

Capturing the Picture You Want



Getting Off Automatic

Using Shutter Speed, f/stops and ISO to Your Advantage



Today's Schedule

- ⦿ Presentation 45 minutes or so.
- ⦿ At end of each topic there will be time for Questions.
- ⦿ Shooting assignment for putting to use things learned.
- ⦿ Ask questions on items that aren't clear during presentation. If something isn't clear you are probably not alone.

Exposure Triangle

🎥 An *Exposure*, *Aperture* & *ISO Speed* card like this covers a majority of today's class key points on one page.

🎥 Search “Exposure Triangle Sheet”

Photography Cheat Sheet Time to lay off that auto-setting!

EXPOSURE

-3 -2 -1 0 +1 +2 +3

DARKER UNDEREXPOSED BRIGHTER OVEREXPOSED

APERTURE

f/2 f/2.8 f/4 f/5.6 f/8 f/11 f/16

BRIGHTER SHALLOW DEPTH OF FIELD DARKER SHARPER IMAGES

SPEED

B 30" 15" 10" 2" 1" 1/25 1/30 1/50 1/100 1/125 1/250 1/320

BRIGHTER SLOWER DARKER FASTER

ISO

100 200 400 800 1600 3200

DAYLIGHT (WELL LIT) MORE CRISP PHOTOS NIGHT (DARK) HIGH POSSIBILITY OF NOISE

WHITE BALANCE

AUTO DAYLIGHT SHADE TUNGSTEN FLUORESCENT

*VALUES SHOWN ABOVE ARE FOR ILLUSTRATION PURPOSES ONLY AND MAY VARY FROM CAMERA TO CAMERA.
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Capturing the Photo You Want



Later in the program
the settings & rationale
for these photos are
covered.



Capturing the Photo You Want





Capturing
the Photo
You Want



Capturing the Photo You Want

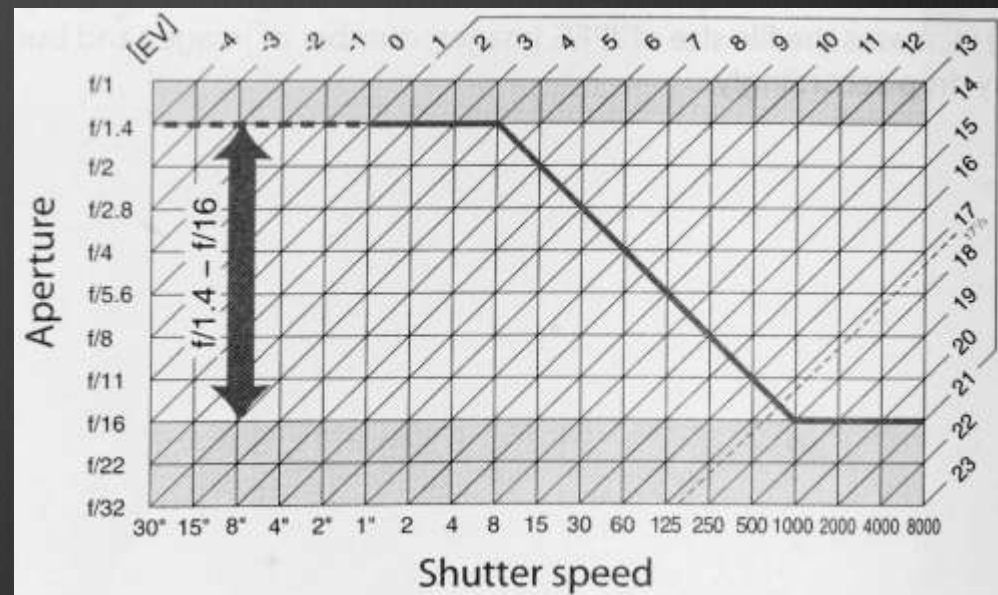


Capturing the Photo You Want



Capturing the Photo You Want

- When set on Automatic the camera has its own built-in logic for setting shutter speed and lens opening (aperture or f/stop). Most can add in adjusting the ISO too.
- That logic may not give you what you want.
- To understand the control you have over the image we need to look at....



Shutter Speed, f/stop & ISO



- ❉ To make a properly exposed image you need to capture the right amount of light.
- ❉ Controlled by: Shutter speed, f/stop and ISO speed.



