

- Camera Settings
- Auto vs. Manual Mode
- Aperture Priority Mode
- Shutter Speed Priority Mode

*APERTURE*



*SHUTTER SPEED*

*and ISO*



- **Aperture:** The aperture is the opening in a camera that controls the amount of light that reaches the camera's film or image sensor (with a digital camera). In combination with variation of shutter speed, the aperture size will regulate the film's or image sensor's degree of exposure to light.







Smaller f/stop numbers increase the size of the camera's iris (aperture) opening and decrease the "depth of field" (picture on the left). Larger f/stop numbers decrease the size of the iris (aperture) opening resulting in increased depth of field (picture on the right).

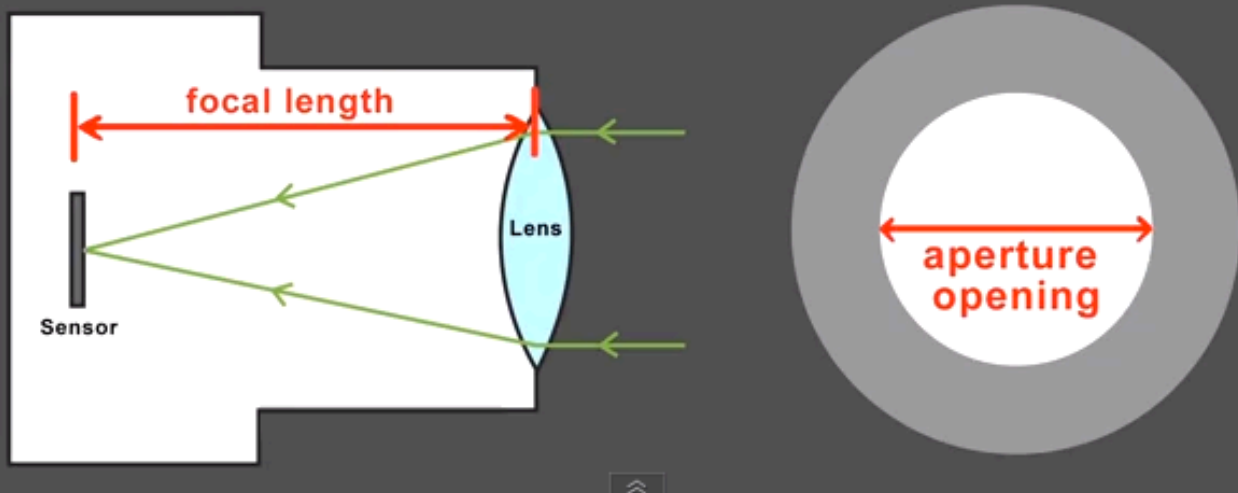
- **Aperture priority** is a semi-automatic shooting mode used in cameras. It allows the photographer to choose an aperture setting and allow the camera to decide the shutter speed and sometimes ISO sensitivity for the correct exposure. This is sometimes referred to as Aperture Priority Auto Exposure, A mode, Av mode (aperture-value mode), or semi-auto mode.
- Typically, a fast shutter speed will require a larger aperture to ensure sufficient light exposure, and a slow shutter speed will require a smaller aperture to avoid excessive exposure.

***Depth of Field (DOF)*** is the distance between the nearest and farthest objects in a scene that appear sharp in an image



Greater Depth of Field means that more in the picture is sharp (in focus).

$$\text{F-stop} = \frac{\text{focal length of the lens}}{\text{aperture opening of the lens}}$$



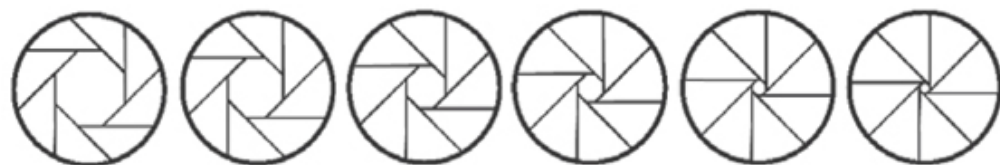
Why is the f-stop a larger number when it is a smaller aperture/opening?  
Because it is a fraction!





