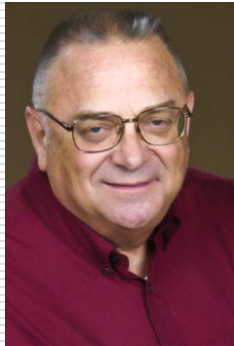


Digital Photography Basics



Kent Messamore

9/5/2011



Snapshot versus Photograph

- Snapshot is taken without much thought
- Photograph - composed by Photographer
 - Photo – “Light”
 - Graph – “to write or draw”

Types of Cameras

- ❑ Cell Phone
(Not allowed)



- ❑ Compact (Point & Shoot)



- ❑ Midrange
(Bridge)



- ❑ Single Lens Reflex (SLR)



Point & Shoot

Advantages versus Disadvantages

□ Advantages

- Easy to operate
- Camera adjusts setting automatically
- Scene Modes to set camera controls to match situation

□ Disadvantages

- Lens is smaller & therefore less light
- To get good exposure shutter must be open longer

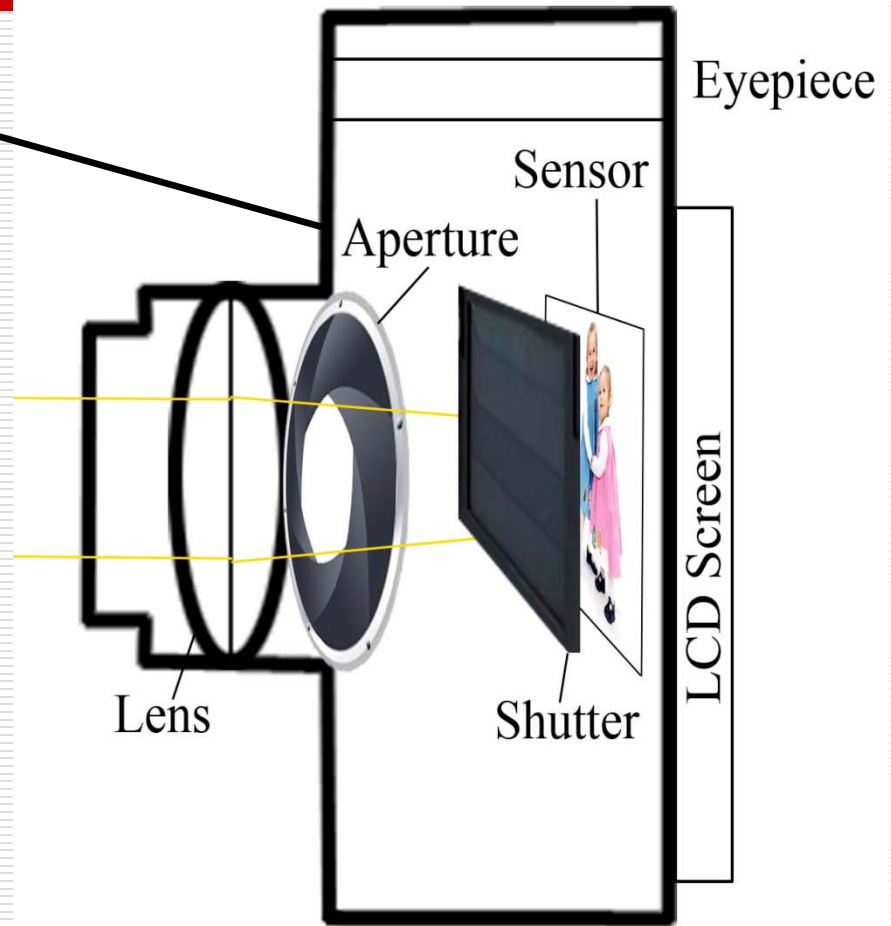


Exposure



The amount of light that hits the sensor (**Exposure**) is controlled by:

- the size of the **Aperture**
- How long the shutter is open (**shutter speed**)
- Another factor in Exposure is the sensitivity to light of the camera Sensor (**ISO**)



Quantity of Light

- ❑ Quantity of light is an absolute. It can be measured by your camera very accurately
- ❑ Quantity of light is called **Exposure**
- ❑ Exposure can be controlled either Automatically in your camera or Manually.
- ❑ **Accurate Exposure** makes the difference between a good photograph and a bad photograph



Exposure

- Quantity of Light or Exposure is controlled by three factors:

How sensitive to light is the sensor in your camera?

ISO



Aperture or f/stop

How wide is the lens opening in your camera?



How fast does the shutter in your camera open and close

Shutter Speed



Accurate Exposure can be achieved by more than one selection of these three controls

Characteristics of Digital Cameras

□ Low end Point & shoot.

- \$75 - \$500
- Zoom Lens 4x to 9x (35 to 135 mm; 35 to 300 mm)
- Resolution 300-600 mp – don't pay for more as you probably won't print greater than 8x10 print
 - Maximum size for good prints
 - Display size on a computer monitor
 - Size of image file, which in turn affects how storage space to hold the file
- Don't pay for a lot of extras (such as RAW format) as you probably won't use them, or if you do, you won't be satisfied with the results
- Major advantages of P&S over DSLR are, small size & quick snapshots
- Make sure you get a Manual control capability (aperture, shutter, ISO)

□ Mid-range Point & Shoot

- \$500 to \$1000
- These are basically point & shoot cameras with these differences:
 - They are easier to use like DSLRs
 - They have a manual capability that is usable
 - They do not have interchangeable lenses, but do have great zoom lenses
 - If you have a long telephoto lens, image stabilization is worth it.

