

Photography 101 Understanding your camera for better photography

List of things covered

Types of cameras
Lens Aperture
Shutter speeds
ISO – “Film” Speed
Exposure modes
Depth of field
White balance

Point & Shoot Advantages

Twist out LCD preview screen
Relatively cheap (including additional lenses).
Small and light weight – May always have it with you
Awesome DOF due to small CCD (sensor) size.
Rivals an SLR for snapshots
Movie capabilities

Point & Shoot Disadvantages

Very limited ISO settings available
Use of auto focus is slow and not very effective in low light.
Expansion options are limited.
Flash close to the lens (Increases chances of red eye)
Shutter lag

SLR Advantages

Quality of the image.
Range of ISO settings available.
Quicker and more effective auto focus.
A lot of flexibility in the lenses available.
Possibility for even greater DOF at high magnifications
Many flash options

SLR Disadvantages

Relatively expensive.
No LCD preview screen (you have to put your eye to the viewfinder).
Relatively heavy and more bulky

How light reaches the “film”

- Lens opening:
 - Determines how much light reaches the “film”
- Shutter Speed:
 - Length of time opens determines how long “film” is exposed to the light

Question: How do you fill up a bucket of water???

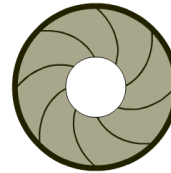
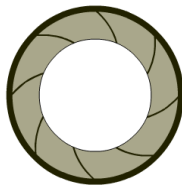
Aperture & fstops

- Aperture – Opening of the lens
- fstop – number representing:
 - Ratio of lens opening to the lens length

fstop = focal length of lens / Aperture diameter

$$f\ 4.0 = \frac{4'' \text{ Lens (100 mm)}}{1'' \text{ Diameter (25 mm)}}$$

$$f\ 8.0 = \frac{4'' \text{ Lens (100 mm)}}{.5'' \text{ Diameter (12.5 mm)}}$$



Whole “Stops”

– 1.4 **2.0** 2.8 **4.0** 5.6 **8.0** 11 **16** 22 **32**

Large fstops (ie. f 2.0) let in large amounts of light when shutter is open

Small fstops (ie. f 22) let in a small amount of light when the shutter is open

Most cameras allow increments of 1/2 and/or 1/3 stops

Large apertures require larger “glass” = \$\$

1 “stop”

f 4.0 → f 5.6 = cutting light in half

f 5.6 → f 4.0 = doubling the light

- One of the 2 “primary” adjustments for proper exposure

Shutter Speeds

Duration of exposure

SLR uses moving curtains (2) (focal plane)

1/30 1/60 1/125 1/250 1/500 1/1000 second

Many readouts only show the denominator

Also called a “stop”

Faster shutter speeds stop action

Bulb – Shutter stays open until released

The other primary exposure adjustment

Handholding camera: 1/focal length

IS or VR lens/camera allows a “slower” shutter speed

Many combinations of fstops and shutter speeds produce the same exposure.

Example:

1/30 @ f 16 Metered

1/60 @ f 11

1/125 @ f8.0

1/250 @ f 5.6

1/500 @ f 4.0

1/1000 @ f 2.8

1/2000 @ f 2.0

Exposure - fstops

Use smaller fstops to:

Increases depth of field or
Allow slower shutter speed

Use larger fstops to:

Decrease depth of field or
Allow faster shutter speeds

Exposure - fstops

Use faster shutter speeds to:

Stop action or
Allow larger fstops (Less D.o.F)

Use slower shutter speeds to:

Blur action
Allow smaller fstops (More D.o.F)

ISO "Film Speed"

Sensitivity of the media or film

Common: 100, 200, 400, 800, 1600

Film, the entire roll is the same film speed

Digital, may be changed for each shot

Grain (film) & noise (digital) increases with speed

ISO 200 → ISO 100 = increase required exposure by 1 stop

ISO 100 → ISO 200 = decrease required exposure by one stop

- A third "primary" adjustment for proper exposure (digital)

Exposure Modes

- Program
Camera determines fstop/shutter speed
- Shutter priority
User determines shutter speed
Camera determines fstop
- Aperture priority
User determines fstop
Camera determines shutter speed
- Manual
User determines fstop & shutter speed

Dedicated Exposure Modes

- "Non-thinking" modes
Auto (Green Box – Canon)
Sports
Scenic
Portrait
Close-up
Night scenes
- Camera determines...
Shutter speed, fstop, drive, flash, ISO etc.
User determines : Nothing

Sunny 16 Rule

Mid-day sun, Front lit subject = 1/ISO @ f 16

Example ISO 400 = 1/400 @ f 16

- 1 = BRIGHT = Sunny day on snow or sand.
- 0 = SUNNY = Bright sunny day, sharp shadows.
- +1 = HAZY = Sun through haze or thin high clouds, distinct but soft shadows.
- +2 = CLOUDY = Bright cloudy day, very soft shadows.
- +3 = OVERCAST = Overcast day or open shade, no shadows.
- +4 = HEAVY = Heavily overcast day.
- +5 = DEEP = Deep shade or deep woods on sunny day.
- +6 = STORM = Just before heavy storm. Deep woods on overcast day.
- +7 = OFFICE = Brightly lit office or store interior.
- +8 = STAGE = Well-lit stage or indoor sports arena.
- +9 = HOME = Well lit home.
- +10 = SOFT = Softly-lit home.

Depth of Field

The area before and behind a subject that is in “acceptably sharp” focus

Varies with:

- fstop
- Focus distance
- Focal length of lens

Closer focusing distance = less depth of field

Larger fstop = less depth of field

Longer lens = less depth of field

Closer focusing distance = less depth of field

100 mm lens focused at 30 feet @ f/16

D.o.F = 23.5 feet to 41.4 feet (17.8')

100 mm lens focused at 10 feet @ f/16

D.o.F. = 9.2 feet to 11 feet (1.8')

Larger fstop = less depth of field

100 mm lens focused at 10 feet @ f/16

D.o.F = 9.2 feet to 11 feet (22")

100 mm lens focused at 10 feet @ f/2.8

D.o.F. = 9.84 feet to 10.2 feet (4")

Longer lens = less depth of field

100 mm lens focused at 10 feet @ f/16

D.o.F = 9.2 feet to 11 feet (22")

400 mm lens focused at 10 feet @ f/16

D.o.F. = 9.95 feet to 10.05 feet (1.2")

More DOF

Smaller fstop

Wide angle Lens

Focus farther from camera

Higher ISO (allows smaller fstop)

Less DOF

Larger fstop

Telephoto lens

Focus closer to camera

Lower ISO (larger fstop)

For a given lens, focusing distance and fstop, “Cropped cameras” usually list smaller DOF compared to “Full Frame” cameras. This is due to greater enlargement for a given print size.

White Balance

- Our *brain* calculates what the “color” should be (snow is white?)
- Our eyes compensate for color shifts
- Color temperature of the “film”
 - Film: fixed for entire roll (Tungsten, Daylight)
 - Digital: may be changed each shot
- AWB (Auto White Balance)
 - Digital only
 - Works in many cases
 - You may or may not like the camera choice
 - May be only choice on “Automatic/Program”
- Primary custom settings
 - Daylight Flash
 - Tungsten Cloudy
 - Kelvin Fluorescent
- Using Preset White Balance Functions
 - Tungsten, Flash, Sunlight, Cloudy, etc.
 - More Control: Part of pre-shot routine