The Goal - Overview

- Understand the variables in collecting light and their impact on the image.
- Think of the light collection as filling a glass of water to the brim from a kitchen sink faucet.
- We want to fill the glass just full.
 - If not full, the image is underexposed and too dark.
 - If running over, the image is overexposed and too bright.



Analogy for Exposure

There are 3 variables for light collection.

- ⦿ Shutter speed equals how long we leave the faucet on. A longer time puts more water in the glass.
- ⦿ f/stop is how big the faucet is. A bigger faucet fills the glass faster.
- ⦿ ISO is how big the glass is. A bigger glass takes longer to fill.



Shutter Speed

- ⦿ Shutter speeds can range from several seconds to as short as $1/32,000$ of a second.
- ⦿ A partial list of full steps look like this: $1/30$, $1/60$, $1/125$, $1/250$, $1/500$ and $1/1000$ of a second.
- ⦿ The speeds double in the progression, each step letting in half as much light as the previous step.

Effects of Various Shutter Speeds

A slower shutter speed blurs action while a faster shutter speed freezes motion.



Shutter Speed Examples



1/6,400 second

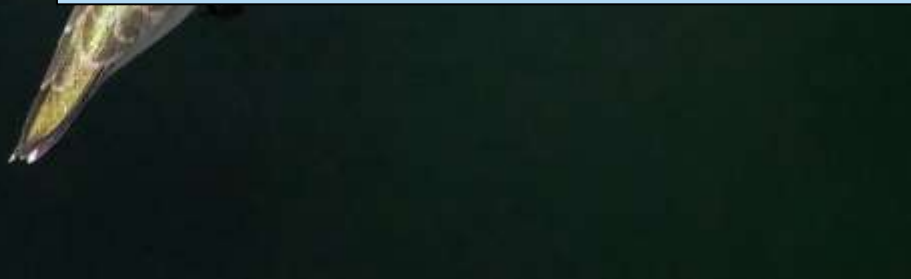


1 second

Shutter Speed Examples



Questions?

