



# Photography Merit Badge

Troop 344 & 9344, Pemberville, OH



# Photography Merit Badge Requirements

1. Safety. Do the following:
  - a. Explain to your counselor the most likely hazards you may encounter while working with photography and what you should do to anticipate, mitigate, prevent, and respond to these hazards. Explain how you would prepare for exposure to environmental situations such as weather, sun, and water.
  - b. Show your counselor your current, up-to-date Cyber Chip.

A close-up photograph of a camera lens, showing the 'EOS 5D' and '24 28' markings. The lens is dark and metallic, with a red dot visible. The background is a solid orange color.

# Photography Merit Badge Requirements

2. Explain how the following elements and terms can affect the quality of a picture:
  - a. Light—natural light (ambient/existing), low light (such as at night), and artificial light (such as from a flash)
  - b. Exposure—aperture (f-stops), shutter speed, ISO
  - c. Depth of field
  - d. Composition—rule of thirds, leading lines, framing, depth
  - e. Angle of view
  - f. Stop action and blur motion
  - g. Timing



# Photography Merit Badge Requirements

3. Explain the basic parts and operation of a camera. Explain how an exposure is made when you take a picture.
4. Do TWO of the following, then share your work with your counselor.
  - a. Photograph one subject from two different angles or perspectives.
  - b. Photograph one subject from two different light sources—artificial and natural.
  - c. Photograph one subject with two different depth of fields.
  - d. Photograph one subject with two different compositional techniques.



# Photography Merit Badge Requirements

5. Photograph THREE of the following, then share your work your counselor.
  - a. Close-up of a person
  - b. Two to three people interacting
  - c. Action shot
  - d. Animal shot
  - e. Nature shot
  - f. Picture of a person—candid, posed, or camera aware
6. Describe how software allows you to enhance your photograph after it is taken. Select a photo you have taken, then do ONE of the following, and share what you have done with your counselor.
  - a. Crop your photograph.
  - b. Adjust the exposure or make a color correction.
  - c. Show another way you could improve your picture for impact.



# Photography Merit Badge Requirements

7. Using images other than those created for requirements 4, 5 or 6, produce a visual story to document an event to photograph OR choose a topic that interests you to photograph. Do the following:
  - a. Plan the images you need to photograph for your photo story.
  - b. Share your plan with your counselor, and get your counselor's input and approval before you proceed.
  - c. Select eight to 12 images that best tell your story. Arrange your images in order and mount the prints on a poster board, OR create an electronic presentation. Share your visual story with your counselor.
8. Identify three career opportunities in photography. Pick one and explain to your counselor how to prepare for such a career. Discuss what education and training are required, and why this profession might interest you.

# Parts of a Camera



1. **Body** - Made of high grade plastic or metal, this holds all the other parts together as well as provide protection to the delicate internal parts of the camera.
2. **Lens** - A proper term for this part should be Lens Assembly, this consists of several layers of lenses of varying properties providing zoom, focusing, and distortion correction. These lenses are mechanically interconnected and adjustment is controlled either manually or electronically through the camera's body.

# Parts of a Camera



- 3. Shutter Release Button** - This is the "trigger" of the camera. In most cameras, a half-press activates and locks the auto-focus, and a full press initiates the image capturing process.
- 4. Mode Dial** - Contains several symbols (slightly different on various camera models), this dial allows you to select a shooting mode, automatic or manual or a choice between one of the pre-defined settings.

# Parts of a Camera



5. **Viewfinder** - A small viewing window that shows the image that the camera's imaging sensor sees. This can either be an optical view finder, which shows the actual image in front of the camera through a peep hole or through mirrors, or an electronic view finder which is simply a small LCD display.

# Parts of a Camera



- 6. Aperture Ring** - Found around the old manual lens of SLR camera this is used to select an aperture opening. In modern lenses, the aperture is controlled electronically through the body.
- 7. Focusing Ring** - This can also be found around the lens of a DSLR camera. This is turned to manually focus the lens.

# Parts of a Camera



**8. LCD Display** - In some compact cameras this acts as the viewfinder. This is a small screen (usually 1.8" diagonally or bigger) at the back of the camera which can be used for framing or for reviewing the recorded pictures.

# Parts of a Camera



9. **Flash** - Built-in on the body of most compact and some DSLR cameras this can either be fixed or flip type, it provides an instantaneous burst of bright light to illuminate a poorly lit scene.

# Parts of a Camera



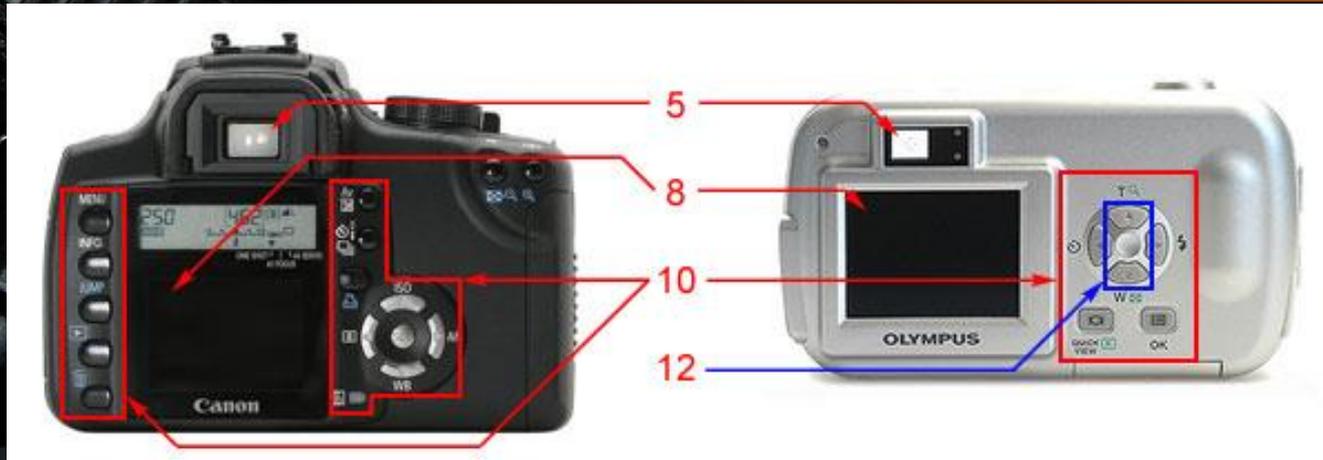
**10. Control Buttons** - Usually includes a set of directional keys and a few other buttons to activate certain functions and menus, this is used to let users interact with the camera's computer system.

# Parts of a Camera



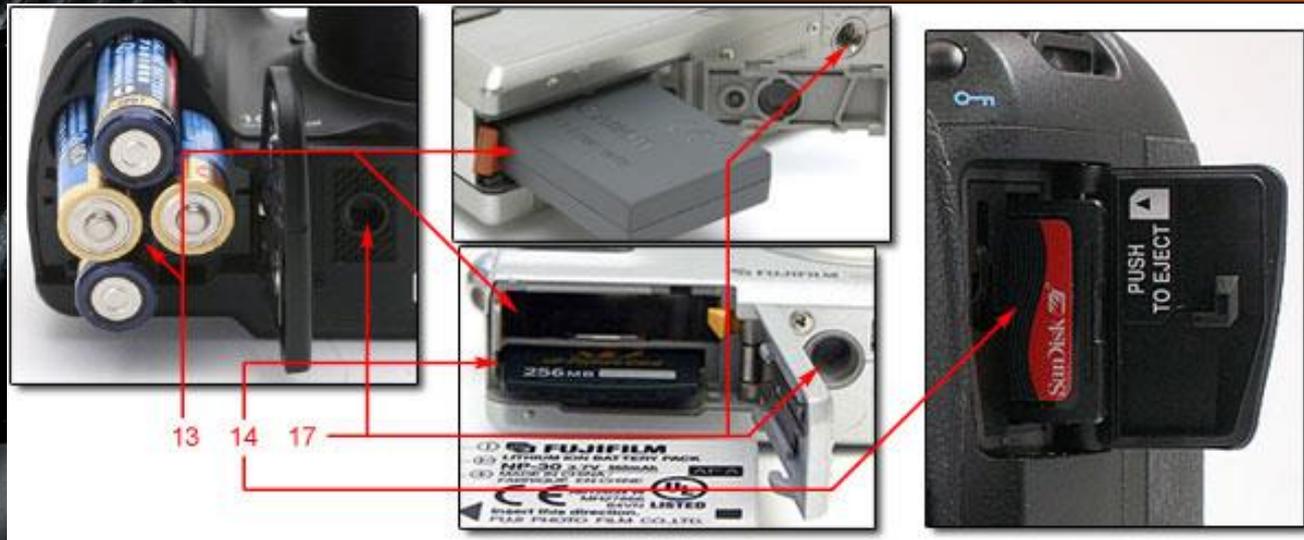
**11. Power Switch** - Turns On or Off the camera. This may also contain a Record / Play Mode selector on some cameras.