The bigger the F stop number (smaller the aperture opening);  
= the more depth of field  
= more in the picture (background *and* foreground) in focus

## How aperture controls depth of field



f/4

f/5.6

f/8

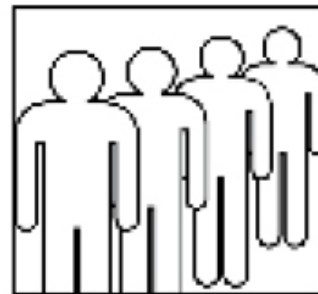
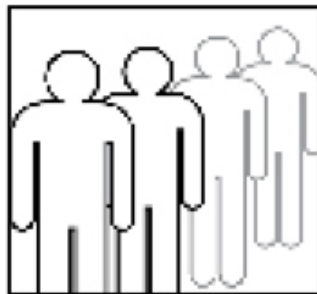
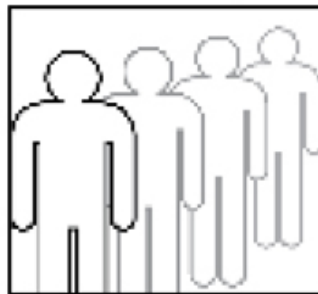
f/11

f/16

f/22

← Less depth of field

More depth of field →



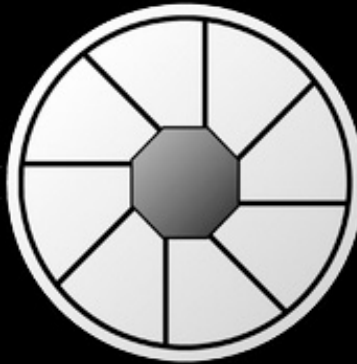
The aperture you use is the main factor in dictating how much of the scene appears pin-sharp. The narrower the aperture opening (and the larger the f/number) the more of the image will be in focus – and vice versa!



f/2.8



f/8



f/22

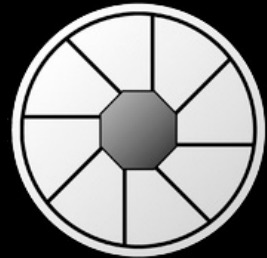




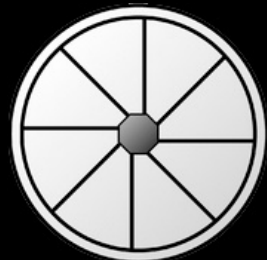
**f/2.8**



**f/8**



**f/22**



- **Shutter Speed:** In photography, shutter speed is a common term used to discuss exposure time, the effective length of time a camera's shutter is open. The total exposure is proportional to this exposure time, or duration of light reaching the film or image sensor.

***Shutter speed*** represents the time that the shutter remains open while taking a picture.

↓ LESS TIME SHUTTER  
REMAINS OPEN = ↓ LESS LIGHT

↑ MORE TIME SHUTTER  
REMAINS OPEN = ↑ MORE LIGHT

**Shutter speed** is measured in seconds or fractions of seconds.

**These are full stops of shutter speed**

1 sec 1/2sec 1/4sec 1/8sec 1/15sec 1/30sec 1/60sec 1/125sec 1/500sec  
← slower faster →

1/250sec

**How shutter speed is displayed in your camera**

1" 2 4 8 15 30 60 125 500  
← slower faster →

Again, because it is a fraction, the higher the shutter speed number on your camera actually indicates the faster the shutter is open. For example 500 = 1/500th of a sec.

## **Shutter speed** needed to stop an action

Motion type	Speed	Distance from Camera to Subject		
		25feet	50feet	100feet
Fast walker	(5 mph)	1/125	1/60	1/30
Running child	(10 mph)	1/250	1/125	1/60
Sprinter	(20 mph)	1/500	1/250	1/125
Fast car	(50 mph)	1/1000	1/500	1/250

Therefore, if the subject being photographed has a fast motion (a car or a moving waterfall) You will want to use a fast shutter speed (a higher number on the camera).

If the subject being photographed is farther away from you and your camera, you will use a slower shutter speed than if the subject is close to you. (Why? Think about how watching an airplane going 300mph in the sky can appear to move slowly, while a car next to you moving 30mph appears to be faster).