Resolution needed for print sizes		
<i>Resolution (megapixels)</i>	<i>Avg. quality</i>	<i>Best quality</i>
.5 mp	3x5 in.	N/A
2 mp	8x10 in.	3x5 in.
4 mp	11x14 in.	5x7 in.
6 mp	16x20 in.	8x10 in.
8 mp	20x30 in.	11x14 in.
10+ mp	25x40 in.	13x17 in.

P&S Zoom Lenses

- ❑ Most P&S cameras identify lenses as 3X, 4X, 9X.
- ❑ These ratings are somewhat meaningless.
- ❑ A better comparison is the “35 mm equivalent”
- ❑ The X is arrived at by dividing the maximum “35 mm equivalent by the minimum, e.g. a 35 to 135 mm zoom lens would be 4X while a 35 to 300mm would be 9X.
- ❑ Be sure to ask what the “35 mm equivalent would be.
- ❑ Optical versus Digital Zoom – Some Camera Manufacturers advertise a combined optical and Digital Zoom, which is misleading.
 - Optical Zoom is a factor of the lens. This is what counts when purchasing a Camera.
 - Digital Zoom is simply blowing up the image in the camera after the picture is taken.

Ultra Wide - 10-20 - Architecture
Wide Angle - 24-35 - Landscapes
Normal - 45-55 (50mm is our eye)
Medium Tele - 85-135 - Portraits
Telephoto - 150-300 - Animals
Super Tele - 400-600 – Small Birds

Memory Cards

- ❑ **SD (Secure Digital)** – small size, reliable, and high capacity, supported by a wide variety of digital cameras. Has a lock tab on the card.
- ❑ **SDHC (Secure Digital High Capacity)**- look just like SD. Has a lock tab on the card, but greater storage capacity
- ❑ **MiniSD:** About half the size of an SD card. Often used in small digital cameras.
- ❑ **CompactFlash** - Larger and square shaped. Wide range of capacities and speeds.
- ❑ Cards such as Sandisk's Extreme III provide fast recording in the camera and fast download to your computer.
- ❑ The faster the card, the more expensive it is.



Single Lens Reflex Cameras

- Amateur or Professional – DSLR
- Compatibility with existing Lenses - Interchangeable lenses (**This is the big advantage of DSLRS so invest in a set that you can live with a long time. You will probably change bodies several times but will be locked in to your lens investment**).
- Expandability
 - Lens selection – Canon and Nikon have the largest selection of quality lenses
 - Flash- If you expect to use flash a lot, look at the flash systems
- Canon & Nikon are the market leaders and either will give you satisfaction. Sony is coming on strong with its purchase of Konica and Minolta
- The choice is basically a budget decision. Put your money into a good zoom lens wide angle to telephoto, e.g. 35 to 135 mm or 24 to 200 mm.
- Buying a Kit (Camera Body plus lens) is not always the best decision as the lens may be of low quality and you may have to replace it later.

Single Lens Reflex Cameras

- ❑ Image Sensor Size (full frame or cropped)
 - Full Frame = 1.0x – Wide Angle, high quality, and low noise advantage
 - APS-H = 1.3x
 - APS-C = 1.6x – Telephoto advantage
- ❑ Resolution? 6 – 25 mp
- ❑ Large, bright LCD screen 2.5-3”
- ❑ Frame Rate – how fast can the camera shoot? 2 – 10 fps
- ❑ Weather and dust resistance
- ❑ Cost \$1000 - \$8000



Resolution needed for print sizes		
<i>Resolution</i> (megapixels)	<i>Avg. quality</i>	<i>Best quality</i>
.5 mp	3x5 in.	N/A
2 mp	8x10 in.	3x5 in.
4 mp	11x14 in.	5x7 in.
6 mp	16x20 in.	8x10 in.
8 mp	20x30 in.	11x14 in.
10+ mp	25x40 in.	13x17 in.

Resolution

- Resolution has two meanings
 - Ability to resolve pairs of fine lines (an indicator of sharpness)
 - Number of pixels a camera can capture
 - (2816 x 2112 pixels = 6 mega pixel camera)
- Camera costs rise with more pixels
- More Pixels means larger image files
- Larger Image files require more Computer storage space

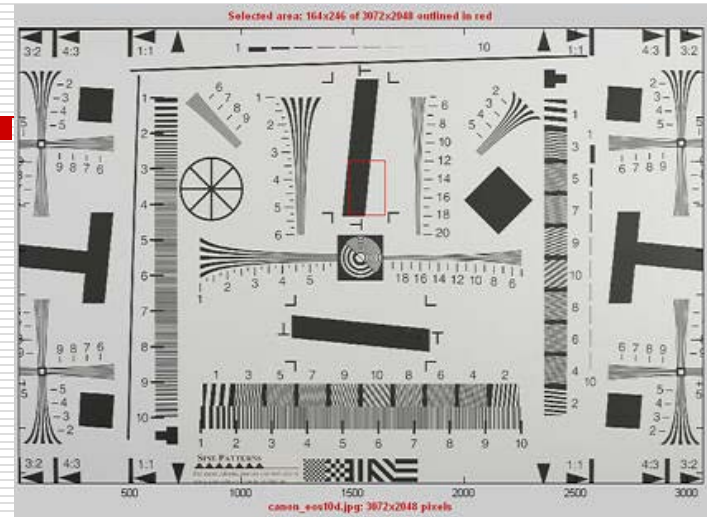


Image Stabilization

- ❑ Common cause of blurry pictures is *camera shake*.
- ❑ The longer the exposure time, the longer you have to hold the camera still to avoid blur.
- ❑ Camera shake is greater problem with a telephoto lenses.
- ❑ *Image Stabilization* (Canon - IS) or *Vibration Reduction* (Nikon - VR) can enable sharper shots when you handhold camera.
- ❑ Steadies image by fast spinning gyroscope, which compensates for vibration.
- ❑ Can be implemented in either the Camera or the lens.
 - In Camera offers stabilization no matter what lens you have attached
 - In lens tailors required amount of stabilization to the specific lens.
- ❑ **Can gain two stops hand held.**

