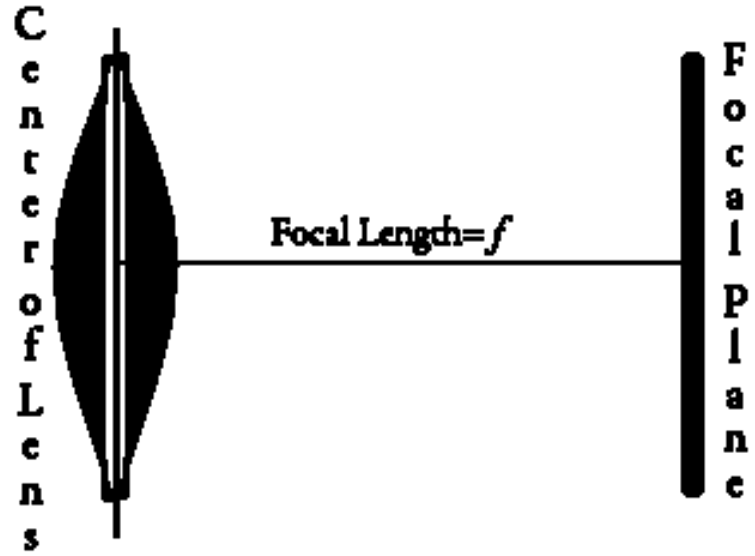
Lenses and Focal Length

a possible cure for lens envy…

Focal Length and Aperture

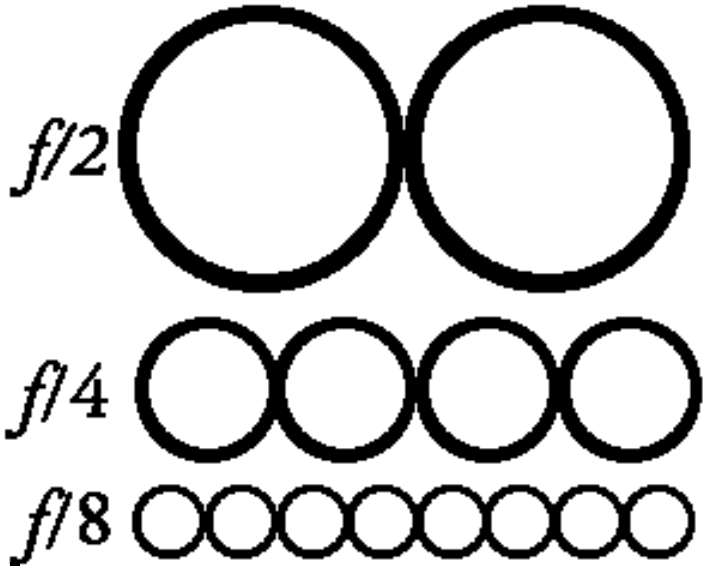
FOCAL LENGTH

The distance between the film (or image sensor) and the optical center of the lens when the lens is focused on infinity.



Aperture or Lens Opening

The size of the aperture is expressed in “f/numbers” representing the ratio of the lens focal length to the size of the opening. This is why the higher the f/number, the smaller the lens opening.



18mm

50mm

200mm

28mm

70mm

Telephoto

35mm

100mm

Wide Angle

Wide Angle Lens

A wide angle lens is designed to make objects look further away than they really are. They come in various focal lengths and can be used for a number of different jobs, such as:

Scenic Photography and Panoramas; Architecture; real estate (especially interiors); large groups of people; working in cramped spaces.

Normal Lens

A normal lens is more versatile than it sounds. It is a ‘One-Power” lens that is usually very effective in low light and costs very little. It does not magnify, it does not de-magnify. It sees the same angle of view as the average person sees with one eye covered.

Telephoto Lens

A telephoto lens is designed to make objects appear closer than they really are. These lenses are useful for sports, wildlife, scenic, surveillance, or any situation in which the subject is far away, or very small.

http://www.bhphotovideo.com/c/find/newsLetter/Mother-of-All-L-Lenses.jsp

Prime or Fixed-Length Lenses

1. Do not zoom, do not change magnification
2. Sharper than zoom lenses
3. Often faster than zoom lenses (More effective in low light.)
4. Usually cheaper and smaller and lighter than zoom lenses.

