Photography with the Nikon D3500

An Introductory Guide

MassArt Studio Foundation
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Contents

Digital Single Lens Reflex (DSLR)

DSLR is an acronym for Digital Single Lens Reflex.

DSLR refers to the reflexive mirror inside the camera that allows one to frame the image through the lens prior to capture.
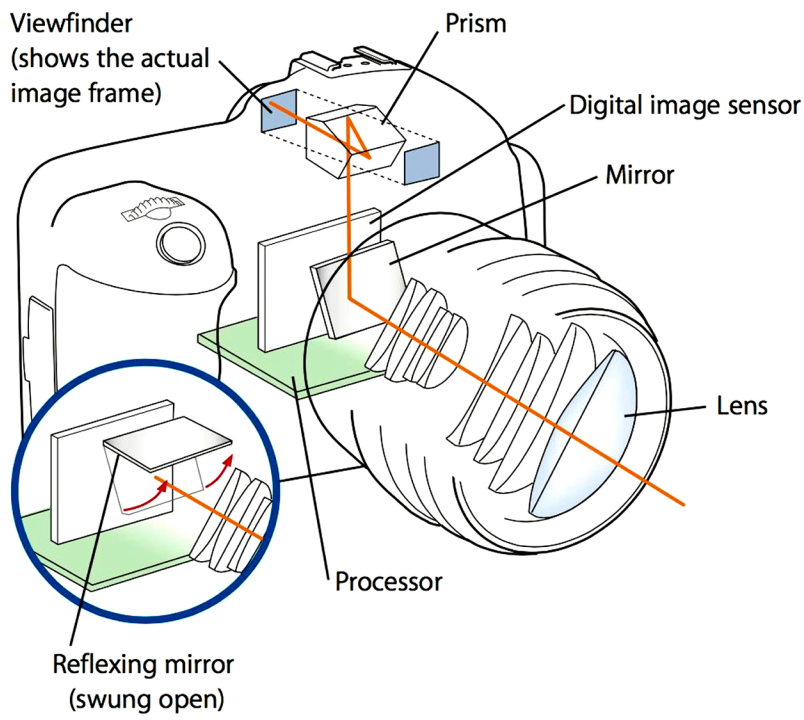
Light passing through the camera lens falls onto a reflexive mirror and then moves upwards through a prism to the viewfinder.

The image in the viewfinder corresponds to the actual image area.

When the picture is taken, the mirror moves up and out of the way and allows the open shutter to expose the digital image sensor, which then captures the image.

Source: Aperture Digital Photography Fundamentals

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Lens

Lenses capture reflective light from a subject and focus it on an image sensor.
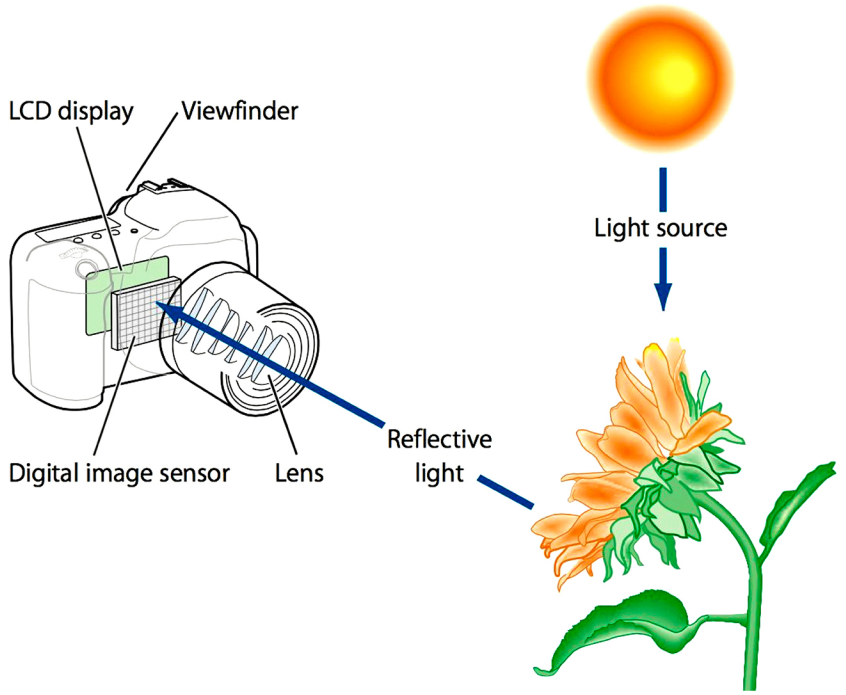
Lenses differ in how they transmit light.

- A **telephoto** lens has a long focal length that magnifies the subject.

- A **wide-angle** lens has a short focal length that takes in a wide view.

