shots, try to include something interesting in the foreground.



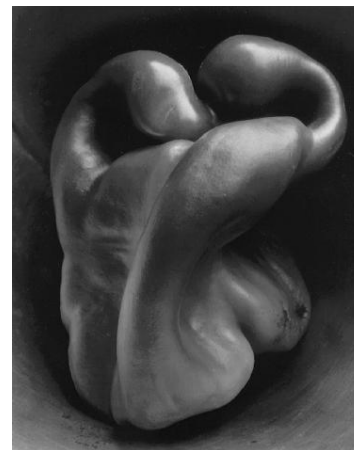
Chris Heflin Age 9, USA

Take several pictures of the same thing and experiment with different backgrounds. Sometimes moving the camera a little up or down, or side to side, will give a better composition. Try several different backgrounds for the same subject. Or try zooming your lens in and out, and examine the results.

Arrangements of objects in your pictures are known as “still lifes” and are one of the main themes in photography. Try “placing” objects in your shots, or “building” your shots with arrangements of leaves, stones, or even such things as food or household objects from your environment.



Fall leaves, Andy Goldsworthy



Edward Weston: Pepper #30, 1930

This green pepper by Edward Weston took several days to make, while he experimented with different backgrounds — until he placed the pepper inside a tin funnel he found in his kitchen!

CAPTURE THE MOMENT

Watch for those special moments. Take several pictures at different moments.

Look for the

“decisive moment”

— where the subject comes alive. Facial expressions are very important.

Find the moment when someone’s personality is

revealed. How do you see other people? Look at strangers; observe their faces and postures – what does this say about the person?



Images by Michael Wolf, China

people and their environment. What is the moment that best describes your subject?

Every activity reveals moments that are exciting and vital. Look for those moments. They often happen in moments of interaction between people or between

Your greatest tool is your ability to watch, and watch more, to be aware of what is going on around you. Pay close attention and observe. Observe, observe, observe—it is the primary key to good photographs.

STAY LOOSE: BE SPONTANEOUS

Think in advance what you want to take pictures of. Your mind will help identify opportunities for pictures. How do you see your home and neighborhood, your friends and family, and your environment?

When you are actually photographing, don’t think. Feel and react to your subject. Click the shutter as soon as you see something interesting. If you stop to think about it, your subject will “get away” from your camera. Take lots of pictures and experiment. The primary fault of beginning photographers is not shooting enough frames.



Cody Nemet Age 12, Maui, Hawaii

You can edit later. Be free while photographing.

Carry your camera with you on a regular basis. Have it loaded with fresh batteries and ready to go. Look around you as you move through your day. Practice by taking pictures freely and spontaneously. The best pictures are often made after you engage the subject, and after you have made several exposures.

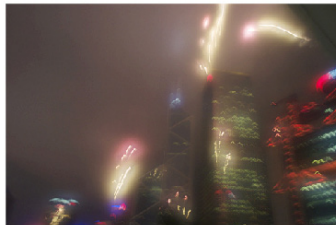
EXPERIMENT: TRY AND TRY AGAIN



Caroline Pfohl-Ho, Hong Kong

Try different things. Keep trying. Don't give up. Don't get discouraged. Professional photographers know they must experiment and try new approaches for successful pictures. Sometimes the first few pictures are just "warming-up" to the subject. Your later pictures, after interacting with the subject, are often the most successful. Interact with the subject.

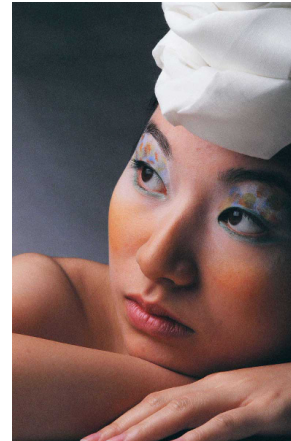
- Try abstracts
 - Try pictures in unusual locations.
 - Try pictures of color and form.
 - Try night photography.
 - Try slow shutter speeds.
 - Try moving your camera while taking the picture.
- Your imagination is endless. Be creative.