*In most cases you'll probably want to consider using shutter speeds of **1/60th of a second** or faster.*

*For shutter speed slower than 1/60sec consider using a **tripod***



- ISO: Since 1974, ISO is a standard of measurement indicating the sensitivity of film or, in the case of digital photography, the sensitivity of the camera sensor.
- In traditional (film) photography ISO (or ASA) was the indication of how sensitive a film was to light (how much light the film could accept). It was measured in numbers (you've probably seen them on films – 100, 200, 400, 800 etc). The lower the number the lower the sensitivity of the film and the finer the grain in the shots you're taking.
- In Digital Photography ISO measures the sensitivity of the image sensor. The same principles apply as in film photography – the lower the number the less sensitive your camera is to light and the finer the grain. Higher ISO settings are generally used in darker situations to get faster shutter speeds (for example an indoor sports event when you want to freeze the action in lower light) – however the cost is noisier shots

**ISO** measures the sensitivity of the sensor or film to light.

↓ THE SMALLER THE ISO = ↓ LESS SENSITIVE TO LIGHT SENSOR IS

↑ THE BIGGER THE ISO = ↑ MORE SENSITIVE TO LIGHT SENSOR IS

- For the best picture quality, you want to have the lowest possible ISO number.
- For low light situations without a tripod and long shutter speed, you would want to use a higher ISO number but your image could be noisy / grainy.
- Some photographers use the noise/grain to get a “film effect”.

## These are full stops of ISO

100

200

400

800

1600

3200

← **less sensitive**

**more sensitive** →

- low noise (grain)
- sharper image
- richer colors

- more noise (grain)
- less sharp image
- dull colors

- outdoor photography
- photography with flash
- long exposures (slow shutter speed)

- low light situations with no flash (indoor, concerts, sport events ...)
- using very fast shutter speed
- if you want to add grain to your image

# Compression

Compression can be lossless as in RAW and TIFF  
(when used) or as in a .zip file.

Or it can toss "unnecessary" data away  
as in JPEG, MP3 and MP4.

The data are lost forever.

You don't notice the missing data if the  
compression is done right.

## What does it all mean?

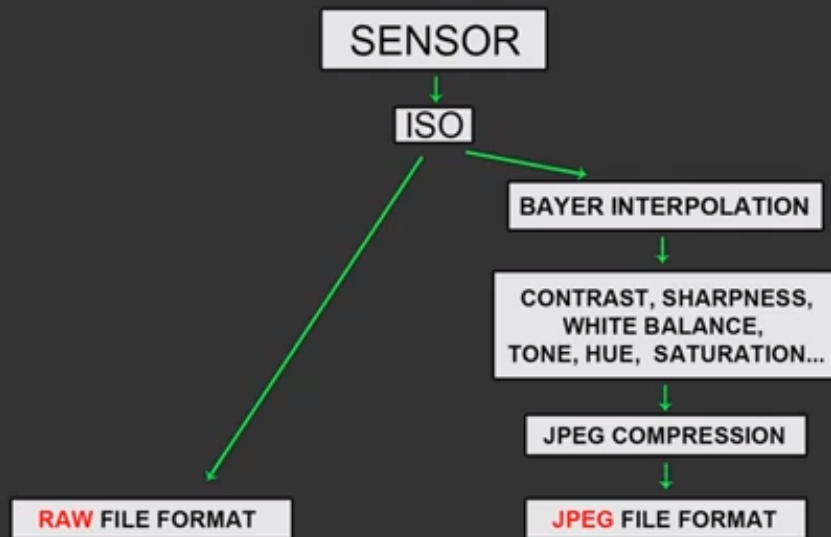
### RAW

- Image file
- "digital negative"

### JPEG

- It is a standard method of compressing photographic images
- JPEG stands for Joint Photographic Experts Group, the original name of the committee that wrote the standard.

## RAW vs JPEG



## RAW files

### Pros

1. No data is lost
2. Allows you to correct mistakes made at the time of exposure
3. You have a lot of flexibility with manipulating the image in post
4. Adjustment made in postprocessing are non-destructive

### Cons

1. Very large files compare to jpeg
2. Images can't be used immediately for printing, e-mailing, etc.
3. Special program is needed to edit images and turn them to jpegs
4. Require time and effort to "develop"



## JPEG files

### Pros

1. File size is much smaller
2. No need for postprocessing
3. Files are ready to go for print, e-mail, etc.
4. It is easy to view and edit with any image editing program
5. JPEG allows you to fire your camera more rapidly

### Cons

1. Compressed files lose some image data
2. It is more difficult to correct mistakes of color and exposure
3. You have less control over the way your final image appears