Zoom Lenses

1. Magnification can be changed
2. Sharpness is traded for convenience
3. Fast zoom lenses are available, but are usually very expensive.
4. More expensive than primes, but one lens does many jobs.

Teleconverters and Wide Angle Converters

1. Cheaper than most prime lenses
2. Loses one stop per multiplication of focal length
3. Not always top-notch optics
4. Magnifies any weakness in the lens attached to it

Specialty Lenses

Some lenses are made with one purpose in mind, and are not really intended for general purpose use, but they can sometimes be fun.

Tilt/Shift Lenses

Tilt/shift lenses are generally used in architectural photography or in commercial product photography. The front and rear element groups are mounted on two separate frames that move independently of each other. This allows the photographer to shoot long objects off-axis and correct for the distortion that comes from the camera angle. It also allows very specific, selective control of depth of field.

Elimination of lean…

Photo by Frank Shearon

Increase Depth of Field

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Increase Depth of Field

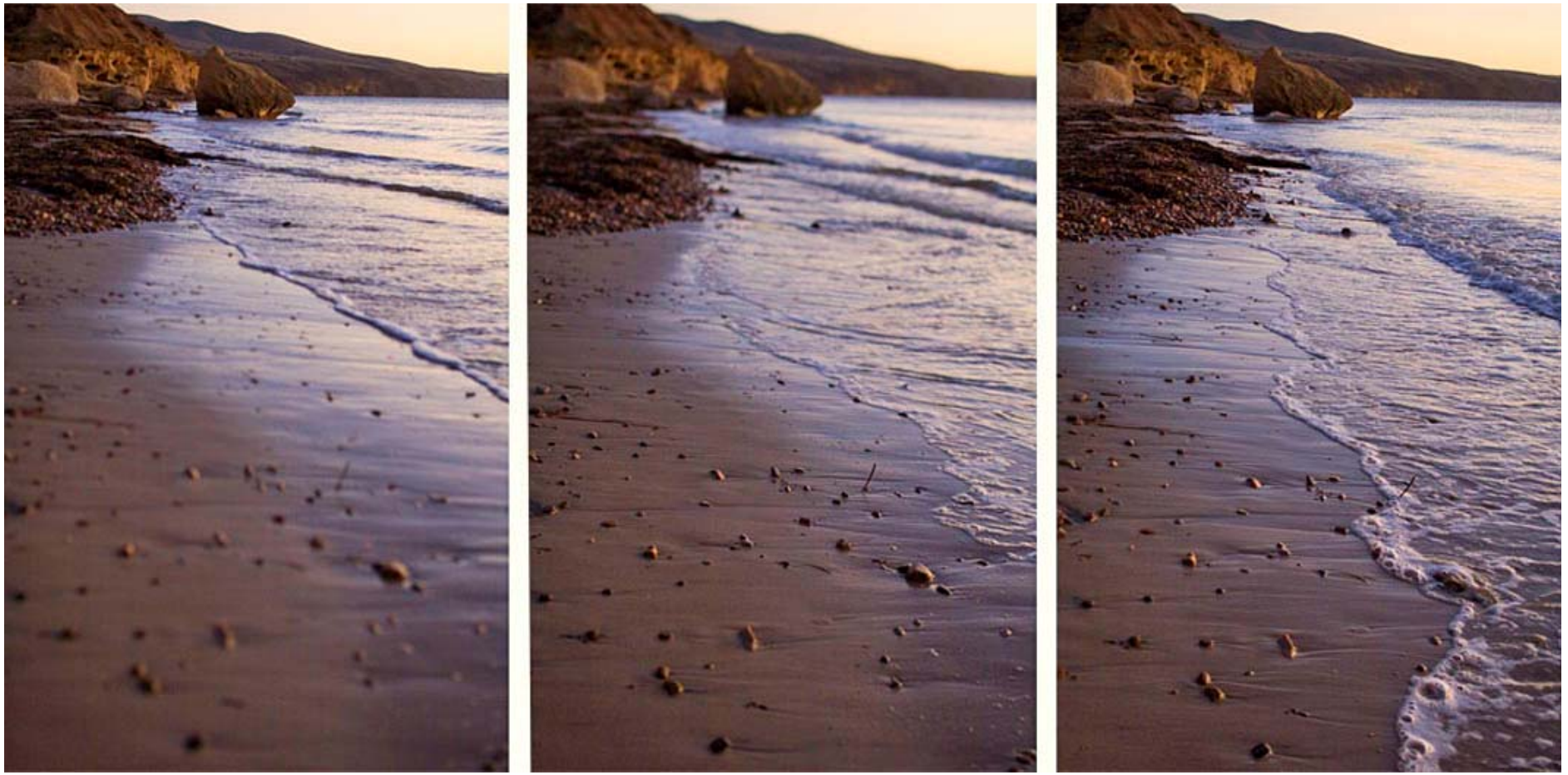


Photo by Frank Shearon

Fish-Eye Lens

A fish-eye lens generally renders a circular image with distortion growing more dramatic as the image approaches the edge of the frame.

Fish-Eye with Subject Centered

Fish-Eye Lens with Subject Off-Center

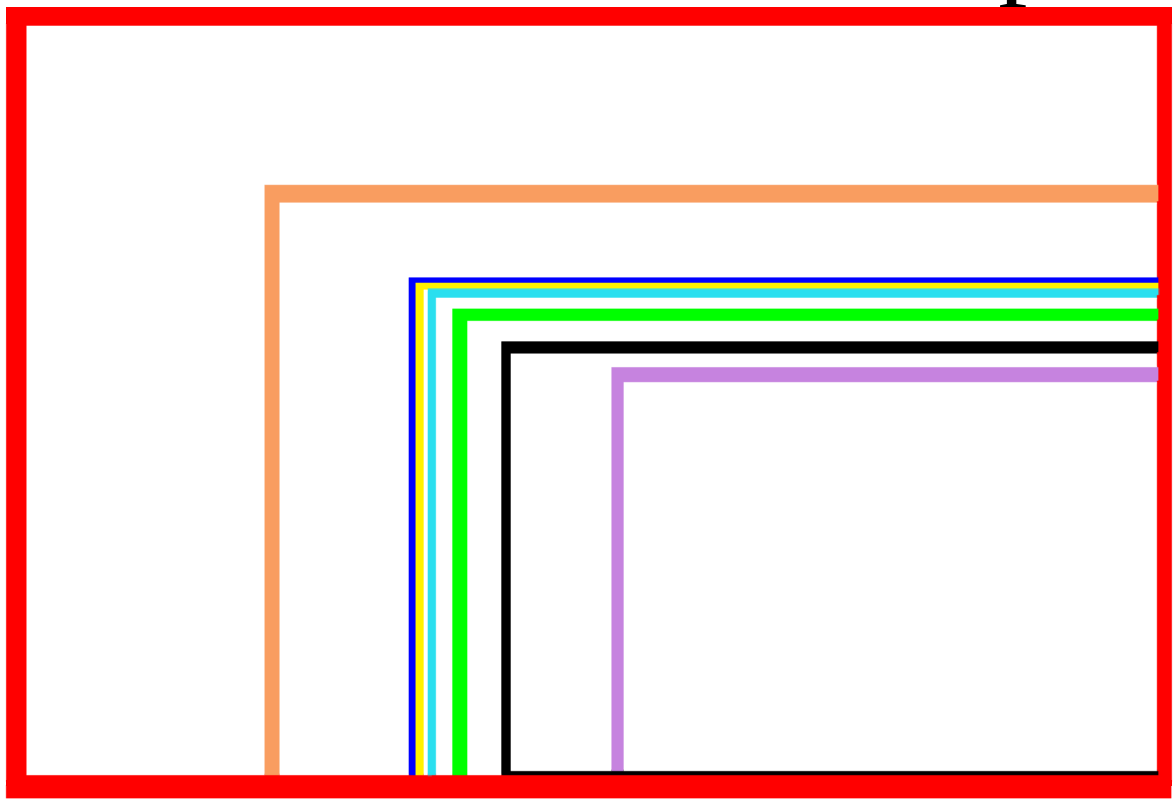
Macro Lens

A macro lens is designed to allow very close focusing at fairly high magnification. Macro lenses are available in wide-angle, normal, and telephoto.