Picking a Camera

- ❑ Download the manual from Manufacturers website
- ❑ Check Camera review sites
 - www.photo.net
 - www.dpreview.com
 - <http://www.luminous-landscape.com/reviews/>
 - www.steves-digicams.com
 - www.digitalreview.ca/
- ❑ Cameras have model changes approx every 18 months. Price is high for new models

DSLR Accessories (Add to cost)

Tripod



Ball Head



Remote Release Cable



Image Stabilized Lenses

Flash Equipment

Flash diffuser

Power Pack

Camera Bag



Processing software

- ❑ Photoshop is high end – Adobe.com (\$699) - Recommended
- ❑ Lightroom – PC/MAC - Adobe.com(\$299) - Recommended
- ❑ Photoshop Elements (\$99) - Adobe.com - Recommended
- ❑ ACDC Pro (\$130)
- ❑ Lightzone (\$99.95) - lightcrafts.com
- ❑ Paint Shop Pro (\$80) - corel.com
- ❑ Camera Manufacturers software (usually free)
- ❑ Gimp (free) – gimp.org
- ❑ Gimpshop (free) – Gimp hacked to resemble Photoshop
- ❑ Google's Picasa (free) - picasa.google.com

Specialty Software

□ **Digital Asset Management** - Designed to help organize your pictures.

■ Lightroom - \$299 (adobe.com)

■ ACDC Pro - \$130 (acdsystems.com)

■ ThumbsPlus - \$50 & Thumbsplus Pro - \$90 (cerious.com)

■ Extensis Portfolio \$200 (extensis.com)

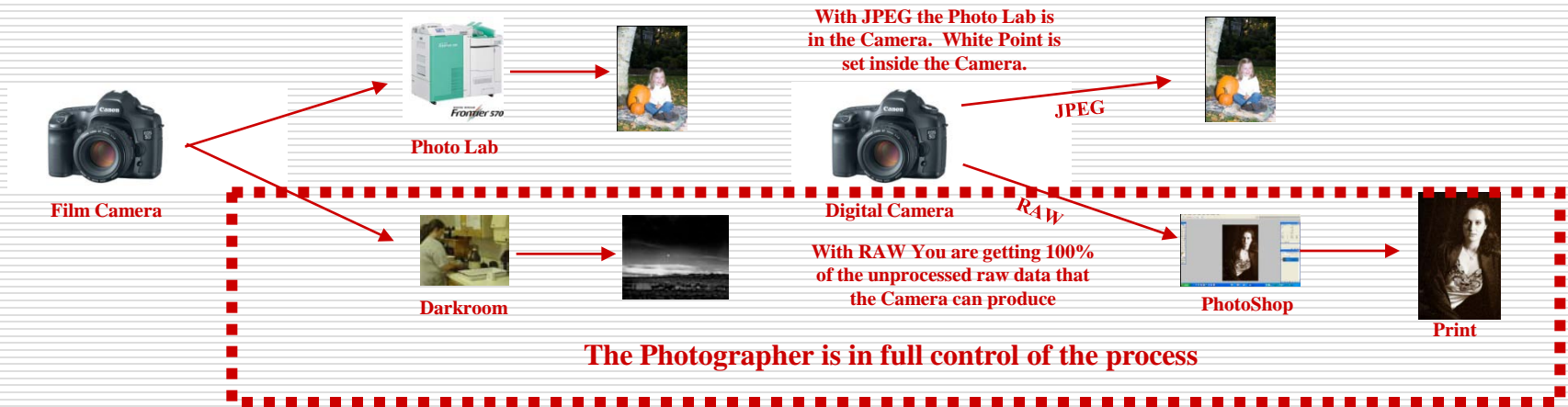
□ **Slide show programs** - most image editing programs offer slide show capabilities. Proshow Gold - \$70 and Proshow Producer \$250), are dedicated to slide shows. (www.photodex.com)

□ **Plug-ins** - a *plug-in* is a mini-program that adds functions to a larger photo-editing program such as Photoshop and Photoshop Elements.

Check out:

<http://www.adobe.com/cfusion/marketplace/index.cfm?MARKETPLACEID=2&OFFERINGTYPEID=5&EVENT=marketplace.categories&count=2>

RAW versus JPEG



JPEG –

•Advantages

- Smaller File sizes
- Can shoot faster (Good for Action Photography)
- Great for snapshots

•Disadvantages

- Only 8 bit Pixel depth
- Must manage processing in Camera at time of shot (Exposure, Tone Curve, White Balance)
- Some of the RAW image data is lost as image is processed, therefore you do not have a “negative” master of your image.