David Ulrich, Hong Kong

WATCH THE LIGHT

The light is so important, it can make or break a photograph. Light can be very different and is always changing. Consider



Winnie Cho, Hong Kong

the best light for your subject. You'll find that certain types of lighting will bring a subject to life. Go back to the same subject at different times, in different kinds of light.

Try very early morning, or late afternoon light. Photograph at night or indoors. Use light to add mood to a scene.

Bright sunlight is often very harsh and contrasty. For portraits in deep shadow, turn your flash on. It will help "open" and soften the shadows. This is called "fill-in" flash. Don't hesitate to photograph in cloudy or soft light, or dark scenes, or even rainy days. When indoors or in dark environments, make sure your flash is turned on, if it does not fire automatically.

Twilight, dusk is often considered a "magic" time by photographers due to the beautiful light and soft colors. Try to photograph just before dark and convey something of this magic.



Jeffrey du Vallier d'Aragon Aranita, Hong Kong

Color changes as light changes. Be aware of color and tonality. Use color in your compositions. Don't be shy or be afraid of very bright or very subtle colors. Take pictures of low key and high key subjects.

AWARENESS IS THE KEY

Try to be aware of your surroundings. Watch the action and observe people, their expressions, postures, and activities. Try to be aware of yourself. What are your reactions, feelings, and thoughts about what you see in the world? What do you see that is interesting or that moves you? What do you want to communicate about your environment? The best photographs are infused with the sincerity and authenticity of the artist.

Be aware and attentive of what is going on around you. There are good pictures everywhere; all you need to do is look at the world, watch your surroundings.



David Ulrich, Hong Kong

What strikes your interest? What moves you to laughter? What do you find interesting or cool, or sad and difficult. What brings you happiness in the world? Don't worry about taking "good" pictures. The best pictures are honest and reflect your real feelings.

Please show respect for others. If someone does not want their picture taken, that is their right unless it is a genuine newsworthy event. Photography helps to place you in another's shoes and helps you understand their circumstances.

YOUR MIND'S EYE

Learn to see as the camera sees by viewing your images on the screen after you make them. Sometimes what you see in your mind is not what the camera sees. Use your imagination and intuition. Try to learn from what the camera sees, and try to convey what you see and feel through the camera. Sometimes a slight change in perspective, a different moment, or a different background will convey what you see and feel.



Simon Wan, Hong Kong

The camera sees differently than your eyes. Your choice of framing, viewpoint, light, the moment, and the zoom of your lens will make a big difference to your photos. A well-known photographer once said: "I photograph to see how things look when photographed."

There are no rules for making a good picture. What does the world look like through your eyes?

Remember these three principles:

Observe

Experiment

Express your thoughts and feelings.

PHOTO EDITING

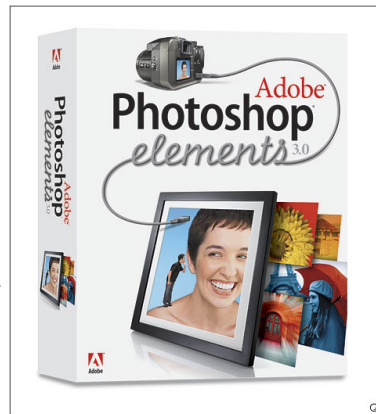
After you photograph, download the images to a file on your computer. A card reader is much faster than a USB cable that goes directly from your camera to the computer.

Image editing and manipulation is part of the standard workflow. With digital images, color correction and tonal range balance, as well as “cleaning-up” imperfections, are a necessary and integral part of the process. Additionally, unless images are sharpened in your camera, a digital capture chip does not and cannot capture images with maximum, optimum sharpness. This is achieved in your photo editing program.

The universal image-editing software is Adobe Photoshop. For most users, except for advanced photographers and graphic professionals, Adobe Photoshop Elements will suit your needs. Elements contains 85% of Photoshop’s features for literally a fraction of the price. Elements is under \$100.