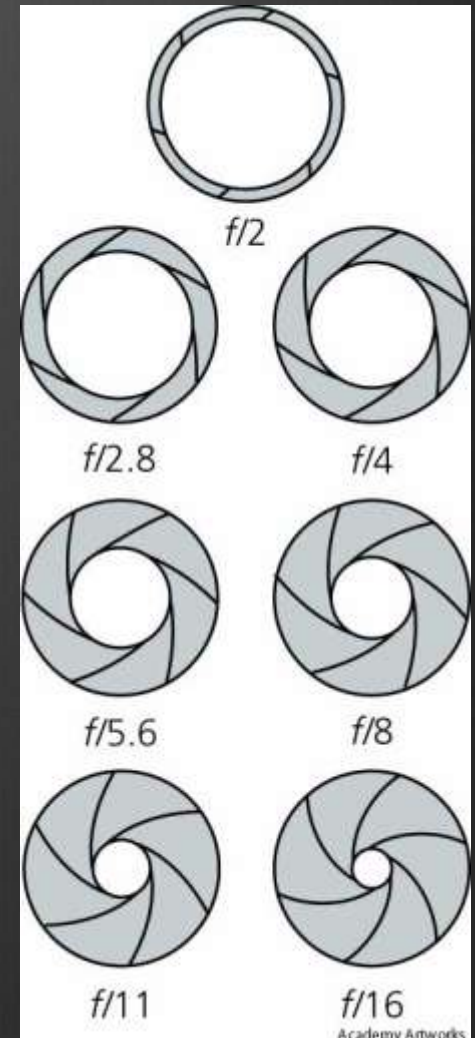


1/2,000 second

1 second

f/stop or Aperture

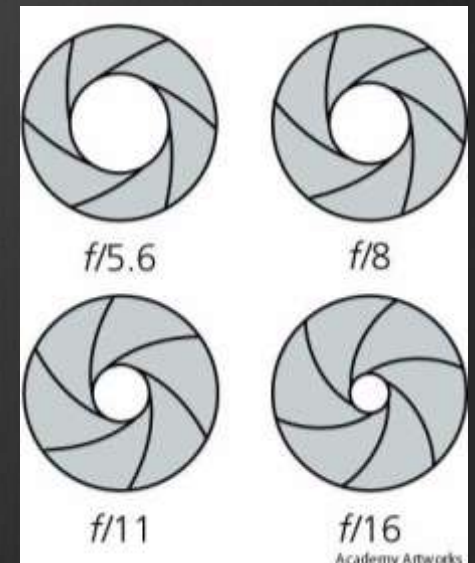
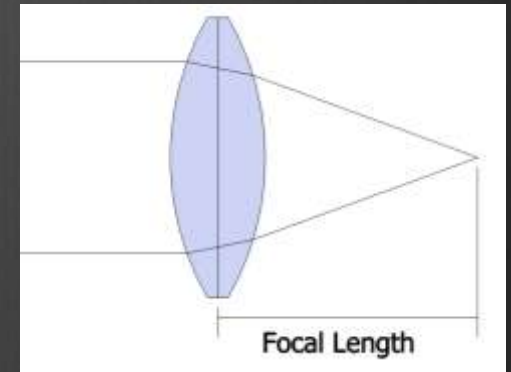
- ❁ In our glass of water analogy f/stop is how big the faucet is. A bigger faucet fills the glass faster.
- ❁ The smaller the f/stop number the bigger the opening. A partial list of full f/stops looks like the illustration.
- ❁ Each stop increase lets in half as much light as the previous step.



f/stop or Aperture

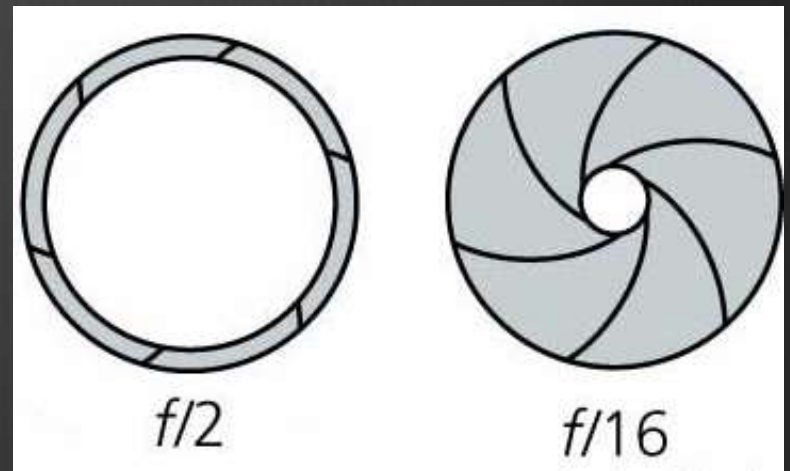
Geek Alert! More than you want to know.

- 🎬 The definition of f/stop is:
“The ratio of the focal length of the lens to the diameter of the aperture.”
- 🎬 Example: A lens with a focal length of 80mm and an aperture opening of 10mm equals f/8, ($80/10 = 8$).



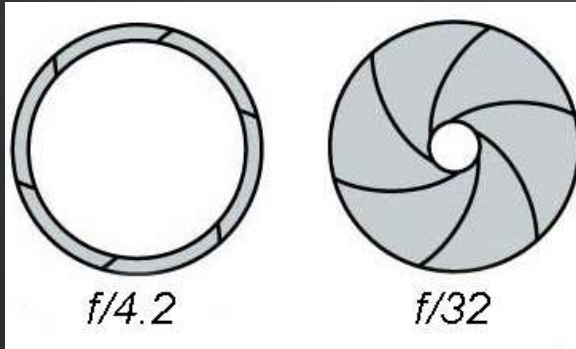
Depth of Field

- *Depth of Field* (DoF) is the distance between the nearest and farthest objects that appear in focus in a photograph.
- The *Depth of Field* changes with the f/stop.
- A bigger opening like f/2 gives less of a *Depth of Field* than a smaller opening like f/16.



Depth of Field

An example of going from a big ($f/4.2$) to a small, ($f/32$) aperture. Focus is on the salt container.



DoF can guide what we want people to focus on.

Depth of Field

- There are two other items that impact the Depth of Field.
 - The focal length of the lens. A longer lens has a shallower the depth of field. For example, a 300mm telephoto lens will have a shallower DoF than a wide angle 18mm lens.
 - Distance to subject. The closer you are to the subject the shallower the depth of field.