Canon 60mm f/2.8 EF-S

A little closer…

APS-C Sensor Size Comparison



Nikon, Minolta, Sony

Canon

Sigma

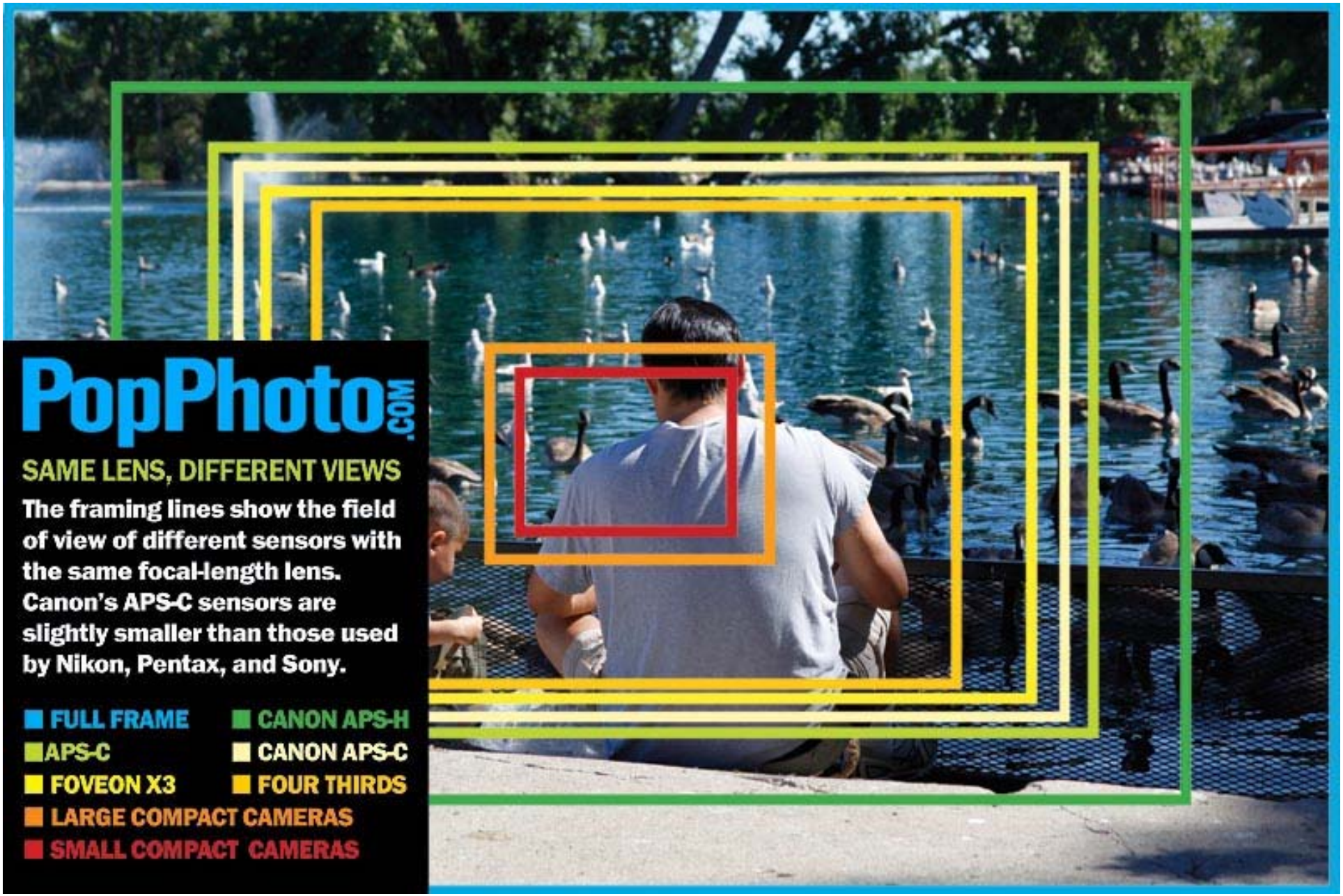
Pentax

Olympus

Canon 1D

Fuji

35mm


PopPhoto.com
SAME LENS, DIFFERENT VIEWS
The framing lines show the field of view of different sensors with the same focal-length lens. Canon's APS-C sensors are slightly smaller than those used by Nikon, Pentax, and Sony.
FULL FRAME
CANON APS-H
APS-C
CANON APS-C
FOVEON X3
FOUR THIRDS
LARGE COMPACT CAMERAS
SMALL COMPACT CAMERAS

Filters

Optical filters can be used to enhance or create special effects during the picture-taking process. There are countless filters dedicated to a variety of purposes.