- A **zoom** (aka "optical zoom") lens has the capacity to change its focal length.

- A **prime** (aka "fixed") lens has a fixed focal length.

Source: Aperture Digital Photography Fundamentals

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Aperture and Shutter Speed

Aperture is the adjustable opening in the lens that lets light pass through.
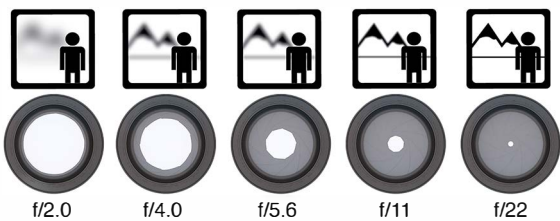
This opening is measured in **f-stops**.

A **stop** is a measure of light).

Each f-stop has half the light-gathering area of the previous one.

f/2.0   f/4.0   f/5.6   f/11   f/22

Depth of Field (DOF) is the area of the image that appears in focus.

DOF is determined by a combination of aperture size and focal length of lens.

Smaller f number: larger opening, shallower DOF, less stuff in focus

Larger f number: smaller opening, deeper DOF, more stuff in focus

f/2.0   f/4.0   f/5.6   f/11   f/22

Shutter Speed refers to the length of time that the camera's shutter is open.

Shutter Speed is displayed in fractions of a second. 1/60 = one 60th of a second.

Shutter Speed has an effect on how motion appears in photos:

Freezes Action   Blurs Action

1/500   1/250   1/125   1/60   1/30   1/15   1/8   1/4   1/2

Aperture and Shutter Speed go hand in hand.

Adjust both to get different, yet correctly-exposed images.

Each exposure pair below allows the same amount of light to enter the camera:

f2.8, 1/2000   f4, 1/1000   f5.6, 1/500   f8, 1/250   f11, 1/125   f16, 1/60

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Controlling Aperture and Shutter Speed

There are several ways to control aperture and shutter speed on the D3500.

Familiarize yourself with the two dials and the button pictured below:

Mode dial   *Command dial*   *Shutter Speed and Aperture*
☒ (⊛) button
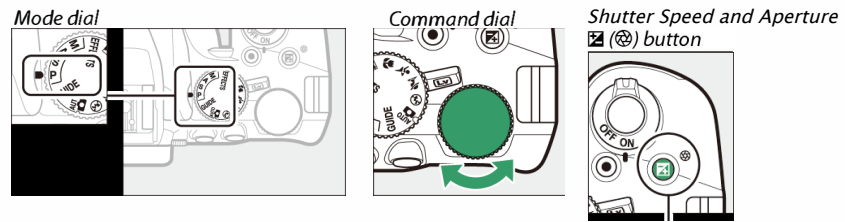
Then, depending on the Exposure Mode you choose:

"P" Programmed Exposure Mode (camera does most of the work for you)
1. Rotate Mode Dial to P
2. Rotate Command Dial right to blur background details or freeze motion
3. Rotate Command Dial left to increase depth of field or blur motion

"S" Shutter Priority Exposure Mode (you control shutter speed only)
1. Rotate Mode Dial to S
2. Rotate Command Dial to select shutter speed (right for faster, left for slower)

"A" Aperture Priority Exposure Mode (you control aperture only)
1. Rotate Mode Dial to A
2. Rotate Command Dial to select aperture (left for larger opening, right for smaller)

"M" Manual Exposure Mode (you do all the work)
1. Rotate Mode Dial to M
2. Rotate Command Dial to select shutter speed (right for faster, left for slower)
3. To adjust aperture, keep the ☒(⊛) button pressed while rotating Command Dial (left for larger opening, right for smaller)

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ISO

The ISO value controls how sensitive the camera's image sensor is to light.

| ISO 50 | ISO 100 | ISO 200 | ISO 400 | ISO 800 | ISO 1600 | ISO 3200 | ISO 6400 | ISO 12800 | ISO 25600 |

The ISO value is a number that ranges from 100 to 3200 on most digital cameras.

The lower the ISO number, the less sensitive the image sensor is to light.
As the ISO number doubles, so does the sensitivity of the image sensor.
High ISO values require less light but can produce excessive digital noise ("grain").

| ISO 100 | ISO 800 | ISO 1600 | ISO 3200 |

Stick to the lowest ISO (100 or 200) when there is plenty of light
(to retain the most amount of detail and to have the highest image quality).

Increase ISO when there isn't enough light to quickly capture an image
(when shooting indoors without a flash and when you want to get ultra-fast shots).