Depth of Field

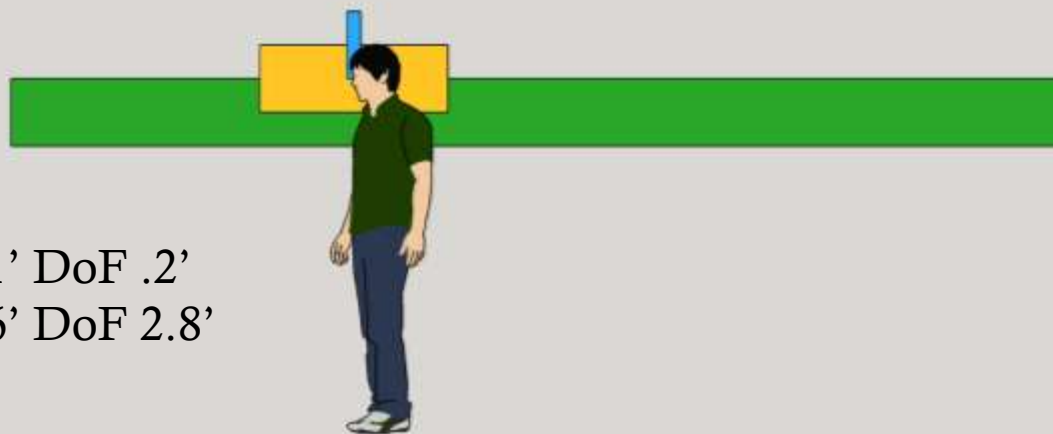
At distance of 10' with different *f/stops*.

The smaller the f/stop the greater the depth of field.



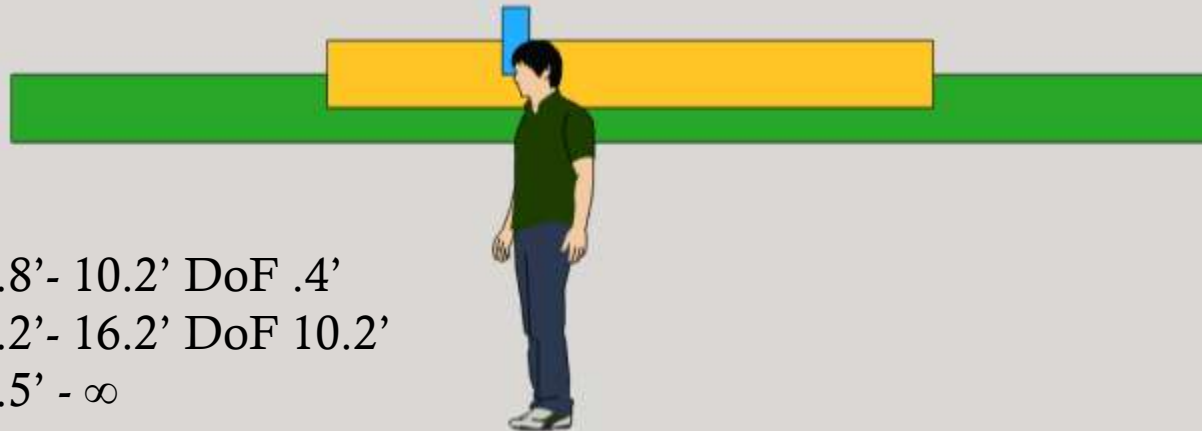
f/5.6

Blue	200mm	9.9' - 10.1' DoF .2'
Yellow	50mm	8.8' - 11.6' DoF 2.8'
Green	18mm	4.9' - ∞



f/16

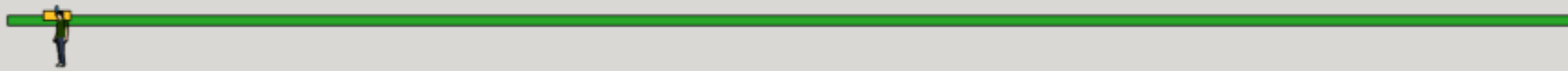
Blue	200mm	9.8' - 10.2' DoF .4'
Yellow	50mm	7.2' - 16.2' DoF 10.2'
Green	18mm	2.5' - ∞



Depth of Field

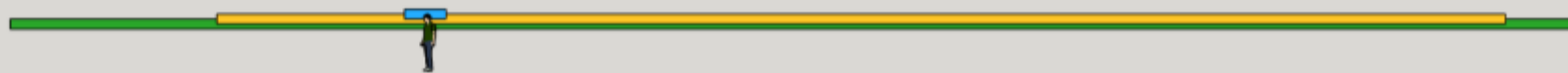
An f/stop of 5.6 at different *Distances*

The greater the distance the greater the depth of field.