# Parts of a Camera



**12. Zoom Control** - Usually marked with W and T, which stands for "Wide" and "Tele" respectively, this is used to control the camera's lenses to zoom-in or zoom-out. For DSLR cameras, the zoom is usually controlled by a zoom ring in the lens.

# Parts of a Camera



**13. Battery Compartment** - Holds the batteries. Depending on the camera model, this varies in size and shape.

**14. Memory Card Slot** - This is where expansion memory cards are inserted. The proper position of the card are often indicated. A mechanical catch usually holds the card in place and a spring helps it eject.

# Parts of a Camera



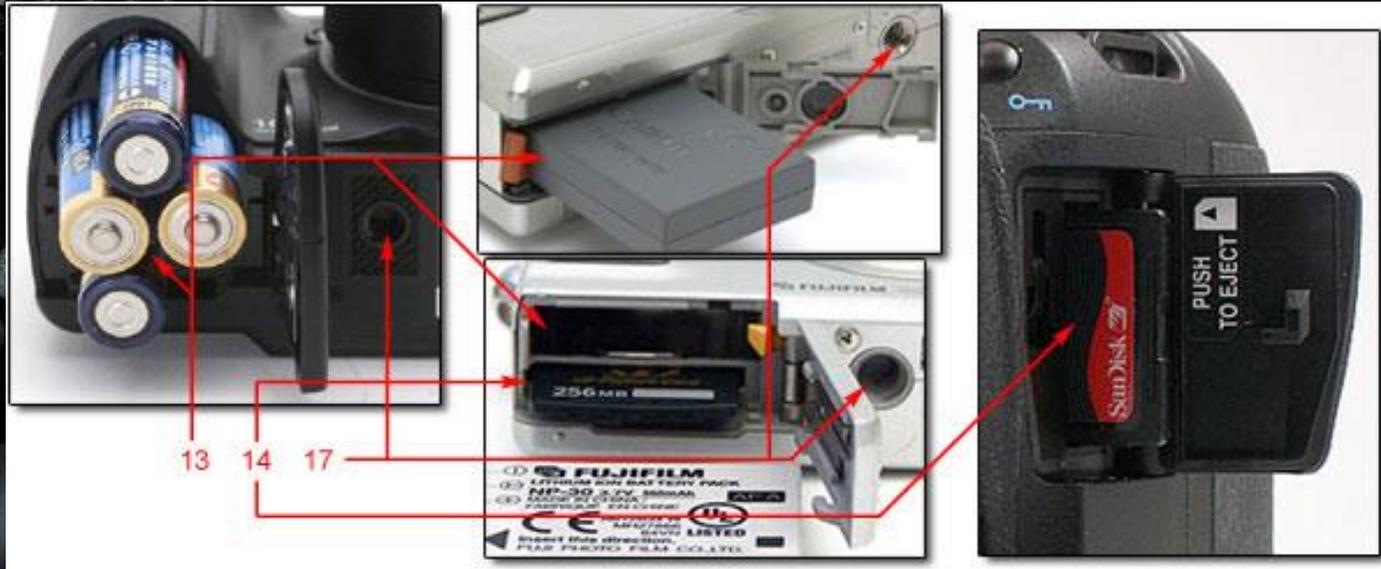
**15. Flash Mount (Hot-Shoe)** - Standard holder with contact plates for optional Flash accessory.

# Parts of a Camera



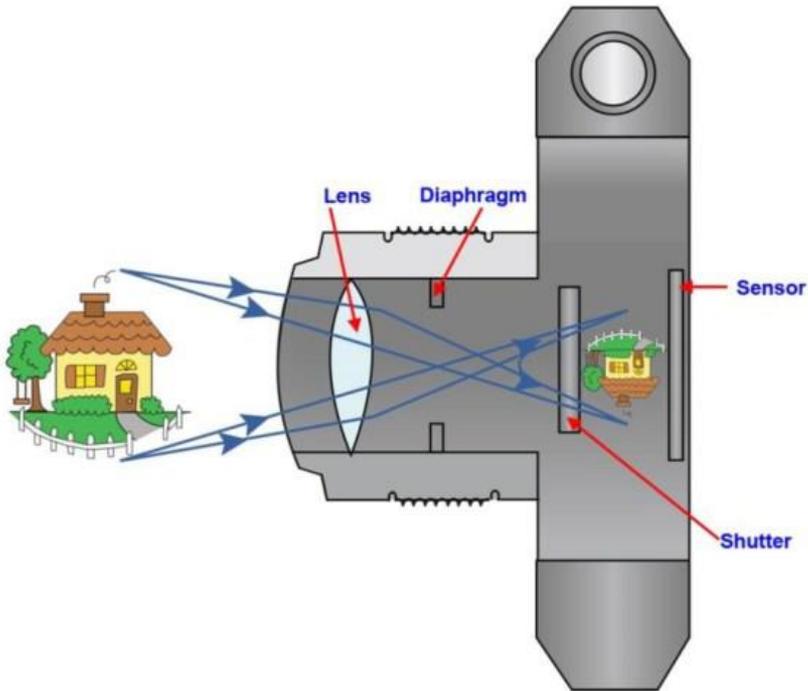
**16. Diopter Adjuster** - Usually available in mid to high end sub-compact cameras and DSLRs located besides the viewfinder. This varies the focal length of the lens in the viewfinder to make even people wearing eyeglasses to see clearly through it even without the eyeglasses.

# Parts of a Camera



**17. Tripod Mount** - Here is where your standard Tripod or Monopod is attached for added stability.

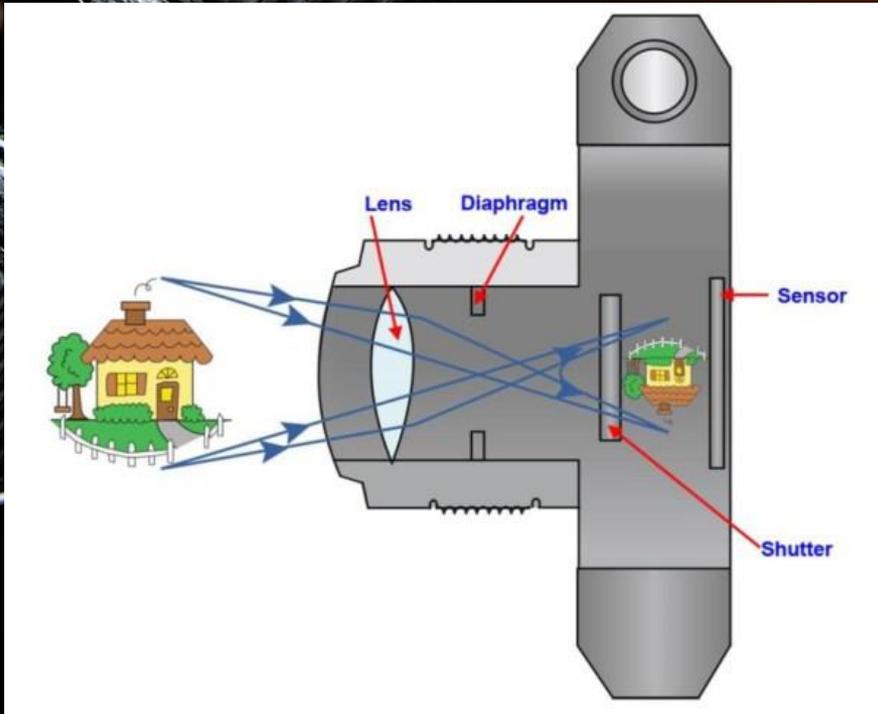
# How a Digital Camera Works



You “frame” a scene with help of a viewfinder or the LCD monitor. Then, you press the shutter release to freeze that moment. Now, a lot of things happen!

1. The lens is focused to get a sharp image,
2. Exposure (shutter speed and aperture size) is set
3. Shutter opens
4. Image is captured on the sensor as pixels.

# How a Digital Camera Works



5. The shutter now closes.
6. The pixels are written into a buffer.
7. The data in the buffer, which is in the form of pixels, is then processed by the CPU to create an image.
8. The image is then written on the memory card.
9. You can retrieve the image from the card and use it for sharing, printing or further processing.

# What is a good image?

- In Focus
- Proper Exposure
- Pleasing to the Viewer



What is a good image?



# Basics of Digital Photography

- **Compose:** This is the creative or artistic part. Arrange all of the elements of the picture within the frame or viewfinder to produce what **should hopefully** be a pleasing composition.
- **Expose:** This is the scientific and mechanical bit. Expose the image to light through the lens of the camera and preserve the image for posterity.



# Basics of Digital Photography



# Basics of Digital Photography



- It's all about the Light !

# Basics of Digital Photography

- Natural light (Sunlight)
- Ambient (Light in this room)
- Flash
- **It's all about the Light !**



# Flash

- Off Camera Flash. Why do we use it?
- Fill Flash.
- Main Light.
- Stop Action.