RAW –

•Advantages

- Give 100% of image data Camera has captured
- 16 bit Pixel depth
- Processing can take place in Photoshop/other image software. This processing offers “after image” choices as to how the image will look
- Can correct some photographer errors such as poor exposure
- Great for Artistic types (Ansel Adams would have loved it)

•Disadvantages

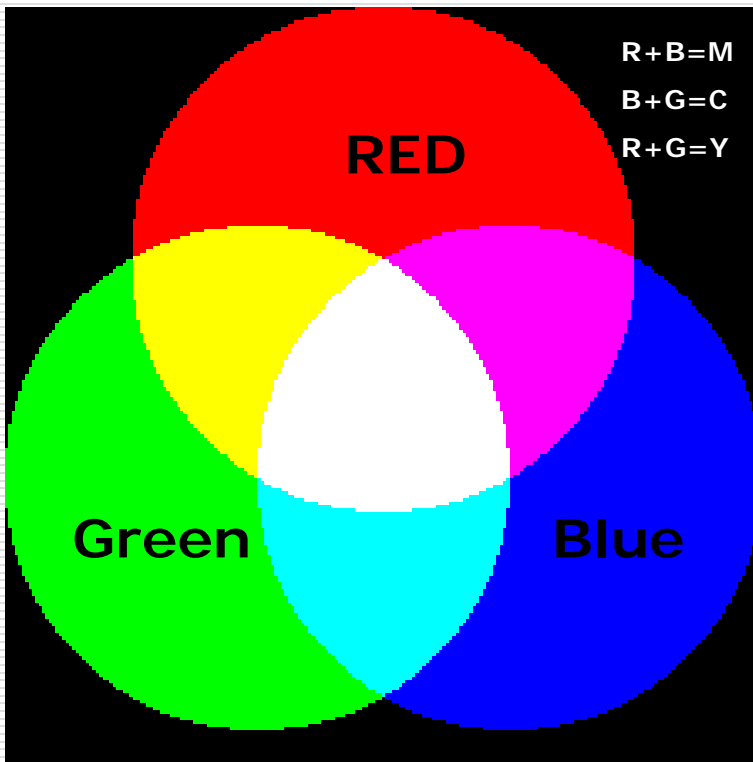
- Must Process in Photoshop/other image software
- Large File Sizes
- You paid a lot of money for that image processor that is built into your camera

File Formats

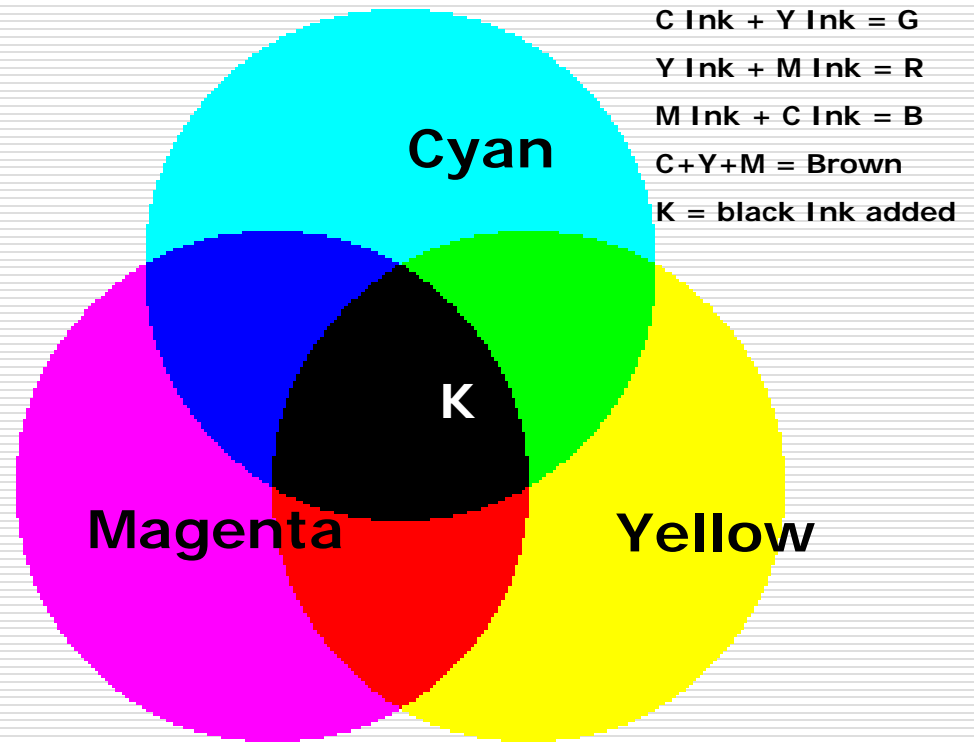
Format	Description	Pros	Cons
JPEG	Lossy compressed file format with compression percentage selectable	Can achieve very large reductions in file size Resulting smaller files take up less drive and media space and transmit much faster. Almost universally supported by imaging programs such as browsers. Sorting, viewing, and cataloging are quick and easy. In Camera shooting of JPEG allows faster loading of image into memory card resulting in faster shooting of multiple images. Good for sports photography.	Produces artifacts and causes loss of detail that may be difficult to notice at low compression ratios but gets progressively worse as compression increases. Multiple compression of files results in quality loss. JPEGs are finished RGB images, meaning you have limited capability to alter or reverse the effects of in-camera settings such as white balance, tone curve, or sharpening.
TIFF	LZW compression available RGB - 24 or 48 bits Grayscale 8 or 16 bits Indexed color 1 to 8 bits Line art 1 bit	No quality loss from compression Excellent for archival storage Almost universally supported by imaging programs.	Files are many times larger than even low-compression JPEGs. TIFFs are finished RGB images, meaning you have limited capability to alter or reverse the effects of in-camera settings such as white balance, tone curve, or sharpening.
RAW	Raw files are minimally processed data from the sensor, which you convert to finished RGB images using special software on your computer.	Highest potential image quality. Depending on your raw-conversion program, you can make extensive changes to image parameters such as exposure, white balance, tone curve, and sharpening. Typically about one-third the size of an RGB TIFF but with none of the information loss of a JPEG.	Images are unfinished, so they need to be converted to another format for printing and posting on the Web, which is often a time-consuming process. Raw formats are proprietary and usually camera-specific and are often not supported by image editors and other software.
DNG	A proposed industry standard by Adobe A nonproprietary version of raw that essentially encapsulates the raw sensor data within a TIFF data structure. A few manufacturers, such as Pentax and Samsung, have started supporting DNG in-camera. Canon & Nikon do not support.	Image quality on par with raw. You can make extensive changes to image parameters such as exposure, white balance, tone curve, and sharpening. Encapsulates side care files	Images are unfinished, so they need to be converted to another format for printing and posting on the Web, which is often a time-consuming process. Not yet widely supported in cameras.
PNG	RGB - 24 or 48 bits Grayscale 8 or 16 bits Indexed color 1 to 8 bits Line art 1 bit; Supports transparency	Supports Transparency	
GIF	Indexed color 1 to 8 bits supports transparency	Supports transparency	Small set of colors supported