Camera to Subject 10'

Blue	200mm	9.9' - 10.1' DoF .2'
Yellow	50mm	8.8' - 11.6' DoF 2.8'
Green	18mm	4.9' - ∞



Camera to Subject 50'

Blue	200mm	48' - 52.2' DoF 4.2'
Yellow	50mm	29.6' - 160' DoF 130.4'
Green	18mm	7.9' - ∞

Depth of Field Examples

Adjusting f/stop can isolate the subject from background or bring everything into focus.

f/5.6



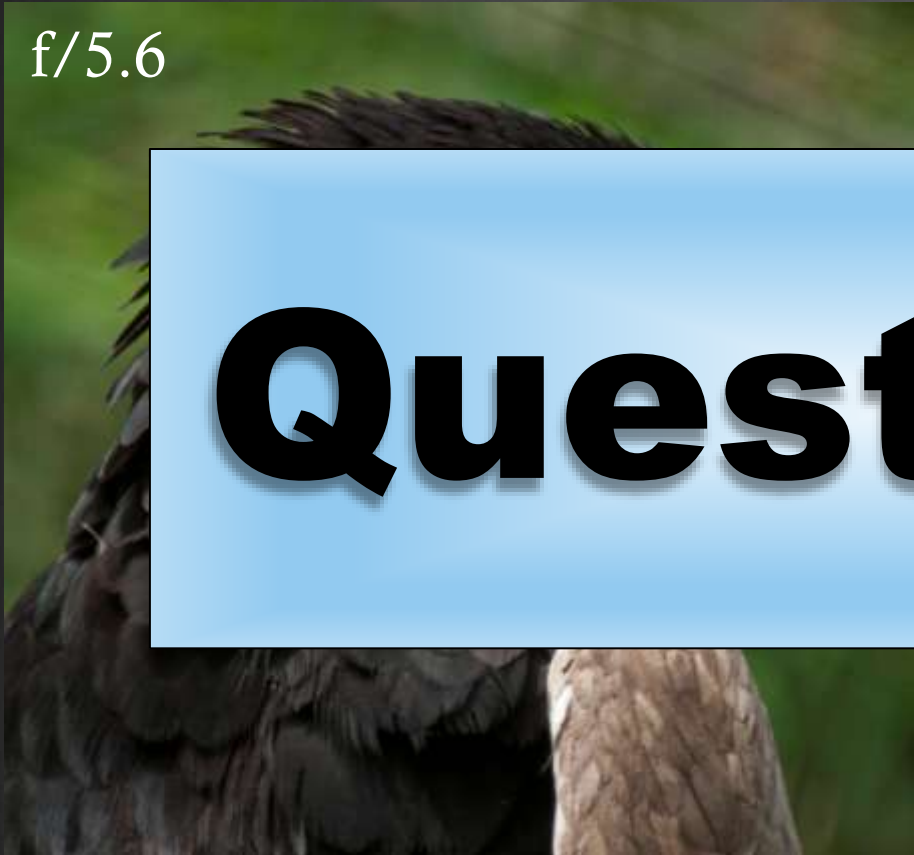
f/22



Depth of Field Examples

Adjusting f/stop can isolate the subject from background or bring everything into focus.

f/5.6



f/22



Questions?

ISO

- 🎬 In our glass of water analogy ISO is how big the glass is. A bigger glass takes longer to fill while a smaller glass takes less time.
- 🎬 The higher the ISO the more sensitive the camera is to light. For example, an ISO setting of 200 needs half as much total light as ISO 100 and twice as much as ISO 400.
- 🎬 This means at a higher ISO a faster shutter speed and/or a smaller aperture can be used.

ISO

- ⦿ Why not just set ISO at 6,400 and leave it?
- ⦿ A higher ISO degrades photo quality.
- ⦿ Personal taste, camera's sensor quality and end use of images will determine highest usable ISO.
- ⦿ A newer camera with a better sensor will get better results at higher ISO values.
- ⦿ Generally, a DSLR or mirrorless will be able to use a higher ISO than a Point and Shoot.

