



## Still Photography BA(JMC) UNIT 2

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## Topic 1: PARTS OF DSLR CAMERA

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## PARTS OF DSLR CAMERA



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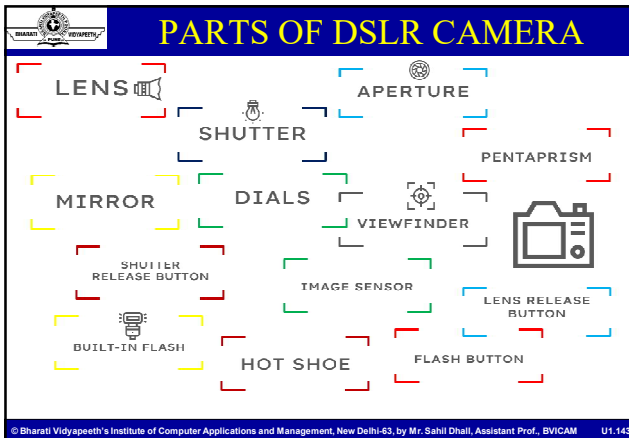
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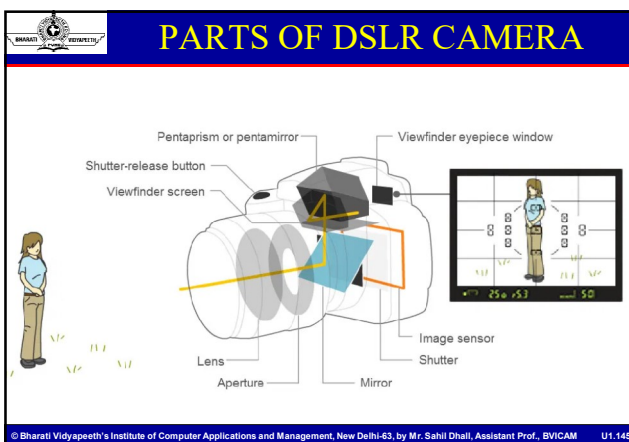
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**PARTS OF DSLR CAMERA**

**1. SHUTTER BUTTON**



Press this button to release the shutter. The shutter button press has two stages: Half-pressing the button activates the AF function, while pressing it down fully releases the shutter.

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**PARTS OF DSLR CAMERA**

**2. RED EYE REDUCTION/SELF TIMER LAMP**



- Red-eye reduction: If red-eye reduction is enabled on your camera, half-pressing the shutter button will light up this lamp when you use the built-in flash.
- Self-timer: When you set the self-timer, this lamp will blink for the duration of the timer until the picture is taken.

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**PARTS OF DSLR CAMERA**

**3. LENS MOUNT**



- This is the section that connects the interchangeable lens to the camera body. To attach the lens, you line up the lens mount index on the lens with the corresponding one on the lens mount and turn the lens clockwise until you hear a click.

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**PARTS OF DSLR CAMERA**

**4. LENS MOUNT INDEX**



Align the mark on the lens with this mark when you are attaching or detaching a lens.

- Red index: For EF lenses (Can be used on both Canon full-frame and APS-C DSLRs)
- White index: For EF-S lenses (Can be used on Canon APS-C DSLRs)

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**PARTS OF DSLR CAMERA**

**5. LENS RELEASE BUTTON**



Press this button when you want to detach the lens. The lens lock pin retracts when the button is pressed, enabling you to turn the lens freely. Before shooting, lock the lens into place by turning it until you hear a click.

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**PARTS OF DSLR CAMERA**

**6. MIRROR**



The mirror is unique to DSLR cameras. It reflects light from the lens into the viewfinder, which lets the photographer see the shot through the viewfinder in real time. The mirror flips up immediately right before shutter release (the shot is taken).

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**7. MICROPHONE**



This is a built-in microphone for capturing the audio sound during movie recording. The microphone used may be monaural or stereo depending on the camera model.

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**8. BUILT – IN FLASH**



When needed, you can fire the flash to capture a shot in a dimly-lit scene. The flash may be automatically fired in some modes.

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**PARTS OF DSLR CAMERA**

**9. Viewfinder Display**

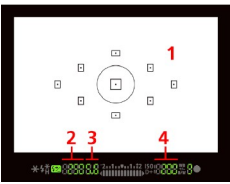


Indicates the position of the focus during AF (autofocus) shooting. The selected AF point will be highlighted in red. You can choose to select an AF point automatically or manually.