1 **Display ISO sensitivity options.**
Press the *i* button, then highlight the current ISO sensitivity in the information display and press ⓞⓀ.

i button
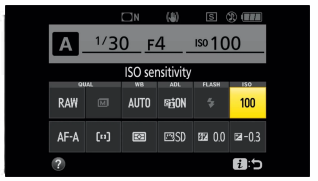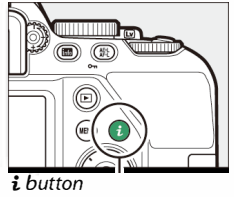
2 **Choose an ISO sensitivity.**
Highlight an option and press ⓞⓀ.
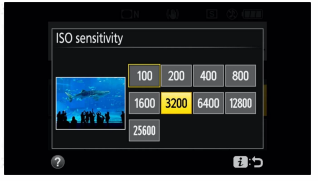
FOR AUTO ISO: Press "MENU">
"ISO sensitivity settings">
"Auto ISO sensitivity"> "ON"

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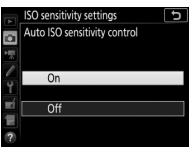
Aesthetic Exposure Triangle

This Aesthetic Exposure Triangle illustrates the aesthetic changes that occur as you individually adjust Aperture, Shutter Speed and ISO.

An appropriate selection of Aperture, Shutter Speed and ISO value contribute to a well-exposed photograph.

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Color Temperature of Light

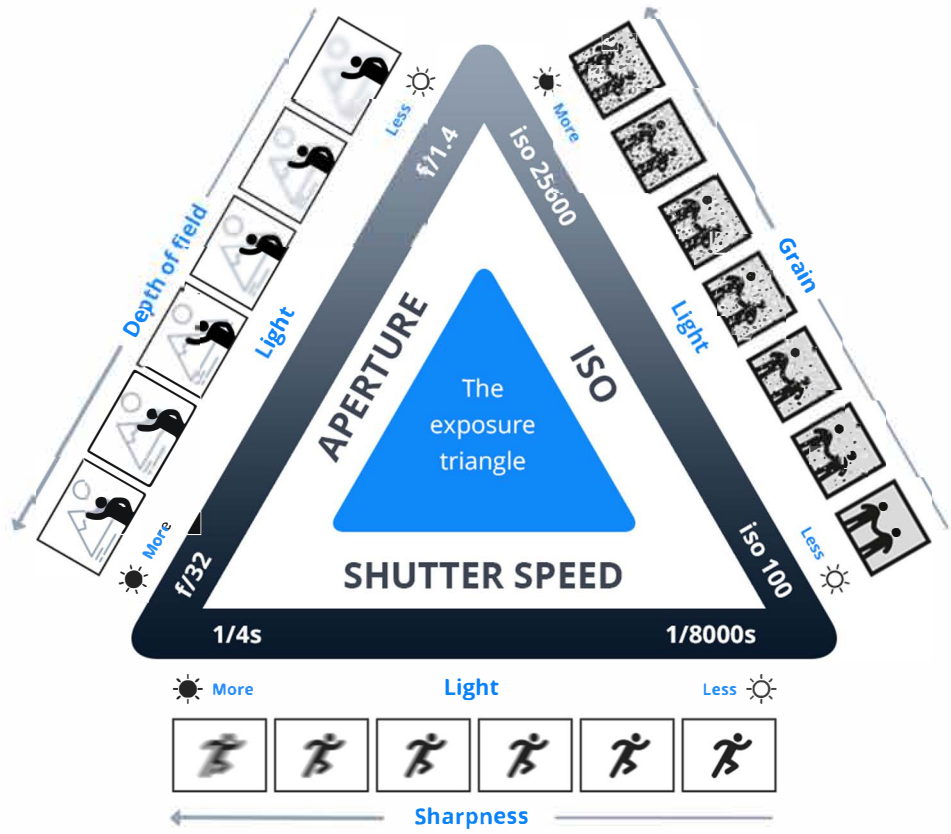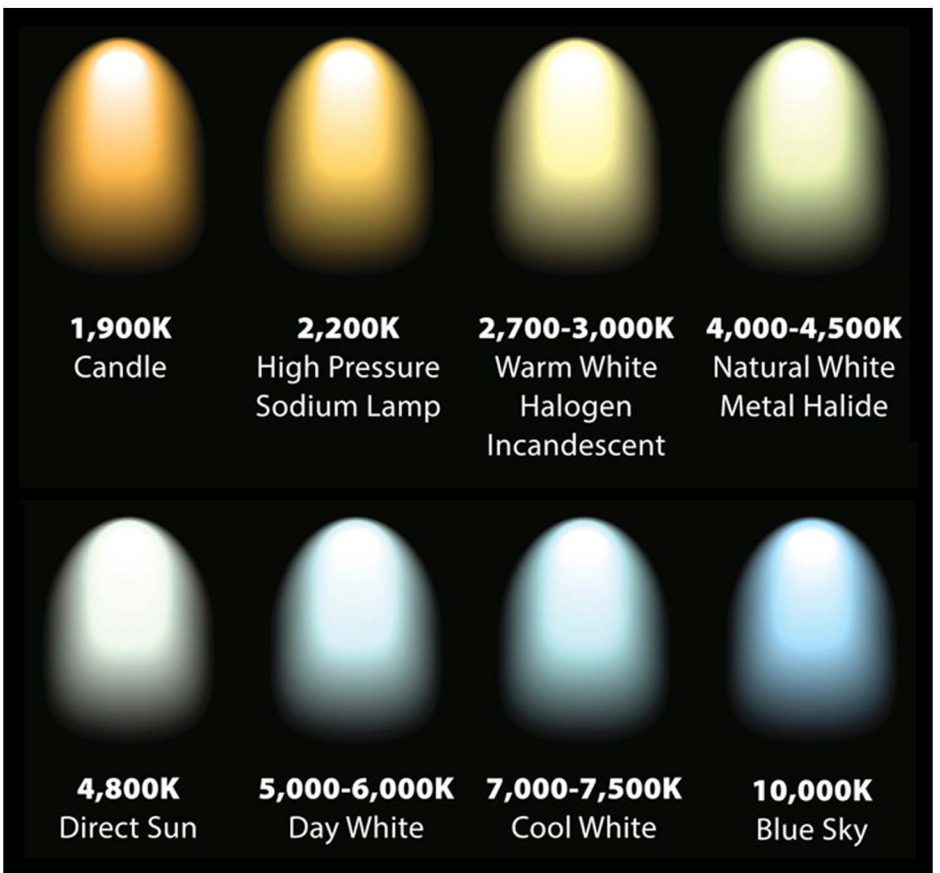**Color temperature refers to the color value of light rather than its heat value.**