ISO

Example of decrease in quality when going from a low to high ISO.

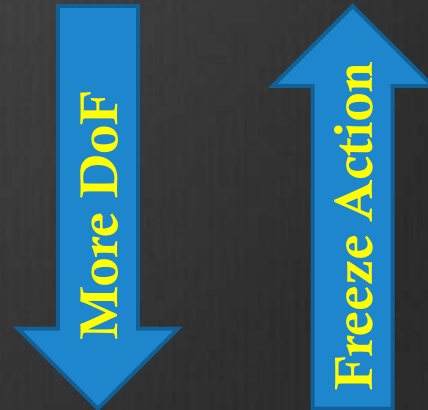


Review

- ⦿ Shutter speed – how long shutter is open.
 - A faster shutter speed freezes motion while a slower shutter speed blurs motion.
- ⦿ f/stop – the size of the lens opening.
 - A bigger opening (f/2) lets in more light and provides less depth of field than a smaller opening like (f/16).
- ⦿ ISO – camera's sensitivity to light.
 - Larger numbers mean greater sensitivity to light but a decrease in quality.

Shutter Speed & Aperture Together

- ⦿ Remember each upward full f/stop or each faster shutter speed step increase lets in half the previous amount of light.
- ⦿ Changing one up and the other down a full step results in the same exposure.
- ⦿ What changes is the depth of field and the ability to freeze the action. The following combinations all give the same exposure:
 - f/4 @ 1/500 of a second
 - f/5.6 @ 1/250 of a second
 - f/8 @ 1/125 of a second
 - f/11 @ 1/60 of a second



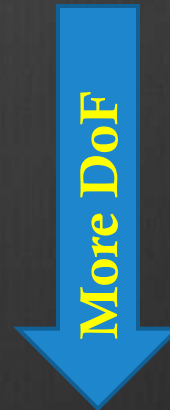
Shutter Speed & Aperture Together

- Remember each upward full f/stop or each faster shutter speed step increases light by $1/16$ th

Questions?

to freeze the action. The following combinations all give the same exposure:

- f/4 @ 1/500 of a second
- f/5.6 @ 1/250 of a second
- f/8 @ 1/125 of a second
- f/11 @ 1/60 of a second



Putting It Together

- ❁ Goal: max. depth of field and long exposure to show flowing water.
- ❁ Exposure: f/22, $\frac{1}{2}$ a second, ISO 100.



Putting It Together

- ❁ By varying the f/stop, shutter speed and ISO we can tailor the exposure to give us the photograph we want.
- ❁ Goal: to freeze as much motion as possible with the background out of focus.
- ❁ Exposure: f/10 for 1/6,400 of a second and ISO of 4,000.



Putting It Together

- 🎥 Goal: maximize depth of field to get as much of flower in focus as possible.
- 🎥 Exposure: f/27, for 1/8 second, ISO 640.
- 🎥 Taken with a tripod.



Putting It Together

- 🎬 Goal: panorama with everything in sharp focus. Image is made from 4 shots stitched together.
- 🎬 Exposure: f/22 for 1/125 of a second, ISO 500.



Putting It Together

- 🎥 Goal: after sunset photo to show the stars and capture last of the sky's colors.
- 🎥 Exposure: f/5.6 for 30 seconds, ISO 400.



Putting It Together

- ❁ Goal: capture photo outside in evening using available dim incandescent light.
- ❁ Exposure: $f/2.0$ at $1/60$ of a second, ISO 3,200.



Putting It Together

- ❁ Goal: adjust depth of field so only the face of the birds are in sharp focus.
- ❁ Exposure: f/5.6 at 1/500 of a second, ISO 640.



Putting It Together

🎥 Goal: photo of the Milky Way.

🎥 Exposure:
f/3.5 at
20 seconds
ISO 4,000.



Putting It Together

🎥 Goal: photo of the Milky Way.

🎥 Exposure:
f/3.5 at
20 seconds
ISO 4,000.



Questions?

Wide Angle & Telephoto

- ⦿ The lens choice can impact the photo.
- ⦿ A Telephoto lens magnifies the image, it pulls objects closer to you and compresses distance. It also magnifies vibration and can result in blurred pictures.
- ⦿ A Wide Angle lens is the opposite. It provides a broader field of view and makes everything seem further away from the camera.