Color Models

RGB - Additive Color

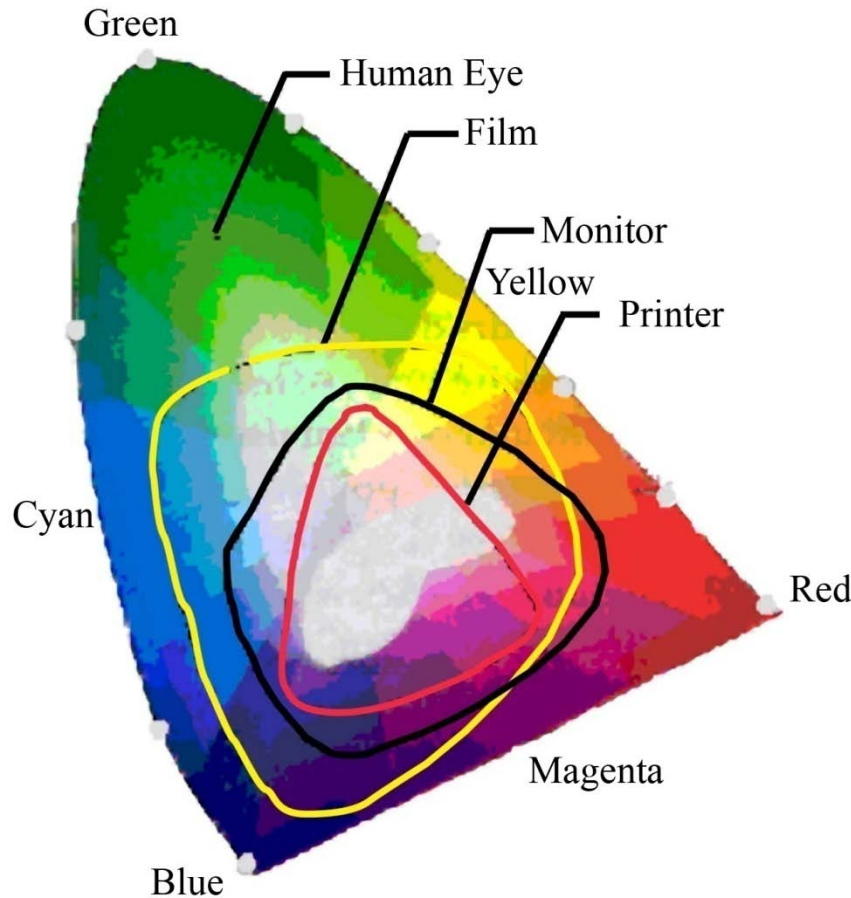


CMYK – Subtractive Color



Color Gamut

Commission Internationale de l'Eclairage (CIE)



Gamut
is like a
box of crayons



How many crayons
are in your Camera's
box?

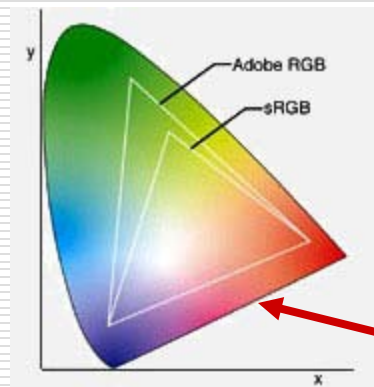
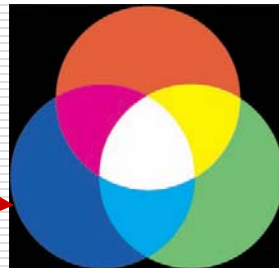
Camera Controls –File Format & Color Space

- ❑ **File Format - JPEG or RAW**
 - How do you select jpeg or RAW format?
 - How do you set jpeg quality (size)?
 - Can you select both JPEG & RAW?

- ❑ **Color Space Adobe RGB or sRGB?**
 - How to you select Color Space?



RGB Color Model (additive)



How many crayons are in the box?

Graph of human eye Color Space

Shooting - Auto Mode



- All P&S Cameras have Auto Mode that sets focus & Exposure Automatically. User has no control. Select Auto Mode on your camera.

- ❑ Hold Camera as if you were a tripod – minimize camera shake
- ❑ **Frame** the Image – **Compose** in view finder
- ❑ **Zoom** the Lens – Zoom in and out to bring subject closer or further away
- ❑ Auto-**focus** – press **shutter button halfway** down
 - Are you too close?
 - Is it too dark to focus
- ❑ Auto-**exposure** – Camera adjusts aperture & shutter for correct amount of light onto the sensor
- ❑ Auto-**flash** – Flash will automatically fire in low light situations. What is the indication that Flash will fire? Red Eye Reduction?
- ❑ Auto-**White balance** – adjusts for color of light, e.g. sunny day, cloudy day, florescent lamp, tungsten lamp
- ❑ Press **shutter button fully down** to take photo

Shooting - Program Mode

- ❑ For Point & Shoot Cameras, this is the most common setting.
- ❑ Most P&S Cameras have a Program Mode that allows user some ability to control image.
- ❑ Camera still makes most of the decisions but usually allows:
 - Setting ISO, i.e. the Sensitivity of the sensor to light, allowing shoots in low light situations
 - White Balance - adjusts for color of light, e.g. sunny day, cloudy day, florescent lamp, tungsten lamp
 - Control of Flash

Camera Controls – Program Mode

- How do you Zoom your camera lens?
- How do you turn flash on?  Off? 
- How do you set ISO?
- How do you set White Balance?