Every light source has a color temperature.

Light's color temperature is measured in units called **kelvin (K)**.

The temperature scale below measures the relative intensity of red to blue light.

1,900K Candle	**2,200K** High Pressure Sodium Lamp	**2,700-3,000K** Warm White Halogen Incandescent	**4,000-4,500K** Natural White Metal Halide
4,800K Direct Sun	**5,000-6,000K** Day White	**7,000-7,500K** Cool White	**10,000K** Blue Sky

Warmer light (orange-to-red tint) has a **lower** temperature.

Neutral or balanced light occupies the midranges.

Cooler light (blue in appearance) has a higher temperature.

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White Balance (WB)

"When you take a photograph with a digital camera, the **color temperature** of the scene is not taken into account until the image is processed by the camera's processor. The camera refers to its white balance setting when it processes the image. When the camera's white balance is set to auto, the camera assumes the brightest value is white and adjusts all other colors in the image accordingly. If the brightest value is white, the colors in the image are rendered correctly. If the brightest color is yellow, the camera still assumes that value is white, and shifts all the colors out of balance." (Source: Aperture Digital Photography Fundamentals)

Cameras have **White Balance presets** that mimic different light conditions.

(With **Auto**, the camera chooses the approximate color temperature for you.)

Tungsten	White Fluorescent	Daylight	Cloudy	Flash	Shade	Auto	Custom (10,000K)
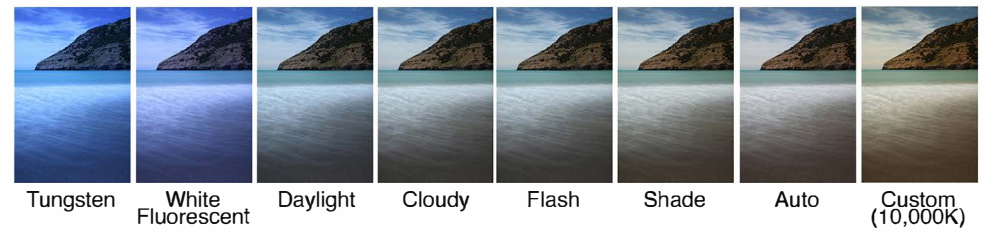
In any shooting situation, you can measure white balance yourself or choose a WB setting that closely matches the specific light conditions.

How to Measure White Balance Yourself

Put blank gray or white object in front of subject
(under same lighting used in the final photograph)

Zoom in on the object so that it completely fills the frame

Press "MENU" > Shooting Menu > "White Balance" >
"Preset Manual" > "Measure" > "Yes" (overwrite existing data)

Quickly take photo of object
(press shutter release button all the way down)

"Gd" flashes in viewfinder (and on screen) when WB process is a success

The message "No Gd" appears when camera is unable to record WB data
*Try adjusting lighting conditions before re-measuring White Balance*

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How to Focus

Select the Focus Mode in the Quick Menu ("i" button) or in the Shooting Menu
Manual focus or one of the Automatic options

While In one of the Automatic modes press the Shutter-Release Button halfway down to focus, press all the way down to shoot