Wide Angle & Telephoto



Wide Angle

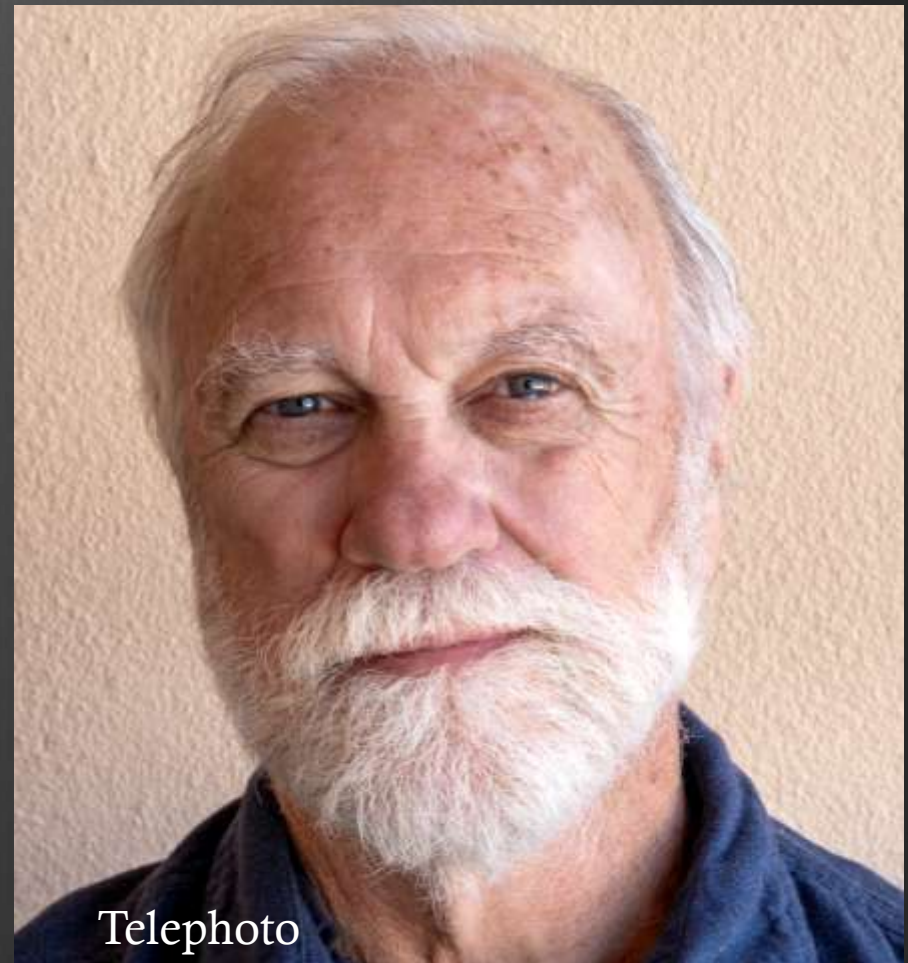
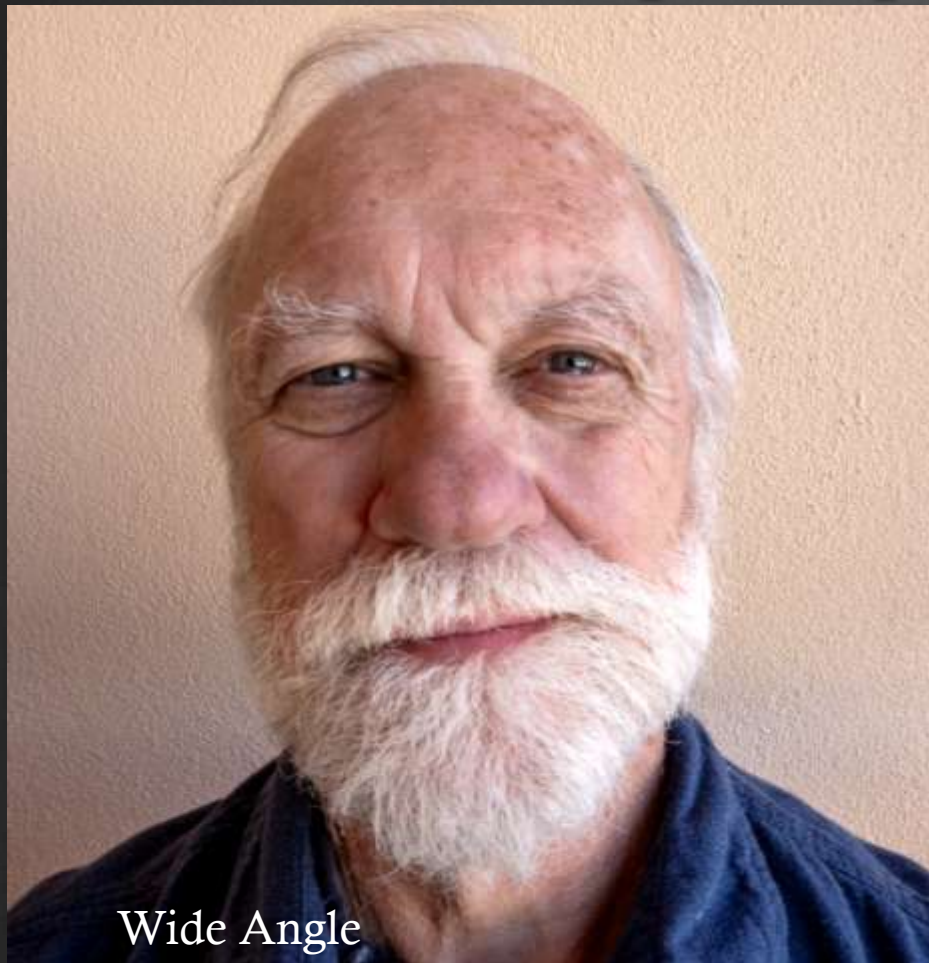