# Flash Mode



- For dim light or for “filling in” backlit pictures most cameras default to auto flash.
- You need to know how to manually turn the flash off or on for special conditions.

# Flash Photography Mistakes

- Turn off the flash when it will be useless.
  - For example, photographing a person near a reflective background or someone far away under dim light conditions.

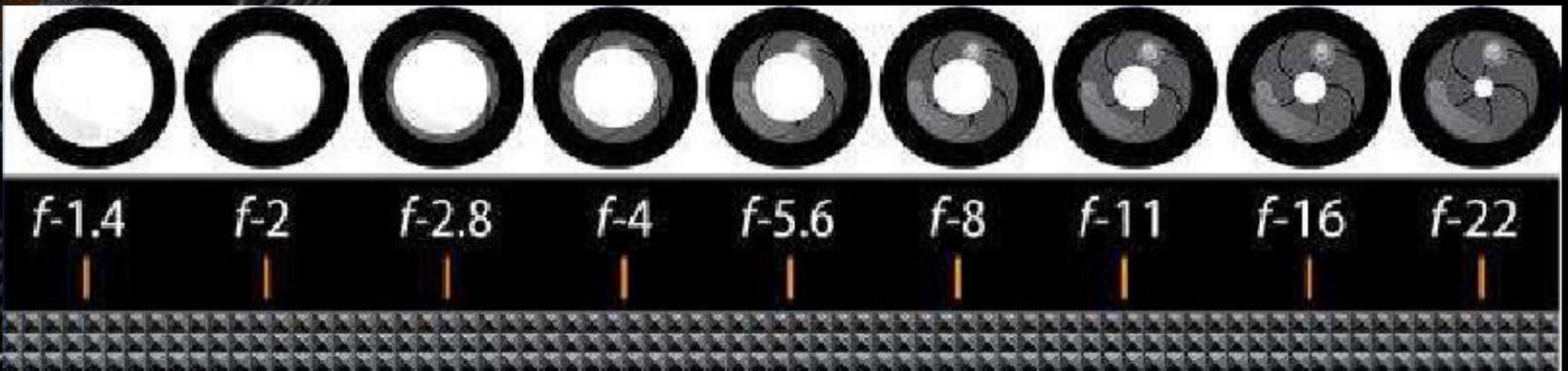


# Night Photography

- Taking photographs at night without flash requires low shutter speeds.
- Your digital cameras night mode.

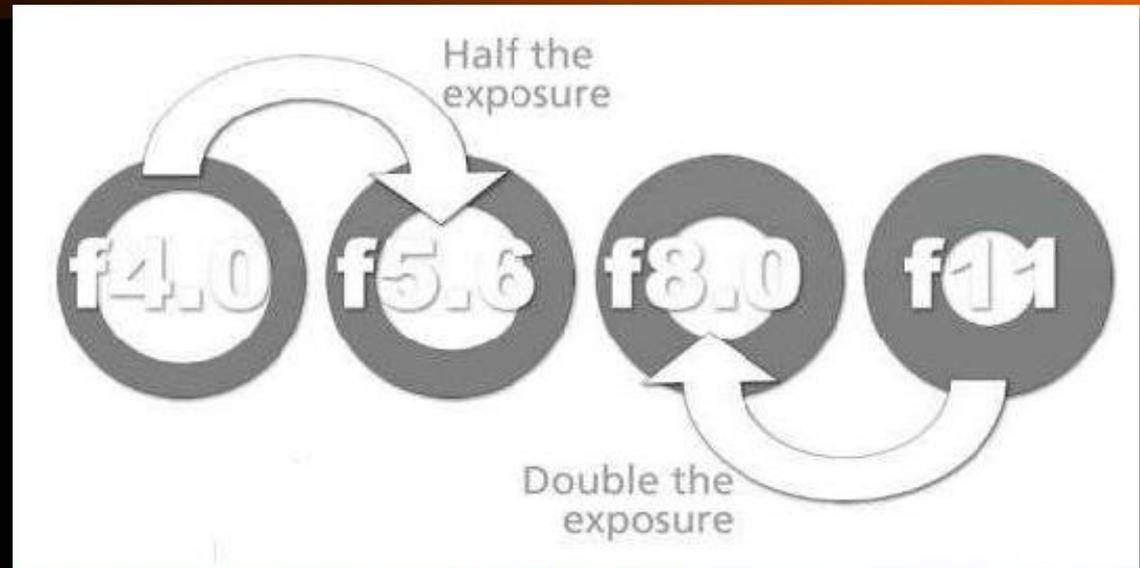
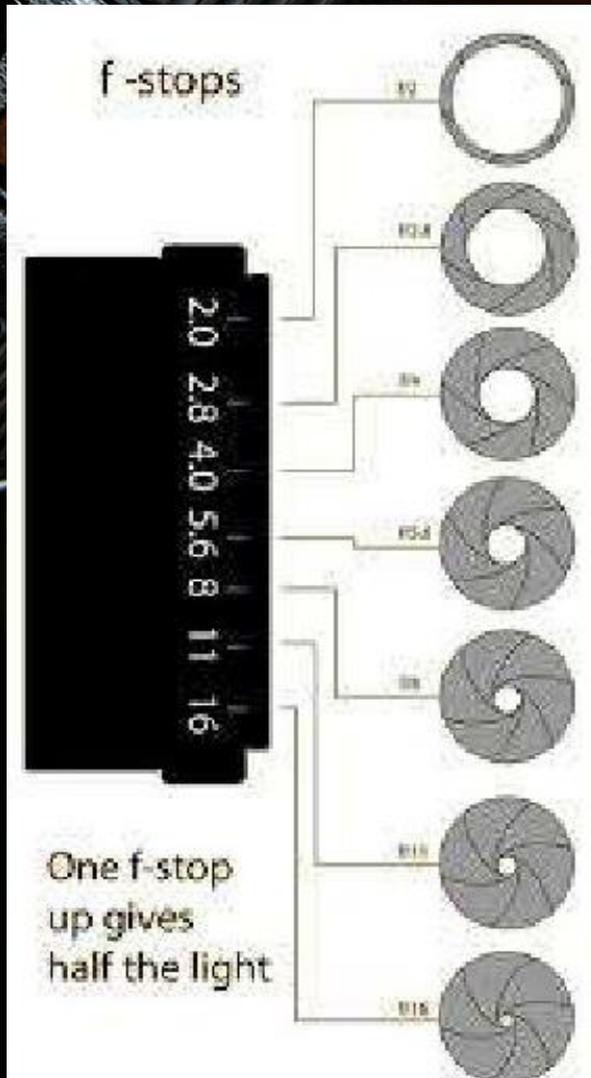


# F-stop



- Aperture regulates the size of the opening in the lens.
- F-stop measures the size of the aperture or opening.
- The bigger the F-stop the smaller the opening.
- F-2 is an “open” stop - lets in more light.
- F-22 is a “closed” stop - lets in less light.

# F-stop



- Double the F-stop = 1/4 the Light
- Half the F-stop = Quadruple the Light

# Depth-of-Field and F-stops

- Depth-of-Field = Amount in Focus
- Smaller F-stop = Less Depth-of-Field (less in focus)
- Larger F-stop = More Depth-of-Field (more in focus)



# Depth-of-Field

- How does **Depth-of-Field** change the photograph?



# Depth-of-Field

- Is this closer to  $f/2$  or  $f/22$ ?



# Depth-of-Field

- Is this closer to  $f/2$  or  $f/22$ ?



# Shutter Speeds

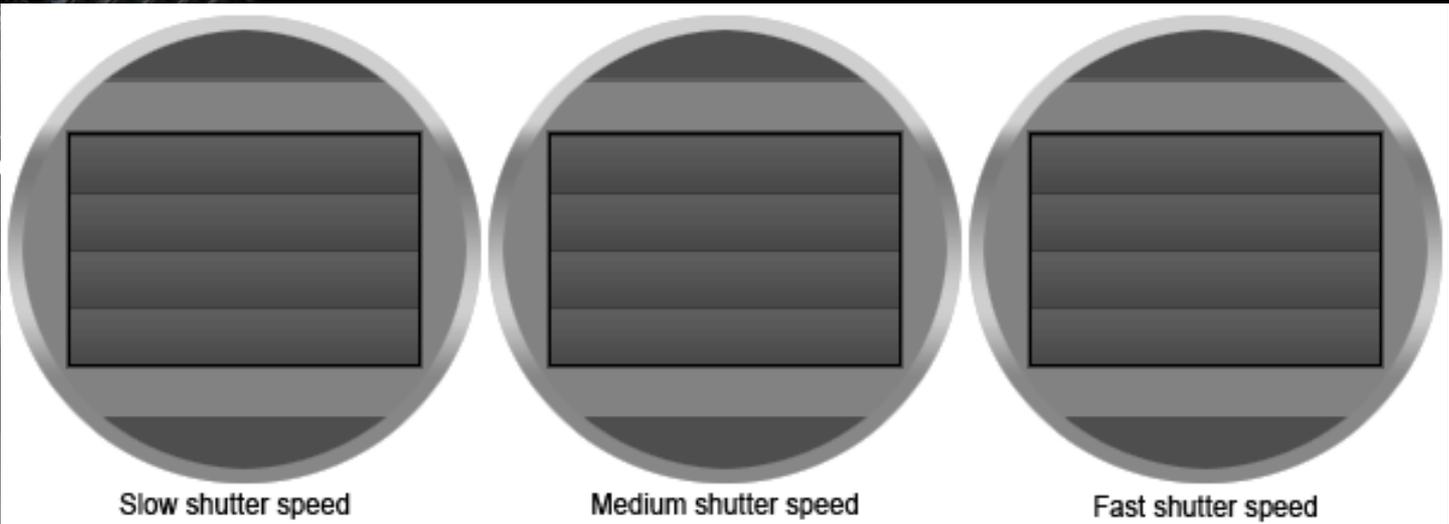


Fig 1.6.2 The appearance of the shutter at various speeds.