Focus: press halfway   *Shoot: press all the way down*
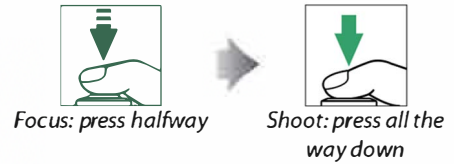
Manual Mode: turn lens focus ring until picture is sharp

Zoom in
Zoom out
Zoom ring
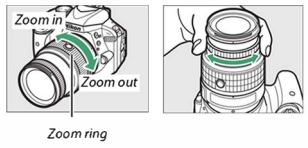
After positioning the subject in the selected focus point, press the shutter-release button halfway and rotate the lens focus ring until you see the in-focus indicator (●)

125 F5.6   [r 12]

AUTOMATIC MODES: press shutter-release button halfway down
A beep will sound and the in-focus indicator will appear when autofocus is complete

OFF ON

125 F5.6   [r 12]

In-focus indicator   Buffer capacity
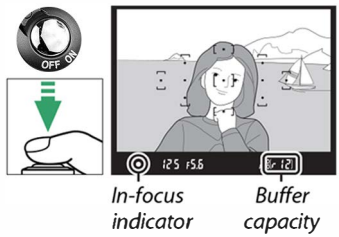
IN ALL MODES: frame the photograph and then shoot

Frame a photo with the main subject in one (or more) of the 11 **focus points** (see "Focus Point Selection" on page 6b)

125 F5.6   [2.0"]

Focus point

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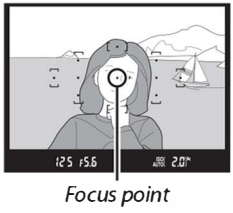
Focus (A Few Notes)

Focus Mode (options)

Focus Mode determines whether D3500 locks focus when shutter-release button is pressed halfway OR adjusts focus throughout recording

AF-A Auto-servo: selects between AF-S (for stationary subjects) and AF-C (for moving subjects)
AF-S Single-servo: locks focus when you press shutter-release button halfway
AF-C Continuous-servo: focuses continuously when you press shutter-release button halfway
MF Manual Focus: (just focus manually instead)

1. Press "i" button, then highlight current focus mode in the info display and press OK

i button
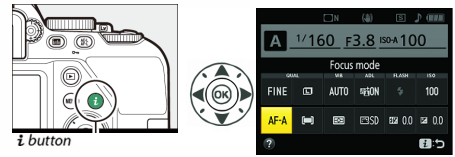
2. Highlight a focus mode and press "OK"

Focus mode
Continuous-servo AF

AF-A AF-S AF-C MF

AF-Area Modes (options)

Determines how D3500 selects focus points for video

Option		Description
[□]	Single-point AF	For stationary subjects. Focus point is selected manually; camera focuses on subject in selected focus point only.
[⊕]	Dynamic-area AF	For non-stationary subjects. **In AF-A and AF-C focus modes**, user selects focus point using multi selector (□ 80), but camera will focus based on information from surrounding focus points if subject briefly leaves selected point.
[3D]	3D-tracking (11 points)	**In AF-A and AF-C focus modes**, user selects focus point using multi selector (□ 80). If subject moves after camera has focused, camera uses 3D-tracking to select new focus point and keep focus locked on original subject while shutter-release button is pressed halfway.
[▦]	Auto-area AF	Camera automatically detects subject and selects focus point.

1. Display AF-area mode options
Press "i" button, highlight current AF-area mode in the info display and press "OK"

i button
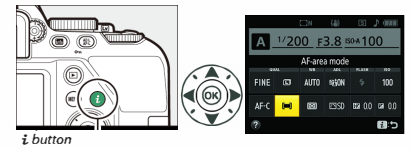
2. Choose an AF-area mode
Highlight an option and press "OK"

AF-area mode
Single-point AF
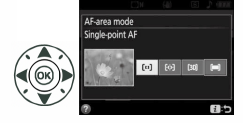
Focus Point Selection

In manual focus mode or when autofocus is combined with AF-area modes (other than Auto-area AF), choose from among 11 focus points to compose shtots with the main subject almost anywhere in frame

1. Return to the shooting display
Press "i" button to return to shooting display

2. Select the focus point
Use multi-selector to select the focus point in the viewfinder (or info display) while exposure meters are on. Press "OK" to select the center focus point

Focus point

Selected autofocus points symbol

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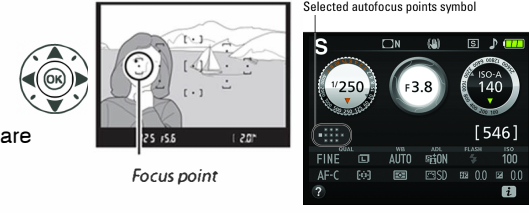
File Formats: "NEF (RAW)" and "JPEG"

A RAW file contains unprocessed image data direct from the camera sensor.