Telephoto

Both these photos were taken from the same spot. Note how the perspective and depth of the images look different.

Wide Angle & Telephoto

A wide angle lens can distort portraits. Using a moderate telephoto provides a better result.



Wide Angle & Telephoto

- ⦿ These two photos are from the same place.
- ⦿ In the right photo I moved so the NASA Rd. sign was the same size when I changed from a telephoto to a wide angle lens.



Wide Angle



Telephoto



Wide Angle

Wide Angle & Telephoto

Questions?



Wide Angle



Telephoto



Wide Angle

Shooting Assignment #1

Pick something in motion to see how the shutter speed, like $1/30$ vs. $1/1,000$ second, impacts the blurriness or sharpness of a moving object.



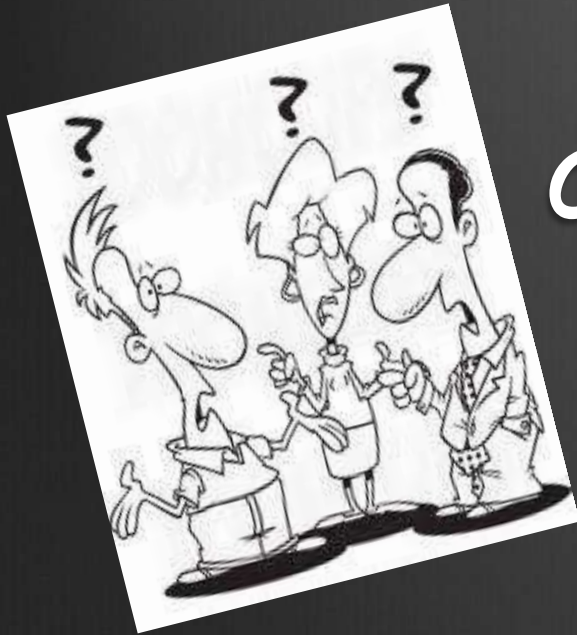
Shooting Assignment #2

Pick a scene to see how different f/stops, like f/2.8 vs. f/22 impact the depth of field. Work to isolate the subject or have everything in focus.



Q U E S T I O N S ?

FEELING
OVERWHELMED?



Shooting Assignments

- Subject in motion to see how the shutter speed, like $1/30$ vs. $1/1,000$ second, impacts sharpness of moving subject.



- Scene to see how different f /stops, $f/2.8$ vs. $f/22$ impact the depth of field. Work to isolate the subject or have everything in focus.