- The camera shutter controls how long light enters the camera.
- A fast shutter speed is  $1/1000$  of a second.
- A slow shutter speed is  $1/2$  of a second.

# Shutter Speed

- A fast **Shutter Speed** can stop action.
- A slow **Shutter Speed** can blur action.

These Standard Shutter Speeds . . .

1/1000 sec | 1/500 sec | 1/250 sec | 1/125 sec | 1/60 sec | 1/30 sec | 1/15 sec | 1/8 sec | 1/4 sec | 1/2 sec | 1 sec

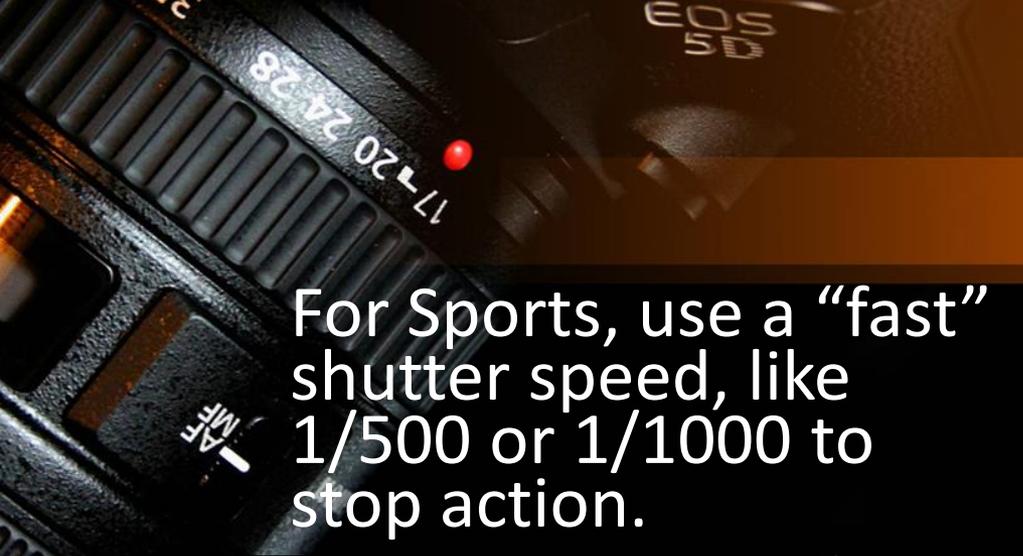
Are written in the following format . . .

1000 | 500 | 250 | 125 | 60 | 30 | 15 | 8 | 4 | 2 | 1"

Faster Shutter Speeds

Slower Shutter Speeds





For Sports, use a “fast” shutter speed, like 1/500 or 1/1000 to stop action.



Hummingbird wings requires a shutter speed in excess of 1/10,000 second to stop action, which is not possible for most cameras.

Using an external flash can stop Hummingbird wings because flash durations are typically 1/35,000 second.



Is this closer to  $1/2$  sec. or  $1/1000$  sec.?



Is this closer to  $1/2$  sec. or  $1/1000$  sec.?



Is this closer to  $1/2$  sec. or  $1/1000$  sec.?



Is this closer to 1/2 sec. or 1/1000 sec.?



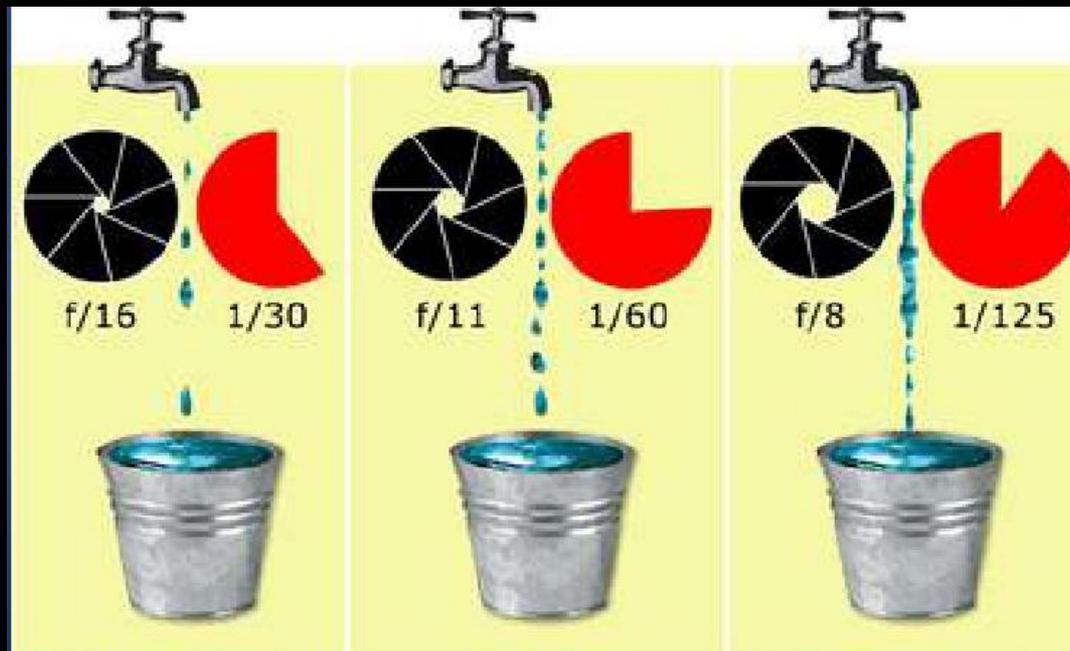
# Exposure



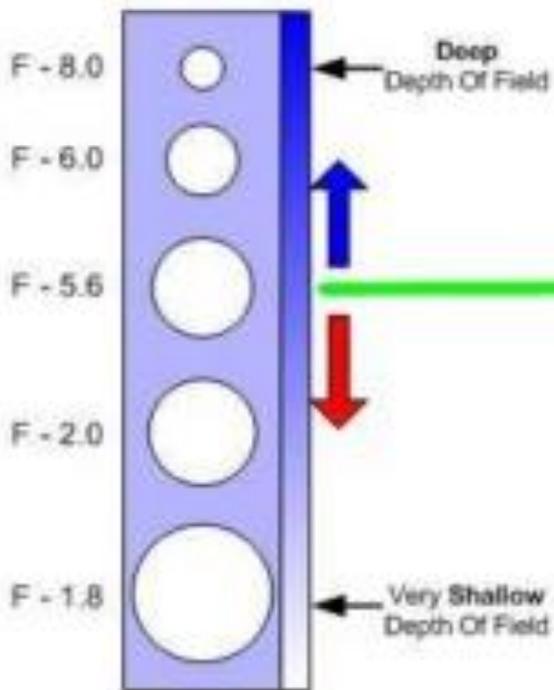
- **Exposure** is the amount of light used to take a picture.
- Over-Exposure = Picture is too light
- Under-Exposure = Picture is too dark

# Exposure

- Exposure is controlled by the aperture and the shutter.