- Take some photos indoors

Scene Modes – Most P&S Cameras have a Scene Modes that allows user some ability to control image. What Scene modes do you have?

- Portrait – Blurs background to bring out subject.



Portrait - Blur background

- Infinity or Landscape – Shows detail in foreground & background



- Night – Take pictures in low light



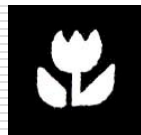
Night shots - Open Aperture Slow Shutter Speed

- Sports or Kids & Pets – increased shutter speed to freeze action



Sports, kids moving around - Fast Shutter Speed

- Macro – for close ups



Other Scene Modes

- Sunsets
- Foliage
- Snow
- Beach
- Fireworks
- Aquarium
- Indoors

Camera Controls – Scene Modes

- What Scene Modes does your Camera have? What are the differences between them?**
- How do you select them?**
- Take some photos indoors**

Managing images on your camera

- How do you play back your images?**
- Can you Digitally zoom in/out on an image?**
- Can you display multiple images?
- Can you “Jump” images?
- How do you erase an image?**

- Play back some images**
- Delete some images**



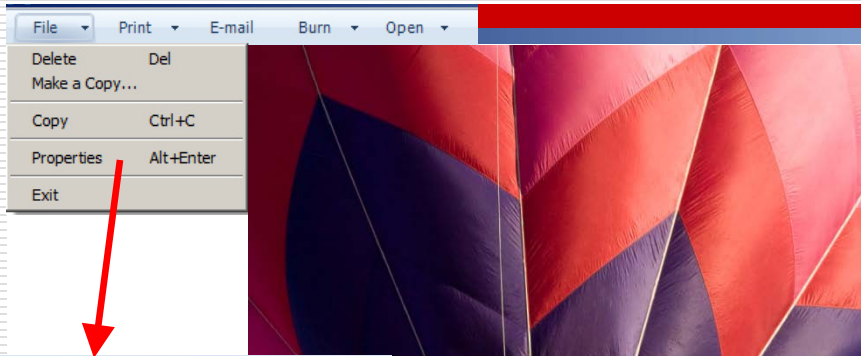
Downloading images to a computer

- ❑ Connect directly to your computer via USB port – Consult your Camera User Manual
- ❑ Connect through a memory card reader which plugs into a USB Port
- ❑ Usually what ever software you have can be set up to automatically open to extract images whenever you insert a memory card.

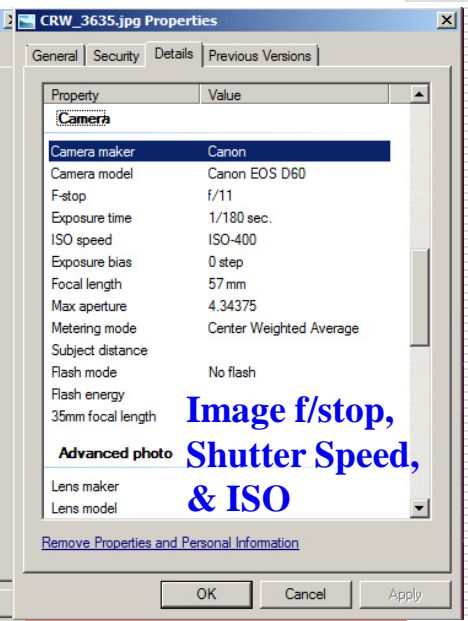
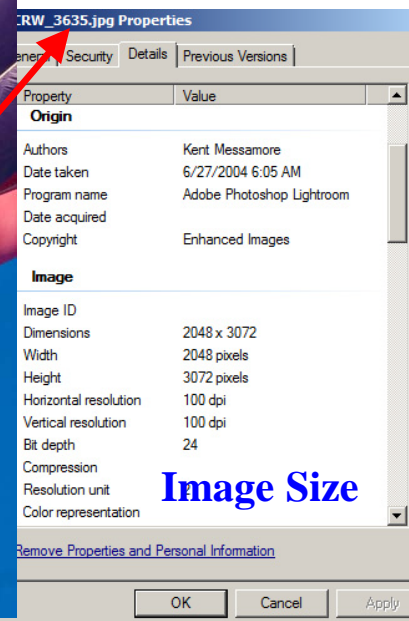
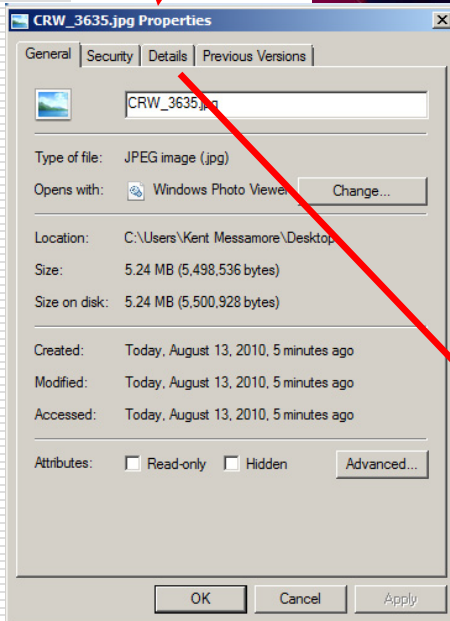


- ❑ Download some images to your computer.
- ❑ Where did you put them? Can you see them on your monitor?