RAW files are much larger in file size than JPEG files.

RAW files are processed on a computer rather than in the camera.

RAW images require RAW processing software such as Adobe Camera Raw.

RAW allows for more control over aspects of image development and exposure.

JPEG files are compressed image files.

The D3500 has three choices for JPEG compression: **fine**, **normal**, and **basic**.

"**fine**" JPEG compression reduces image file size while maintaining image quality.

Too much JPEG compression ("**basic**") can produce image compression artifacts.

Choosing Image Quality and Image Size

i button

Press "i" button

highlight current image quality in info display and press "OK"

highlight a file type option and press "OK"

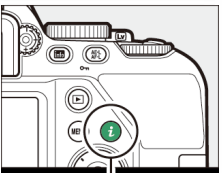**Choose one of the following IMAGE QUALITY options:**

"NEF (RAW) + JPEG fine" (highest quality), "NEF (RAW)" (highest quality), "JPEG fine", "JPEG normal", "JPEG basic"

To choose IMAGE SIZE: press the "i" button, highlight current Image Size, choose one of the following options:

LARGE (6000 pixels by 4000 pixels, 6:4 ratio) (highest quality)
MEDIUM (4496 pixels by 3000 pixels, 6:4 ratio)
SMALL (2992 pixels by 2000 pixels, 6:4 ratio)

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Structure and Resolution of Digital Image

Digital images are formed from **pixels** (px) and each pixel displays one color.
The image below has a total of 24 million pixels (6000 pixels x 4000 pixels).
24 million pixels is abbreviated as 24 megapixels (24 MP).
The D3500 can capture images that contain 24 million pixels.

— 6,000 pixels wide —

4,000 pixels tall
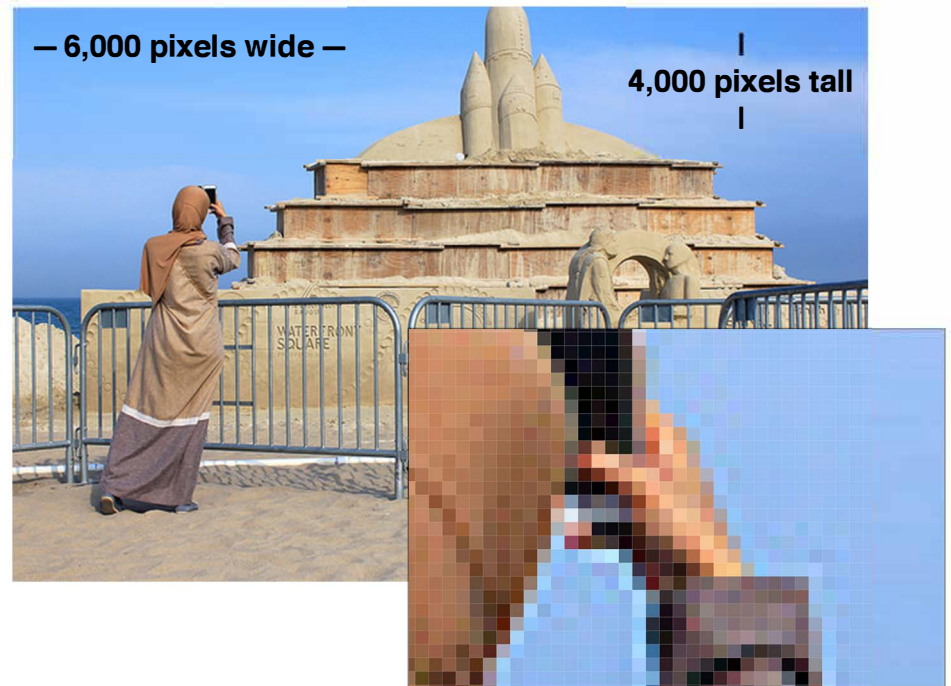
The **resolution** of an image can be expressed in different ways:
1) total number of pixels in the image, expressed in megapixels (MP)
2) number of pixels in the horizontal and vertical dimensions (ex: 6000x4000)
3) physical dimensions of the image along with number of pixels per inch (ppi)

Image Resolution refers to how many pixels will print inside each inch of paper.

Aspect Ratio is the relative shape of the image frame.
An aspect ratio of 4:3 (4 by 3) is the frame shape of old television.
An aspect ratio of 16:9 (16 by 9) is the frame shape of modern television.
The aspect ratio of the image above is 6:4 (6 by 4).