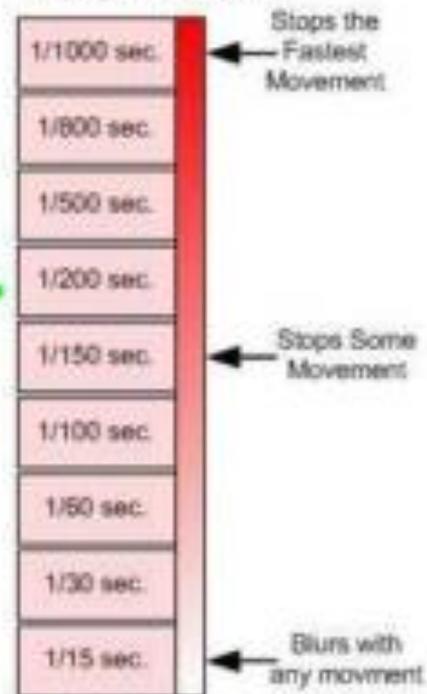
## F Stops



A perfectly exposed picture



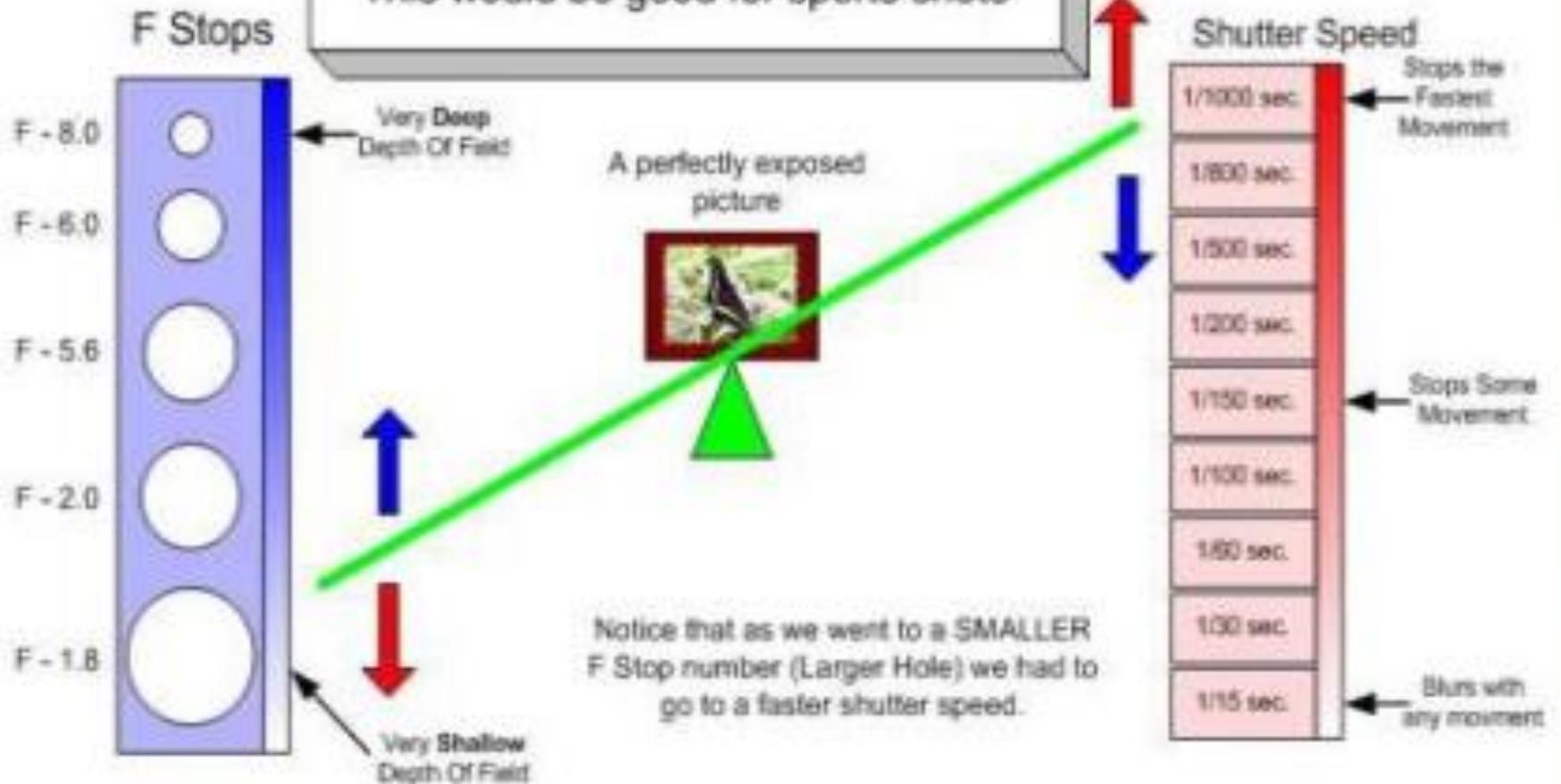
## Shutter Speed



This setting will have Very Deep depth of Field (DOF)  
This would be good for Macro shots.

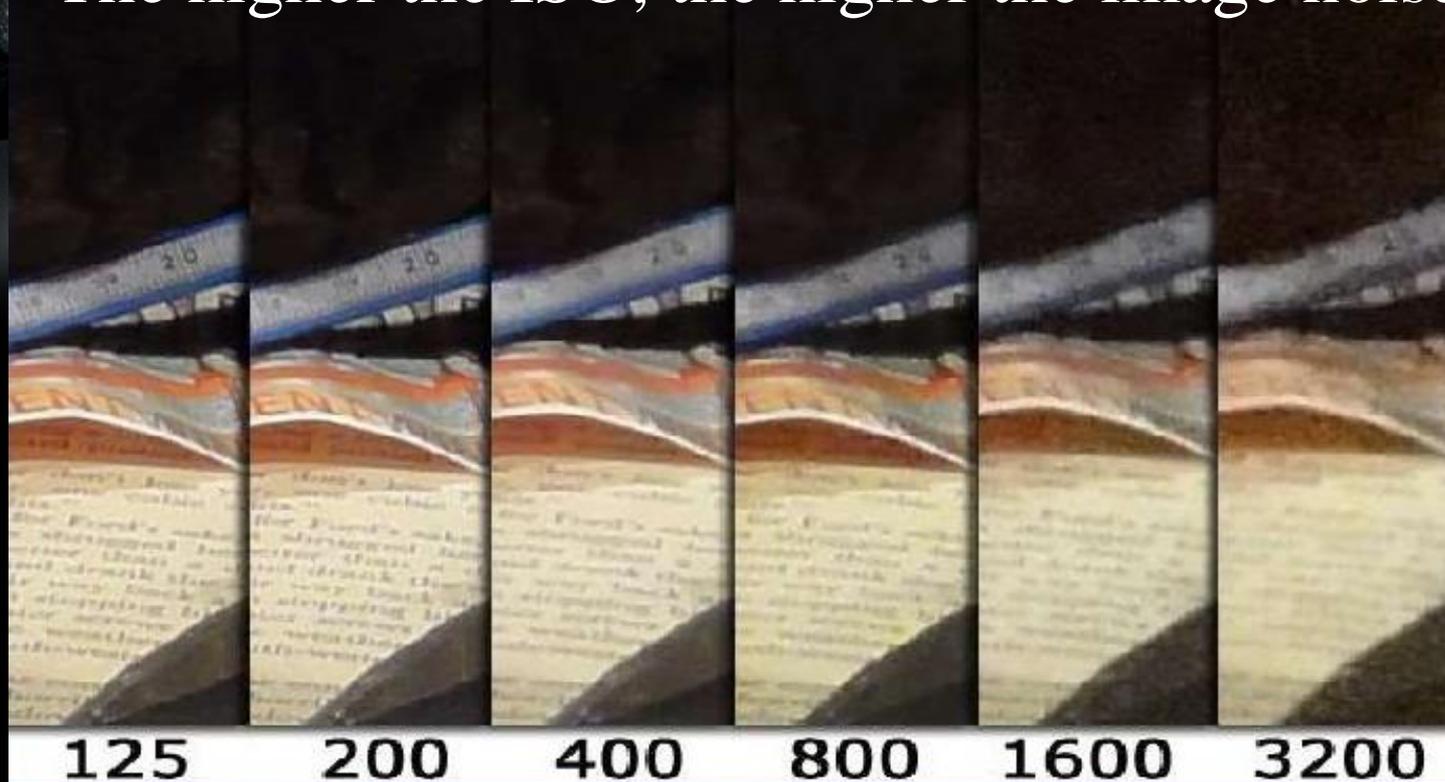


This setting will STOP the action but will have shallow Depth Of Field (DOF)  
This would be good for sports shots



# ISO

- ISO adjusts the camera's sensitivity to light.
- The higher the ISO, the less light is needed.
- The higher the ISO, the higher the image noise.



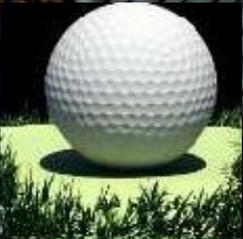
# Light



- **“Natural” Light** - light from the Sun (inside or outside).
- **“Ambient” Light** - natural or artificial lighting that exists at the scene without a flash or other photographic lights.
- **“Flash”** - a brief high intensity artificial light used to illuminate photographs at close range.



# Types of Natural Light



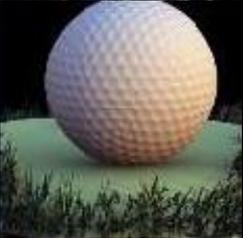
**CLEAR MIDDAY SUNSHINE** - Primarily comprised of direct, downward sunlight. The hardest and most neutrally-colored lighting of any time of day, and typically is the least desirable natural light.



**MID-MORNING & EVENING** - Mid-morning and Evening light becomes slightly warmer, and begins to cast noticeable shadows making subjects often appear much more three dimensional.