In digital photography, many filters are better applied digitally. A picture taken with an optical filter on the lens will always have the filter effect. A digitally applied filter can be turned off should the need arise.

Special Effects Filters

Many cameras have built-in special effect filters. Optical special effect filters can work on almost all cameras.

An optically applied special effect filter is almost always impossible, (or at least very difficult) to get rid of later.

Some special effect filters are:

1. Multi-Image or Prism Effect
2. Star Effect
3. Bi-Focal
4. Soft Focus

Corrective Filters

Corrective Filters are generally used to fix a lighting situation. As with Special Effect filters, these are usually best applied digitally after the picture has been taken.

Some Corrective Filters include:

1. Color filters for color temp balance
2. Neutral Density filters to reduce exposure
3. Polarizing filters to control glare and color saturation.

Lens Protectors

Long, long ago, it was all the rage to use a UV or Haze filter to protect the front element of your lens. This is a good idea with film.

Unlike with film, a UV filter can affect exposure and color balance. The effect is minimal, but it is there.

Skylight filters were once very popular too, but they have a slight pink cast and can have a slight warming effect on images.

Plain, clear filters are available, much better than UV filters.

Tiffen makes a High Transmission filter, which is a clear filter that boosts contrast rendering better color saturation and makes images appear sharper. It is also very tough glass that is hard to scratch and easy to clean.

Singh-Ray makes a similar filter called the Hi-Lux filter.

Both are good options for full-time lens protection.

The Protective Filter Conundrum

1. Lenses are expensive and need to be protected.
2. Why would I put a $20.00 piece of glass over my several-hundred dollar optic?

Filter Software

Digital filters are effects that are applied via an editing program after the picture has been taken. These have the primary benefit of being cancelable. They are also usually adjustable and the effect can be selectively applied rather than blanketing the whole image.

The Catch . . .

Digital filters are usually “Plug-Ins.”

These are programs that require a regular editing program to be on the computer for them to be utilized.

Photoshop, Photoshop Elements, and Lightroom are the programs most commonly required.

Some Digital Filter Options

Nik software (www.niksoftware.com)

1. Color Efex Pro 4- 55 special effects filters that enhance, correct, and just do weird things to an image.
2. Viveza- Allows selective control of contrast, hue, saturation, lightness, and darkness of specific part of an image, or the whole image.
3. Silver Efex Pro- Converts images to Black & White using different rendering techniques.
4. HDR Efex Pro- Creates High Dynamic Range images
5. D-Fine 2- Very powerful noise reduction controls
6. Sharpener Pro 3- Sharpens images for clearer enlargement.

On One Software (www.ononesoftware.com)

1. Perfect Portrait- Retouching tools, works as a plug-in or stand-alone program
2. Perfect Layers- For blending multiple images into one
3. Perfect Effects 3- Special effects filters that enhance, correct, and do other weird things to images; works as a plug-in or stand-alone program
4. Perfect Mask- Handy for lifting a foreground from a background or vice-versa; works as a plug-in or stand-alone program.

Freebies…

Just Google plug-in for whatever program you use. There are countless free plug-ins for most image editing programs. Some are pretty cool, some are pretty crappy.

Adobe offers a vast array of free plug-ins for Photoshop, Lightroom, and Photoshop Elements.

Focal Length and Depth of Field Homework

Pictures using different focal lengths and apertures

1. With a zoom lens, take several pictures of the same subject or scene, from the same position, at different focal lengths.

2. In any mode accept Programmed Auto or Green, take pictures of objects from very close using different lens openings.

3. Take the same pictures you did in part 2 of this assignment, but from further away.

4. Find repeating series of objects like lines on the highway, a picket fence, rows of cars in a parking lot, etc. Take several pictures of each subject using different focal lengths to compare the stretching of wide angle and the compressing of telephoto.

5. If you have questions, call or email me.