Metadata



- Whenever you take a photo with your camera, the camera records a great deal of information about the photo.
- Access this data by opening the photo in Microsoft Photo Viewer and going to File -> Properties



Getting Prints from your Images

- Retail Service
 - Walmart (\$.09), CVS (\$.19), Ritz Camera (\$.09), etc.
 - Cosco (\$.13) – [Recommended](#)

- Online Services
 - Flickr does not print images, however they will forward your prints to Snapfish
 - Snapfish will send your prints for local pickup:
 - Walgreens
 - Ritzpix
 - CVS
 - Walmart
 - Mpix - <http://mpix.com/> [Recommended](#)

- Your own printer
 - Epson has been major player in photo printer marketplace for over ten Years.
 - HP and Canon have been major players in Business printer market.
 - HP and Canon have improved technology on high end printers to catch up with Epson.

Formatting Memory Card

- How do you erase all of the images on your memory card**
- If you format your card by mistake, the images are still on the card. Formatting only eliminates the directory
- Computer recovery software can scan the card and recover most images
- Caution – when throwing away a memory card, you should be aware there may be images on it.

Aperture Priority

□ Aperture-priority autoexposure:

- You specify aperture, or f-stop; camera selects the shutter speed needed to produce a good exposure.
- Control over aperture is important as setting affects *depth of field*, or distance over which objects in scene appear in sharp focus.
- If you're shooting portrait, for example, you can select an aperture that keeps the subject sharp while blurring the background.

□ This mode typically is Av

Does your Camera have Aperture Priority?

Shutter Priority

- **Shutter-priority autoexposure:**
 - you select shutter speed; camera selects aperture needed to expose the picture properly.
 - Since shutter speed determines whether moving objects appear blurry or “frozen” in place, gaining control over this exposure setting is especially important if you shoot action pictures.
- Shutter-priority mode is usually labeled S or Tv (*time value*) on the camera’s exposure dial.

Does your Camera have Shutter Priority?

Exposure Compensation

- ❑ Photos taken in Aperture or Shutter Speed Priority have exposure calculated by the camera
- ❑ Camera doesn't always get it right
- ❑ Most cameras have "Exposure Compensation" that allows manual over-ride of the camera exposure value by a + or – factor

Does your Camera have Exposure Compensation?

Manual shooting

— With a point & shoot camera, Manual shooting is cumbersome at best.

□ Manual exposure:

- You specify both aperture and shutter speed to precisely control exposure.
- Most cameras display an exposure meter that lets you know whether your picture will be properly exposed

Does your Camera have Manual Exposure?

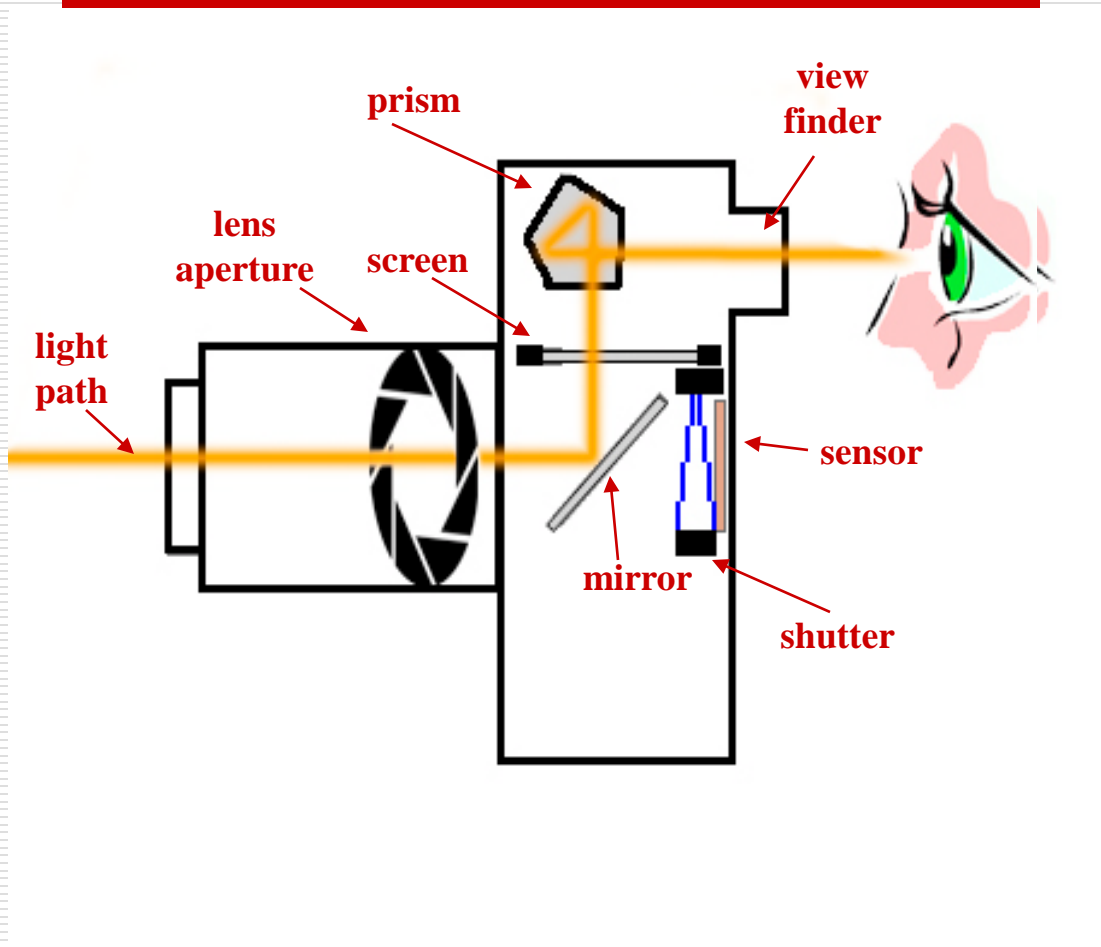
What is the Aperture or f/stop range?