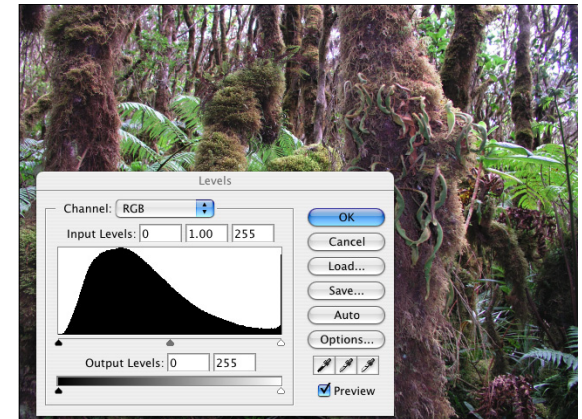
PS Elements Workflow for Image Correction & Enhancement

1.) Adjust Dynamic range. From the main menu, use *Enhance>Adjust lighting>levels* to view the histogram — or use *Adjustment Layers* for *Levels* which are more flexible and can be re-edited later. A vibrant photographic image generally has a full range of tones, from small areas of complete black to small areas of complete white.



Create *Adjustment Layer* for *levels* either from the *layer* menu or the *black/white circle icon* at the top of your layer palette. Check histogram to ascertain dynamic range of tonal values of your image. If the histogram information does not extend to the black or white point, move the black point and white point to the first appearance of shadow or highlight density respectively in the histogram. Move the center slider to adjust the density only.

Moving the black or white sliders changes the contrast of the image. Moving the center slider changes the density (darkness or lightness) of the image.



2.) Correct Color Cast. Most digital capture chips, scanners, and traditional photo processing leave a color cast of varying degrees over some (i.e. highlights or shadows) or all of your image. Photographing at altitude or on the water, or in non-standard lighting conditions can also lend a color cast to the image. These color casts must be removed to reveal the inherent colors of the scene.

Color correction is an art that requires knowledge and sensitivity, and will come with time and experience.

If you are knowledgeable about evaluating color and do

not need assistance, create an *Adjustment layer* for *Hue/Saturation* using the black/white circle icon at the top of the layer palette. Adjust sliders in varying amounts to remove any color cast. Always begin with whatever color cast is in predominance and gradually build to the more subtle changes.

If you are not comfortable evaluating color, use the visual guides located under *Enhance>Adjust Color>Remove Color Cast* or *Enhance>Adjust Color>Color Variations*. These tools offer their own help menu and will assist you in seeing and determining the necessary color adjustments.

3.) If You are Lucky. For 75-80% of your images, you can use *Enhance>Auto Smart Fix* or *Enhance>Auto Color Correction* to correct your color and dynamic range at the same time. This will work only if there is a neutral value, i.e. grey or white somewhere in the image — such as in the image below. Otherwise, these tools will make your image look very off in terms of color and tonality.

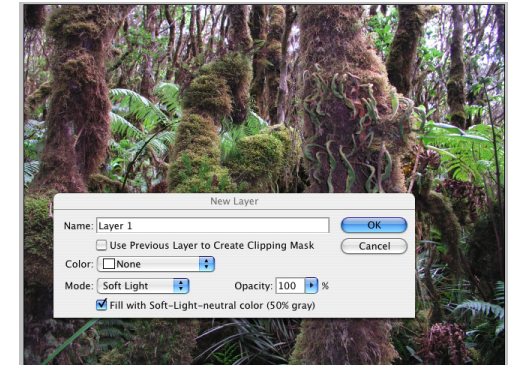


David Ulrich, Hong Kong

4.) Image Enhancement: Dodging and Burning are methods of selectively lightening or darkening parts of your image.