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Shooting Tips

Experiment with angles, distances and points of view (POV)

Notice the light (and its sources and directions)

Shooting Tips

Capture the moment (be ready to shoot quickly)

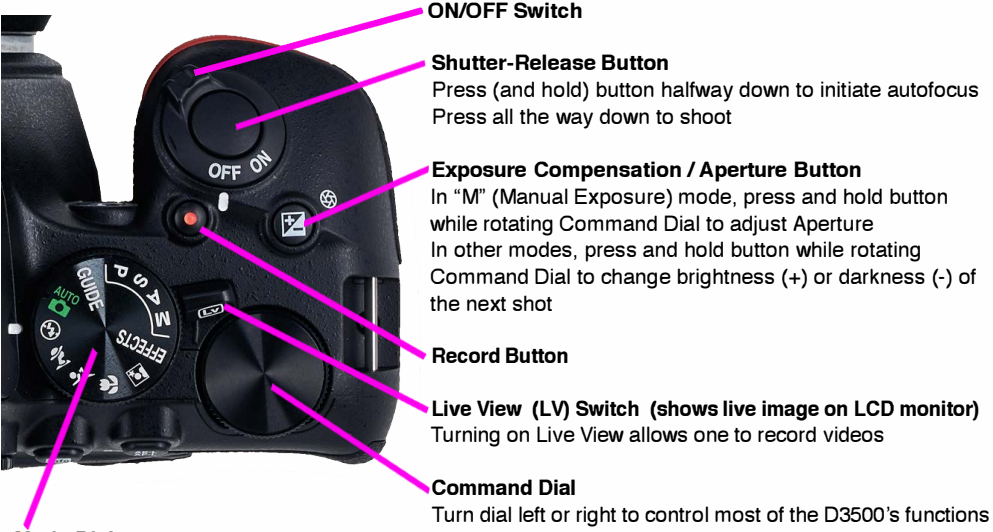

Find a good place to stand

Know the Rule of Thirds

When composing a shot, imagine the picture plane divided into a grid.
Try positioning important elements near the lines and intersections of the grid.
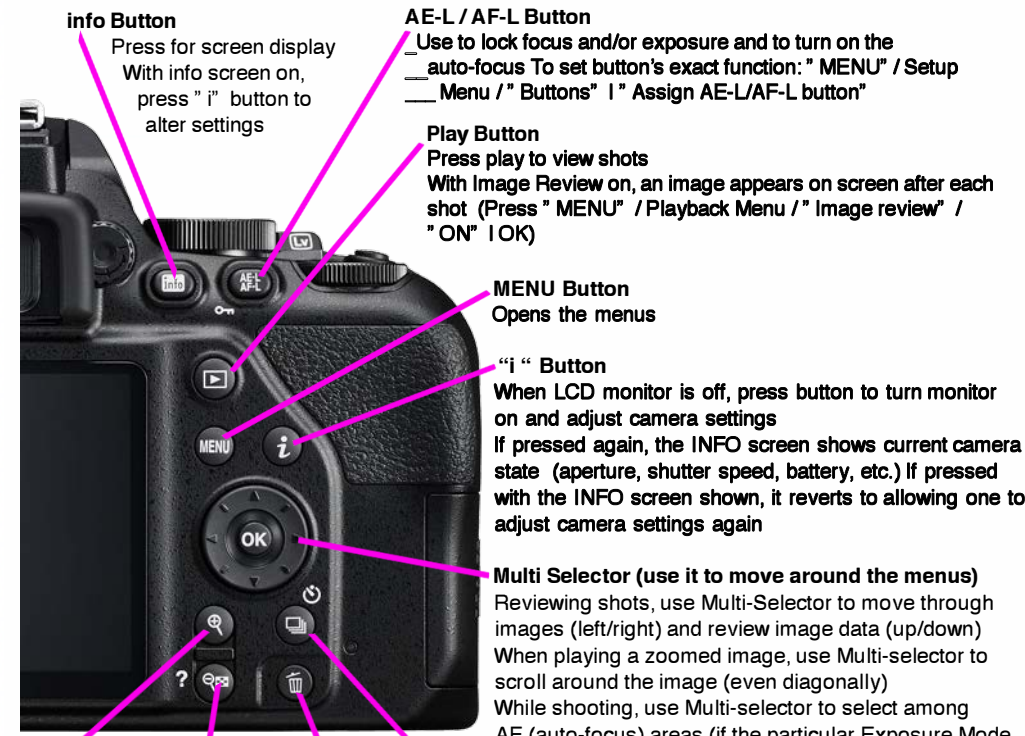
Know Your Equipment

ON/OFF Switch

Shutter-Release Button
Press (and hold) button halfway down to initiate autofocus
Press all the way down to shoot

Exposure Compensation / Aperture Button
In "M" (Manual Exposure) mode, press and hold button while rotating Command Dial to adjust Aperture
In other modes, press and hold button while rotating Command Dial to change brightness (+) or darkness (-) of the next shot