**SUNRISE/SUNSET (GOLDEN HOUR)** - The hour just after sunrise or just before sunset provides very desirable light characterized by horizontal light that casts long shadows and gives subjects a warm glow and depth.



**TWILIGHT, DAWN & DUSK** - The half hour before sunrise or after sunset while the sky is still light but without direct sunlight. This light produces soft, multicolored lighting, from warm and reddish to cool blue or purple, that gives a calm, peaceful mood to subjects.



**SHADE & OVERCAST SUNLIGHT** - Typically has a cool, soft appearance, since the source of such light is spread across the entire sky, and doesn't include any direct sunlight.



Direct Sun



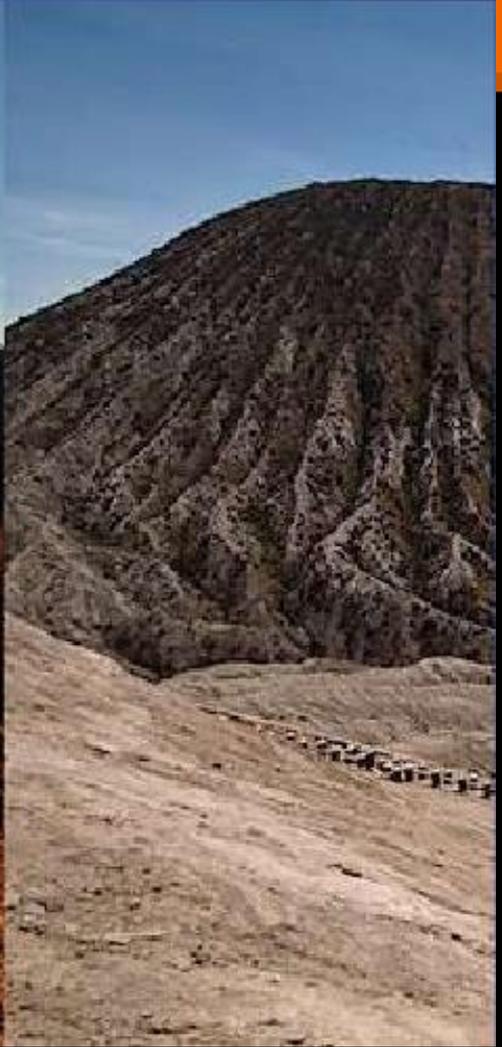
Shade



Twilight



Sunrise



Noon

EOS 5D  
17 20 24 28



Dawn



Sunrise



Morning

# Ambient Light

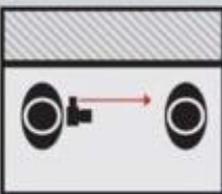




- **Florescent Lights** can add a bluish-green cast to photos.
- **Incandescent Lights** add a yellowish tinge to photos.
- Most digital cameras have a **White-Balance** which can compensate for unflattering types of light.

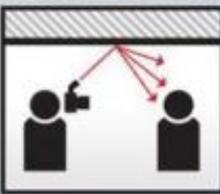
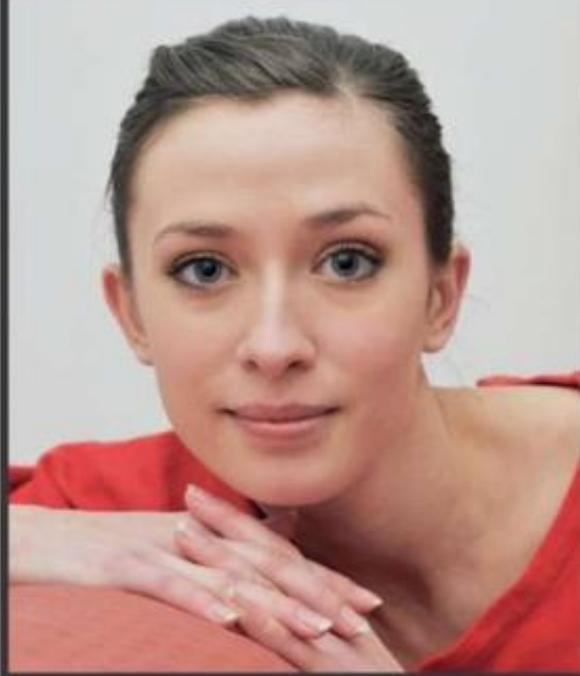


### Standard flash



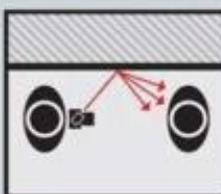
In this shot you can see that the flashgun was mounted on the camera, which was held vertically with the flash positioned to the side. This has created an unsightly shadow in the background. Ideally, you want to avoid this, and by bouncing the flash you'll create a more flattering portrait.

### Bounced from the ceiling



In this portrait we rotated the flash so it pointed up towards the ceiling. As a result, the light was bounced off the white surface, which altered its direction. The end result is a soft diffused illumination that comes from above the model. The improvement here is plain to see.

### Bounced from the wall



In some situations the ceiling might be too high, painted in a non-reflective dark colour, or you just might want to create subtle side-lighting instead. If so, try bouncing the light off the wall. Be aware, however, that if there's a strong colour on the wall it too will be reflected, adding a tint to your subject.

## Using Flash



- Direct sunlight can create harsh shadows, especially if you do not want your subject squinting in the sun.
- Using your **Flash** to **Fill** in the shadows can brighten an image.

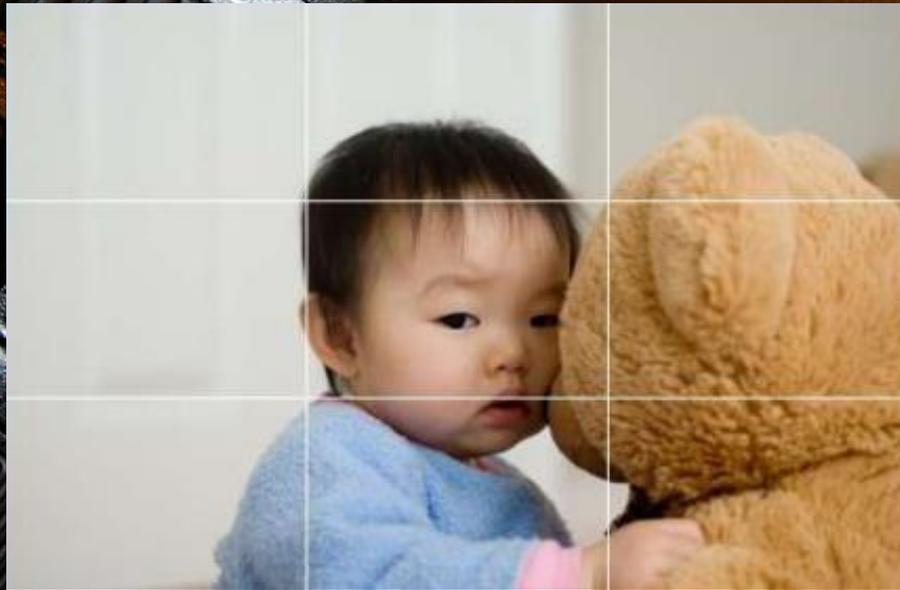
# Ambient or Flash Lighting?



# Rule of Thirds

- Keep the subject of interest out of the center of the picture.
- The **Rule of Thirds** is applied by aligning the subject with the intersecting points of imaginary guide lines dividing the picture into nine (9) equal boxes.
- One of the most important rules of composition.





“Rule of Thirds”

From Good to  
GREAT!





## “Rule of Thirds”

Now the seagull has more room to fly, giving a greater sense of action and depth.



# Rule of Thirds

- **Rule of Thirds** may be broken when other rules of composition are used to focus on the subject.
- Learn to use the **Rule of Thirds** effectively before trying to break it, then you will be doing so to get a better composition and not just for the sake of it.
- Once you've mastered the **Rule of Thirds**, experiment with purposely breaking it to see what you discover.



# Leading Lines



- **Leading Lines** are used to draw a viewers attention to a specific part of a picture.

# Leading Lines



- **Leading Lines** can be almost anything: a road, path, sidewalk, fence, river, hedge, tree line or shadow.

# Leading Lines

**Leading Lines** may draw a viewers attention to the subject



... or to a vanishing point in the background.



# Framing



- Using other objects in your photograph to frame the main subject.

