Understanding –
ISO
Aperture
Shutter Speed
ISO

APERTURE
F stop

SHUTTER SPEED
ISO

- AUTO: More sensitive to lower light
- 100: Highest Quality
- 200
- 400
- 800
- 1000
- 1600: Lower Quality, More Noise
Aperture and Depth of Field
Aperture – an adjustable opening in a diaphragm in a lens
Lens Opening = Aperture = f-stop

2.8 * 4 * 5.6 * 8 * 11 * 16 * 22

Larger Opening ↔ Smaller Opening

More light ↔ Less light

More exposure ↔ Less exposure

X 2 ↔ X 1/2

Small depth of field ↔ Large depth of field
DEPTH OF FIELD
DEPTH OF FIELD

f4 = small Depth of Field
DEPTH OF FIELD

f4 = small Depth of Field
DEPTH OF FIELD

f16 = large Depth of Field
Depth of Field is determined by:

1. Aperture
2. Focal Length
3. Distance to the subject
Lens Opening = Aperture = f-stop

2.8 * 4 * 5.6 * 8 * 11 * 16 * 22

Larger Opening  Smaller Opening

More light  Less light

More exposure  Less exposure

X 2  X 1/2

Small depth of field  Large depth of field
Lens Opening = Aperture = f-stop

2.8 * 4 * 5.6 * 8 * 11 * 16 * 22

Small Number ↔ Large Number

Small depth of field ↔ Large depth of field
Lens Opening = Aperture = f-stop

Smallest Number  \(\rightarrow\)  Largest Number

Smallest depth of field  \(\rightarrow\)  Largest depth of field
Where to focus?
Where to focus?
DEPTH OF FIELD

f16 = large Depth of Field

1/3  2/3
Shutter Speed

1000  500  250  125  60  30  15

Short Time ← Long Time

Less Light ← More Light

Less Exposure ← More Exposure

Stop Motion ← Blur Motion
SHUTTER SPEED

1/250 sec
SHUTTER SPEED

1/15 sec
SHUTTER SPEED
1/250 sec
SHUTTER SPEED

1/15 sec
1/250 sec
Where else might there be motion?

This is called “camera shake.”
Hand holding the camera

Using a tripod
Hand Holding the Camera
Hand Holding the Camera
Hand Holding the Camera

• **RULE OF THUMB:**

Use a shutter speed that is at least of fast as \( \frac{1}{\text{lens focal length}} \)
Hand Holding the Camera

If the Focal length = 200 mm

Then the Shutter Speed = 1/200 sec.
Or 1/300
Or 1/500
Or 1/1000
What is the focal length?

A fast shutter speed will help to eliminate "camera shake."
Hand Holding the Camera

If you have a zoom lens 70 - 200 mm,

What shutter speed should you use?

Shutter Speed = 1/200 sec.  ???
What about “lens crop factor”? 

- For cameras with less than a full frame sensor, the crop factor is generally 1.5 
- Therefore, a 200mm lens becomes a 300 mm
What is the focal length?
Hand Holding the Camera

With a crop factor of 1.5,

Focal length = 200 mm

Shutter Speed = 1/200 sec.
What about -

- Image Stabilization
- Vibration Reduction

These can improve your shutter speed by 2 or 3 stops.
Hand Holding the Camera

With a crop factor of 1.5,

Focal length = 200 mm

1/40 ← 1/80 ← 1/150 ← 300

Shutter Speed = 1/200 sec.
Hand Holding the Camera

• Apply your lens Crop Factor

• When shooting, pay attention to your shutter speed!

• Image Stabilization helps
How to get the shot you want.
Set your ISO - Low

Select your largest f-stop

The camera will figure out the shutter speed.
Set your ISO - Low

ISO

The camera will figure out the f-stop.

APERTURE
F stop

Select a fast shutter speed

SHUTTER
Set your ISO - Low

Select your smallest f-stop

The camera will figure out the shutter speed.
Set your ISO - Low

ISO

Select a fast shutter speed

APERTURE F stop

The camera will figure out the f-stop.
ISO

APERTURE
F stop

SHUTTER SPEED
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Set your ISO - Low

APERTURE
F stop

The camera will figure out the f-stop.

ISO

SHUTTER SPEED

Select a fast shutter speed
ISO = 200
ISO

200  Highest Quality
400
800
1000
1600  Lower Quality, More Noise
ISO = 400
ISO = 800