To dodge and burn, DO NOT use the dodging and burning tools in the Photoshop toolbox. A much better method of dodging and burning is as follows:

- Make a *new layer* from the layer menu or layer palette submenu. Choose *mode>soft light*. And check the radio box to fill with soft-light neutral grey. Now, select the brush tool from the toolbox a brush size large enough to burn or dodge the area you wish to lighten or darken. VERY IMPORTANT: In the brush submenu, choose a very low opacity. I use anywhere from 5-15%. Any more may create obvious areas of inconsistent tone.



- Make sure your foreground and background color swatches are set to their defaults: black and white. To **LIGHTEN** parts of an image, paint with white using the brush tool on the area you wish to lighten. To **DARKEN** parts of an image, paint with black on the area you wish to darken. Continue painting until you have achieved the quality of tonality that you desire.

5.) Retouch and Correct Imperfections:

Removing dust spots, intruding elements, and retouching skin tones are all within the capabilities of PS Elements.

Clone Stamp tool = “grafts” pixels from one part of an image

(the source) to another (the destination.) Best tool for dust spots and removing interfering elements.

Spot Healing Brush tool = Blends pixels from the source to the destination. Best tool for retouching skin tones. Pixels are blended for smooth transition, insuring smooth retouching. Ideal for skin tones and removing wrinkles, blemishes, and skin imperfections. Use with restraint. Removing ALL wrinkles and blemishes looks unnatural and is a sure sign of a Photoshop novice.

To use the *Clone* or the *Spot Healing brush* tool, select a brush size from the tool sub-menu (directly under the main Photoshop menu) that is equivalent to the area that you want to clone. A brush slighter larger than the imperfection is often ideal.

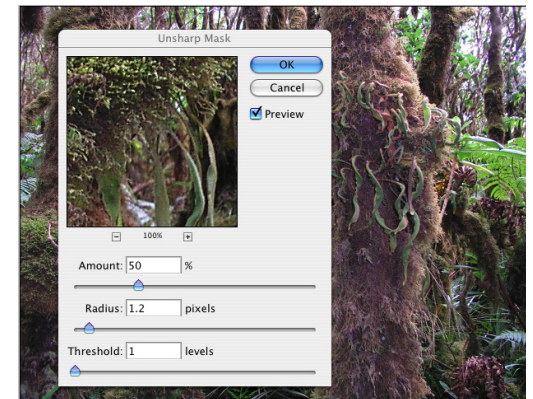
For the *Clone Stamp tool*, select clone tool in toolbox, select pixels that closely match the area you wish to retouch. Option-click your source point. Let go of the option key and move the cursor over the area you want to retouch. You will see a crosshair (your source point) and your cursor location (your destination point). The pixels from the source area will replace the pixels in the destination area.

For the *Spot Healing Brush tool*, select spot healing tool in toolbox, simply “paint” over the areas you want to retouch.

6.) Sharpen: Unlike film, most digital capture chips and scanners do not create optimum sharpness in the image. You must sharpen the overall image manually. However, many cameras have a sharpness control built in to the camera. See if your camera has sharpness built in, and turn it off or turn it down. It allows for more control if you sharpen your

images as desired in PS Elements. To sharpen: Go to the main menu, *Filter>Sharpen>Unsharp mask*. Use an amount of 50-100%, a radius of 1-2, and a threshold of 0-4 for most images. The higher the resolution of the image, the greater your sharpening needs to be. For higher resolution images, use greater numbers on the controls.

Many photographers have their own favorite formulas for sharpening. Experiment and find what works for you. My own preference is to under-sharpen rather than over-sharpen. I usually begin at 100% with a Radius of 1.0 and) Threshold and adjust until the image looks “right,” with no halos around the edges. Too much sharpening creates a “posterized” effect and reduces the subtleties of tonal gradation and color relationships in the image.



7.) Prepare image for print or web: Controls for adjusting your image size and resolution are found in the main PS Elements menu under *Image>Resize>Image Size*

- For most print purposes, you need a target resolution of 300 dpi. Save as Tiff or native Photoshop format.
- For web or email, use a resolution of 72dpi, the resolution of most computer monitors. A file size of under 500kb when sending images electronically is desirable. Save as jpg format. Downsize image if needed.