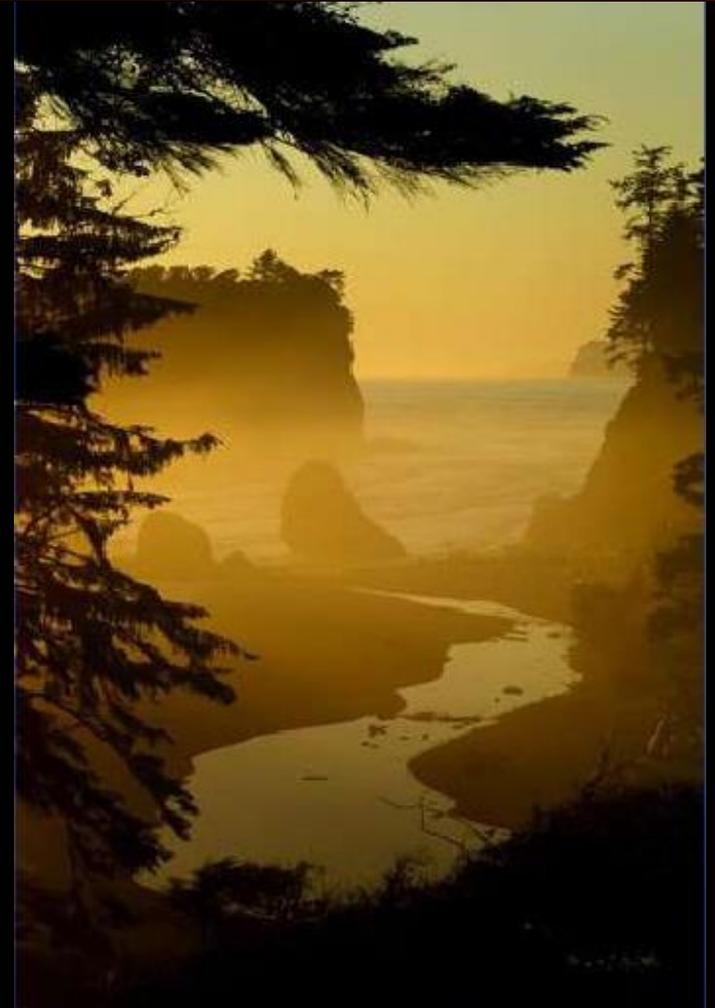
# Framing



- Use trees or objects to provide a natural “frame.”



# Framing



- **Framing** brings more depth to the picture and a better focus on what the main subject is.

# Depth

A good foreground can really give **Depth** to an image and make it **POP**.



To take it a step further, make sure there is a foreground, mid-ground and background to your image, which will dramatically allow you to take control of the sense of **Depth** in your image.



# Depth

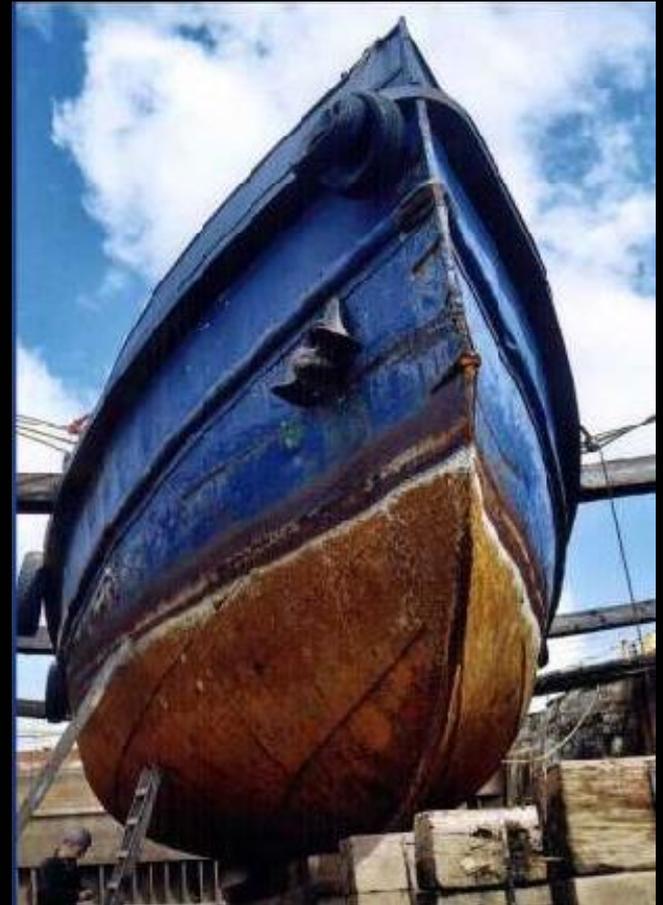
**Depth** can also be achieved by using all of the other composition rules: Rule of Thirds, Leading Lines, and Framing.



# Depth



- A change in viewpoint can strikingly alter the **Depth** of a photo.
- Angling the camera up for a scenic shot is a fun way to experiment with converging lines to add **Depth**.
- Try getting low to the ground to include some interesting foreground to add **Depth**.



# Depth



- The right lighting can add a three-dimensional feel to your photos.
- For scenic shots, the late afternoon sun provides both a warm glow and **deepening** shadows which will make your photos stand out.

# Depth



18mm "wide"



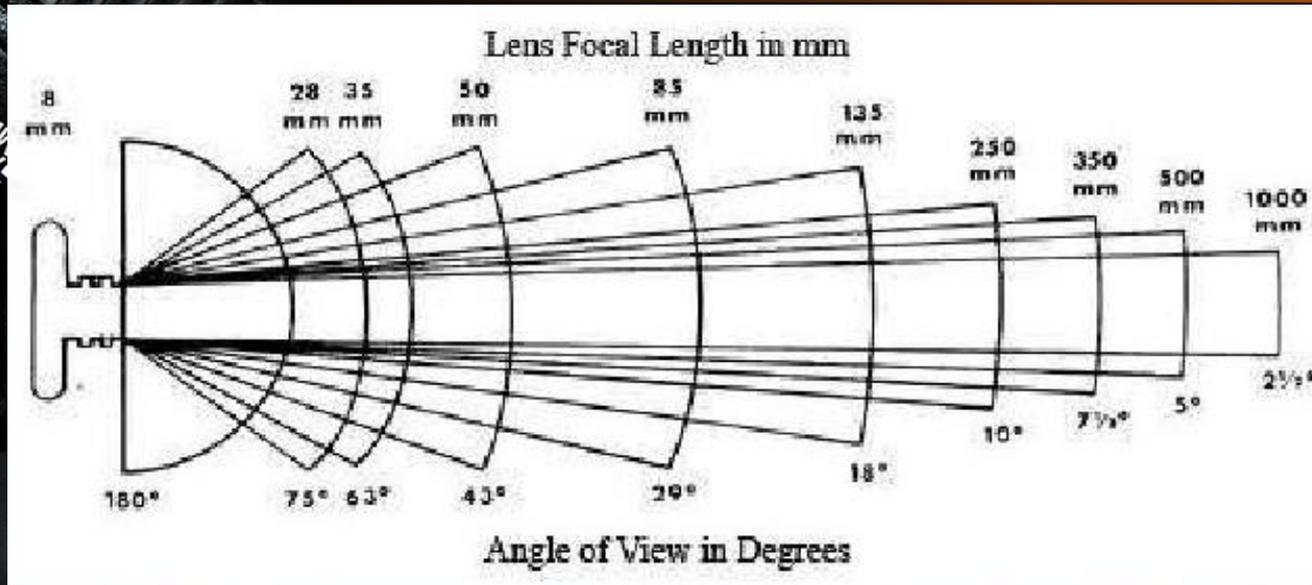
50mm "normal"



120mm "telephoto"

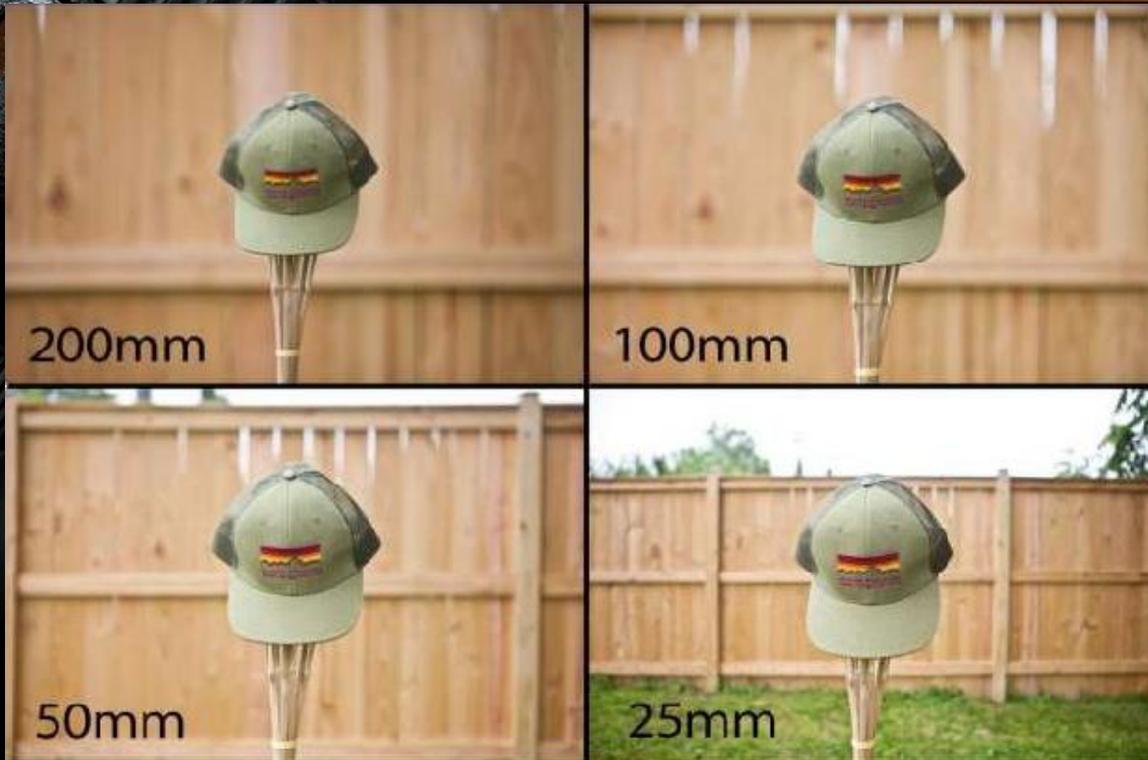
- Wide-angle lenses exaggerates **Depth** by making close objects appear larger while creating converging lines that make distant objects appear smaller than normal.
- • Telephoto lenses cause images to appear more compressed, with less background, reducing the sense of **Depth**.