What is the Shutter Speed range?

Shutter Release Mode

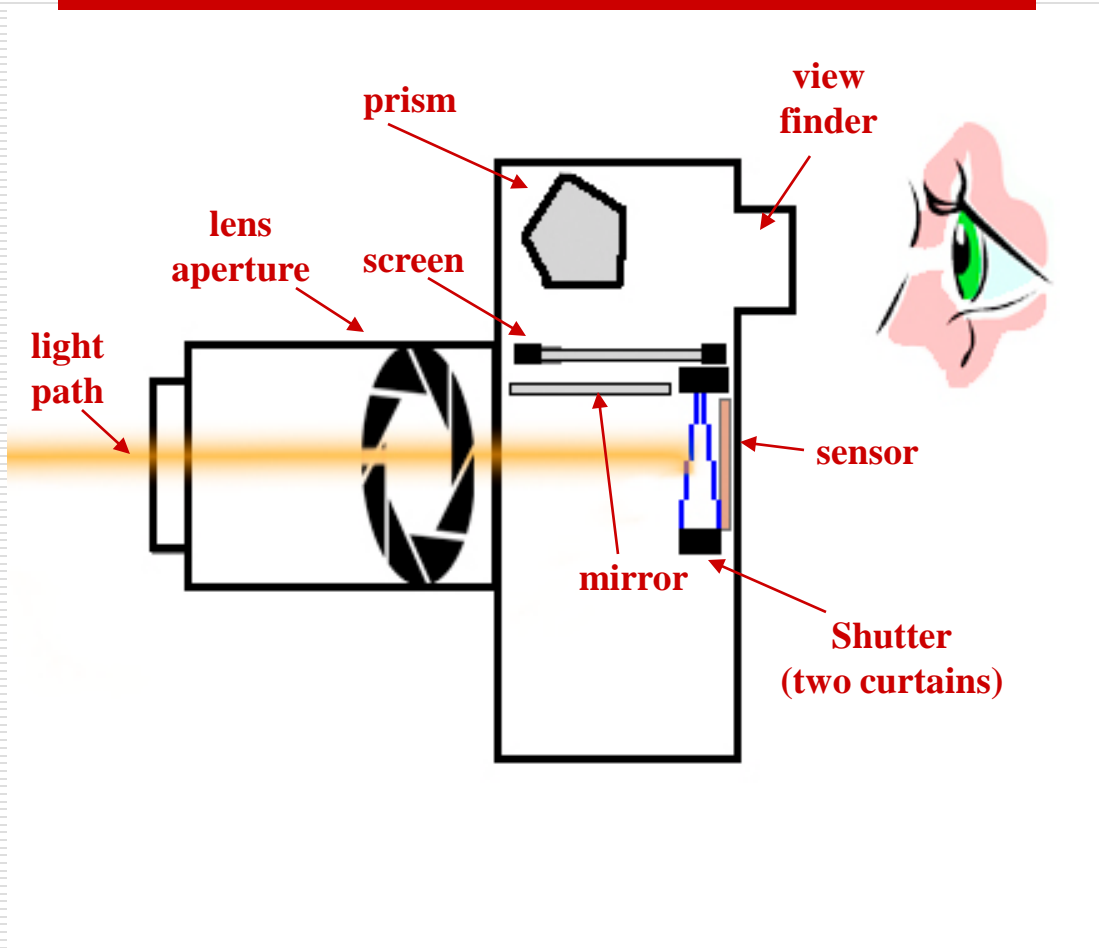
- **Shutter-release mode:** Many cameras offer choice of shutter-release modes, which controls what happens when you press the shutter button. Common modes include:
 - *One-shot or single mode:* Camera records one image every time you fully depress the shutter button. In other words, this is normal photography mode.
 - *Continuous or burst mode:* Press and hold shutter button down to record continuous series of images at a rapid pace. The camera keeps recording pictures until you let up on the shutter button.
 - *Self-timer mode:* Press and release the shutter button, and image is captured several seconds later. (This is the mode you use when you want to put yourself in the picture.)
 - *Remote-control mode:* Some cameras enable you to trigger the shutter button with a remote control unit; if so, this mode sets up the camera for that option.
- Option that controls the shutter-release mode varies; it may be named Drive mode, Release mode, or Shooting mode.

SLR Camera Firing Sequence



- ❑ Set Aperture (f/stop) and Shutter Speed
- ❑ Press Shutter Button Half Way
- ❑ Lens Aperture stops down
- ❑ Press Shutter Button full down
- ❑ Mirror pops up

SLR Camera Firing Sequence



- Set Aperture (f/stop) and Shutter Speed
- Press Shutter Button Half Way
- Lens Aperture stops down
- Press Shutter Button full down
- Mirror pops up
- Rear Curtain opens
- Front curtain opens
 - Exposure begins
- Rear curtain closes
 - Exposure ends
- Front curtain closes
- Mirror drops down

Before taking a shot, ask yourself:

- What is the story I am telling?
- What do you want viewers eyes to see?
- Are there any distracting objects that I should exclude from the image.
- Is anything in the scene moving?
- What is in the background of the shot?
- Are you close enough?
- What is the main source of light?
- Should I move to another position?
- Should I shoot Portrait or Landscape?
- How will the eye travel through this image?