Record Button

Live View (LV) Switch (shows live image on LCD monitor)
Turning on Live View allows one to record videos

Command Dial
Turn dial left or right to control most of the D3500's functions

Mode Dial
Use Mode Dial to select an Exposure Mode (examples: M, A, S or P)
In most cases, "P" (Pro Auto Exposure) works. In P mode, camera chooses f-stop and shutter speed
Standard combinations are f/4 at 1/60, f/5.6 at 1/125, f/8 at 1/250, f/11 at 1/500, etc.
Turn Command Dial to select alternate combinations of f-stop and shutter speed
(each combination produces the same exposure)

Focal plane mark (⊖)
It shows precisely where the image sensor (or film frame) is inside the camera

Speaker
Audio playback (two small holes)

Microphone (monaural)
(two small holes)

Lens Release Button - PLEASE DON'T REMOVE LENS

Lens Lock / Unlock Button

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Know Your Equipment

info Button
Press for screen display
With info screen on, press " i" button to alter settings

AE-L / AF-L Button
Use to lock focus and/or exposure and to turn on the auto-focus To set button's exact function: " MENU" / Setup Menu /" Buttons" I " Assign AE-L/AF-L button"

Play Button
Press play to view shots
With Image Review on, an image appears on screen after each shot (Press " MENU" / Playback Menu /" Image review" / " ON" I OK)

MENU Button
Opens the menus

"i " Button
When LCD monitor is off, press button to turn monitor on and adjust camera settings
If pressed again, the INFO screen shows current camera state (aperture, shutter speed, battery, etc.) If pressed with the INFO screen shown, it reverts to allowing one to adjust camera settings again

Multi Selector (use it to move around the menus)
Reviewing shots, use Multi-Selector to move through images (left/right) and review image data (up/down)
When playing a zoomed image, use Multi-selector to scroll around the image (even diagonally)
While shooting, use Multi-selector to select among AF (auto-focus) areas (if the particular Exposure Mode allows it)

Release Mode Button (bearded rectangle)
Determines what camera does when one presses all the way down on the Shutter-Release button

Zoom In (+) Button
Zoom in on an image (use Multi-Selector to scroll around)
While zoomed in, turn rear dial to see images at same zoom level

Zoom Out (-) / Checkerboard / ? Button
In playback mode, press button to reduce size of images
In the menus, press button for info about a particular setting

Trash Button
With image displayed on monitor, press button to erase photos/videos
(press again for the " are you sure?" prompt

Optical Viewfinder

Lightning Bolt "+ /- " (Flash Mode and Flash Exposure Button)
Press button once to pop up the built-in flash
Change brightness of flash exposure by holding this button, holding exposure comp. button and turning Command Dial (at same time)

Monitor Screen

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Before You Shoot (checklist)

Unlock Lens using Lens Lock Button
Push button (on side of lens) and rotate lens to release

Insert Battery and Check Battery Level
Look for battery level info on display screen
(upper right-hand corner)

where the battery lives

Format Memory Card (formatting erases content on card)
Press "MENU" > go to Setup Menu (wrench icon) > select "Format memory card"

Choose an Exposure Mode
Turn Mode Dial to select an Exposure Mode
(recommended modes: P, S, A, M, Auto)

Auto w/o flash

Choose the Focus Mode (pages 6a & 6b)

Choose Image Size and Image Quality (page 7a)

Set White Balance (WB) (page 5b)

If applicable, choose Aperture and Shutter Speed (pages 3a and 3b)

If applicable, choose an appropriate ISO value (page 4a)

Choose Metering Mode (Metering measures the brightness of the subject)
Press "MENU" > Shooting Menu > "Metering" > "Matrix" (recommended)

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Additional Resources

DSLR Basics: Nikon
Gives beginners a grasp of the basics with easy-to-understand explanations of the features and design of digital single-lens reflex cameras

https://www.nikon-tutorials.com/category/nikon-d3500/

Tips and Tricks and Camera Functions: Nikon D3500
Learn how to take gorgeous photos in a variety of different situations and also about useful camera controls and functions

https://imaging.nikon.com/support/digitutor/d3500.html

Aperture Digital Photography Fundamentals
Document explains digital terminology for the professional photographer who is new to computers and digital photography

https://archive.org/details/ApertureDigitalPhotographyFundamentals

Common Sense Photography
Website is intended to teach simple but very useful concepts and help others to enjoy the art of photography

http://www.commonsensephotography.com

Camera Sim
Camera Sim is a tool (camera simulation) that helps one learn about photography

http://camerasim.com/apps/original-camerasim/web/

MassArt Visual Language Resources
A summary of the support resources related to the digital media materials taught in the Visual Language course

http://sf.massart.edu/resources/vl-resources/

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