# Angle of View



- **Angle of View** is the maximum **view** a camera is capable of “seeing” through a lens, expressed in degrees.
- **Angle of View** depends on a camera lens focal length stated in millimeters.
- Smaller mm = wider **Angle of View** (wide-angle lens)
- Larger mm = narrower **Angle of View** (telephoto lens)

# Angle of View



- With a wide **Angle of View** (wide-angle lens), **MORE** of the background will fit in the image.
- With a narrow **Angle of View** (telephoto lens), **LESS** of the background will fit in the image.

# Practice with Your Camera

- The best way to take good pictures is to take a lot of them and to experiment with your camera.
- Understand your camera settings
- Take pictures and do tests: Take the same picture several times while changing the settings for each shot. Then compare the result. What settings work best under what conditions? What are the characteristics of your camera?
- **Digital pictures are FREE**
- until you print them!





Film or Digital???

**Sensor:** Digital cameras use a light sensitive sensor (sometimes known as a CCD), while film cameras use a light sensitive film to record the image.

**Cost and Feedback:** Photos taken with a digital camera are kept in erasable memory, can be seen instantly, and can be discarded at no cost. Film camera require buying each roll of film, developing the negatives, and printing each negative before pictures can be seen.

**Storage Capacity:** Digital cameras can hold hundreds and sometimes thousands of photos on a single media. A roll of film generally holds no more than 36 photos.

**Quality:** High end digital SLR cameras have now surpassed film cameras in resolution, but film still captures a greater range of colors especially in the shadows.

**Longevity:** Film will deteriorate over time, while digital photos can last forever without any quality loss if they are properly backed up.

**Batteries:** Digital cameras require batteries , while many film cameras can operate without batteries.



# Pixels

- A pixel is a contraction of the term Picture Element.
- Digital images are made up of small squares, just like a tile mosaic on your kitchen or bathroom wall.
- Though a digital photograph looks smooth and continuous just like a regular photograph, it's actually composed of millions of tiny squares as shown below.
- On the left the full image, on the right the area in the red square magnified to show individual pixels



# Megapixels



- A megapixel is equal to 1 million pixels.
- How many megapixels a camera shoots indicates the maximum size of a digital picture.
- Generally, more pixels are better (and cost more), but it is not only factor that should be considered when choosing a camera.



## Image Size

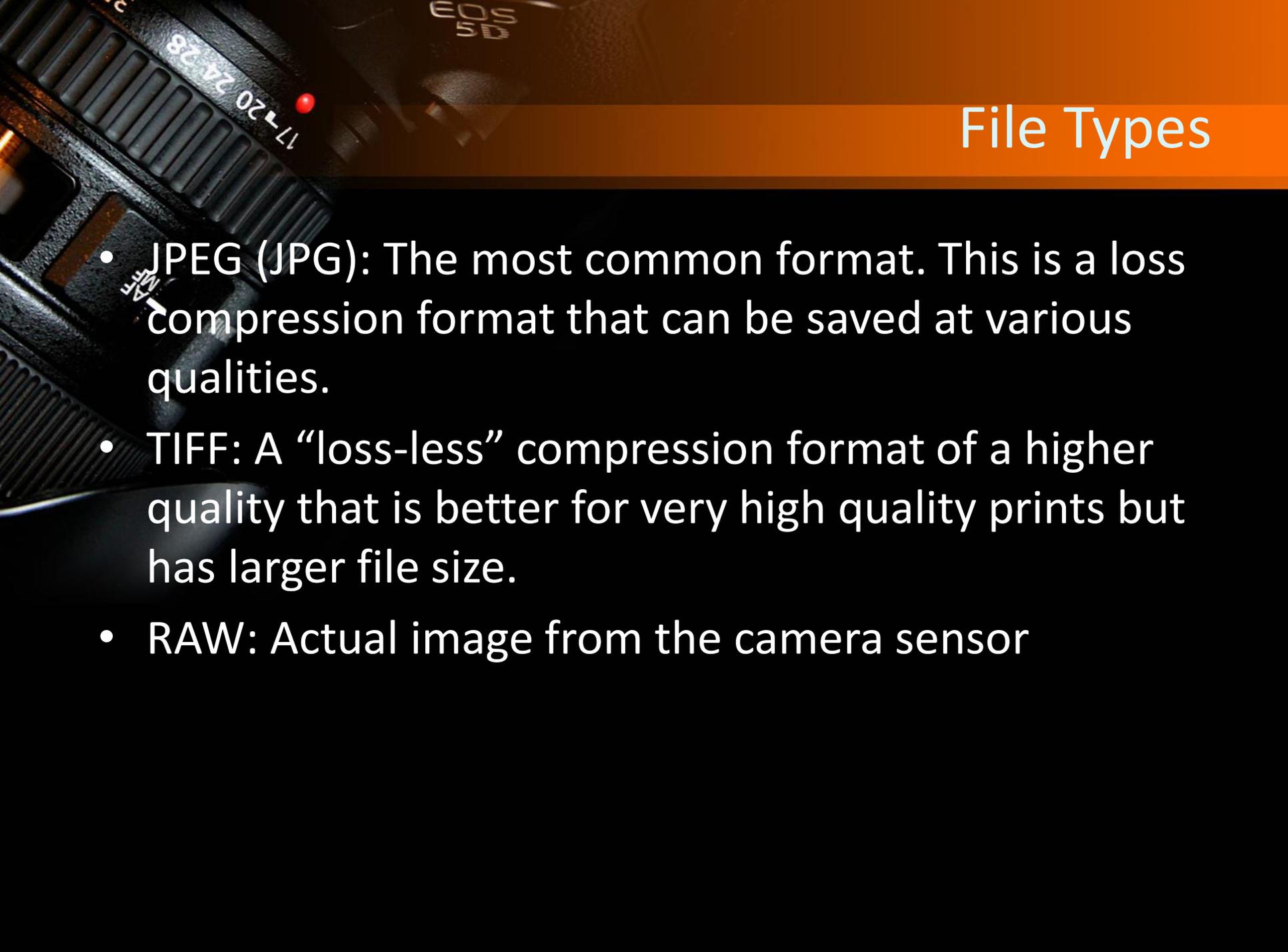


- Refers to the dimensions of the image, measured in pixels.
- Pictures taken at smaller sizes require less memory and are suitable for distribution by email or on the web.
- Conversely, the larger the image, the larger the size at which it can be printed or displayed without losing quality (becoming “grainy”).

## Image Size



Image Size	Pixels	Print Size (@300dpi)
3264 x 2448	8MP	<b>11" x 14"</b>
2592 x 1944	5MP	8½" x 6½"
2048 x 1536	3MP	7" x 5"
1600 x 1200	2MP	5" x 4"
1280 x 960	1MP	4" x 3"
640 x 480	.5MP	Email and Web

A close-up photograph of a camera lens, likely an EOS 5D, showing the lens barrel with markings for focal lengths (17, 20, 24, 28) and a red dot. The lens is set against a dark background with an orange gradient at the top.

## File Types

- **JPEG (JPG):** The most common format. This is a loss compression format that can be saved at various qualities.
- **TIFF:** A “loss-less” compression format of a higher quality that is better for very high quality prints but has larger file size.
- **RAW:** Actual image from the camera sensor



# Photo Editing



Create a Photo that is . . . Out-of-this-WORLD!

# Career Opportunities in Photography

- Photojournalist  
(newspaper/magazine/web)
- Advertising/Corporate photographer
- Architectural/Industrial photographer
- Outdoor or wildlife photographer
- Sports photographer
- “Location” photographer
- Fashion photographer
- Forensic photographer



# Education and Training

- Four (4) years of college (B.A. degree) and/or 2+ years apprenticeship as photographer's assistant
- Lots of hard work!



# Photography

- Can provide a lifetime of fulfillment as a hobby
- Can complement other hobbies
- Difference between “professional” and “amateur” is **not** always skill level.