This value indicates the extent to which the aperture blades inside the lens are open. A smaller value means the aperture is more widely open, which allows more light to be captured. The selectable aperture value range varies according to the lens in use.



Indicates the time interval during which the shutter is open. The shutter speed value is denoted in the "1/parameter" format. However, only the parameter value is shown in the viewfinder. Increasing the parameter value shortens the time interval the shutter remains open. Shutter speeds slower than 1/4 second are indicated as, for example, 0'3, 0'4, 0'5, 0'6, 0'8, 1", or 1'3. In this case, 1'3 means 1.3 seconds.



The ISO speed setting varies constantly when the Auto setting is selected. A higher ISO speed makes it easier to capture shots of a dimly-lit scene.

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### PARTS OF DSLR CAMERA

<p><b>1. Eye Cup</b></p>  <p>The eyecup prevents external light from entering when your eye is in contact with the eyepiece. A soft material is used to reduce the burden on the eye and the forehead.</p>	<p><b>2. Viewfinder Eyepiece</b></p>  <p>The viewfinder eyepiece is a small window on the camera which you look through in order to compose your photo and establish focus on a subject. When shooting using a viewfinder, external light is reduced. This allows you to put full attention on the subject right before your eyes, which in turn makes it easier to track moving subjects.</p>	<p><b>3. LCD Monitor</b></p>  <p>In addition to the shooting settings as shown in the illustration here, the captured image as well as text information such as the menu can also be displayed on the LCD monitor. Also, you can magnify the display image to check the details. Some camera models have a Vari-angle LCD monitor, which allows you to alter the angle of the monitor during Live View shooting, making it easier to capture low-angle or high-</p>
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### PARTS OF DSLR CAMERA

<p><b>4. Menu Button</b></p>  <p>Use this button to display the menu for adjusting the different camera functions. After selecting a menu item, you can adjust the camera settings in greater detail.</p>	<p><b>5. Playback Button</b></p>  <p>This is the button for playing back images you have captured. Pressing the button once displays the last image you captured or showed on the LCD monitor.</p>	<p><b>6. Wi-fi Lamp</b></p>  <ul style="list-style-type: none"> <li>✓ This lamp indicates the wireless connection status.</li> <li>✓ Lamp on: Wi-fi connection is on</li> <li>✓ Blinking lamp: Camera is waiting for connection/reconnection</li> <li>✓ Intermittent rapidly-blinking lamp: Connection error</li> <li>✓ Rapidly blinking lamp: Data is being sent/received</li> </ul>
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**PARTS OF DSLR CAMERA**

<p><b>7. Access Lamp</b></p>  <p>The lamp appears blinking when there is data transmission between the camera and the memory card. Do not open the card slot or battery compartment cover while the light is blinking. Doing so may cause the camera to malfunction.</p>	<p><b>8. SET Button / Multi Controller</b></p>  <p>The Multi-controller keys are directional buttons that allow you to:</p> <ul style="list-style-type: none"> <li>- Move between menu items</li> <li>- Move a magnified display to a different point during image playback</li> <li>- Move the AF point during AF point selection</li> </ul> <p>In shooting mode, the functions of the keys switches to the ones indicated by the icon on it. Meanwhile, the SET button confirms a selection.</p>	<p><b>9. ISO Speed Setting Button</b></p>  <p>✓ Press this button to adjust the sensitivity of the camera toward light. ISO speed is an international standard that is determined based on the sensitivity of negative films.</p>
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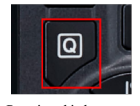

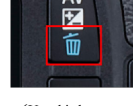
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**PARTS OF DSLR CAMERA**

<p><b>10. Quick Control Button</b></p>  <p>Pressing this button displays the Quick Control screen (further explained in the section "Settings on the Quick Control Screen"), which allows you to confirm various camera settings at one glance and adjust them.</p>	<p><b>11. Display Button</b></p>  <p>By pressing the DISP button, you can:</p> <ul style="list-style-type: none"> <li>- Turn the display on/off</li> <li>- Toggle between different information displays in Image/Movie Playback mode and during Live View shooting</li> <li>- Display the camera's major function settings when the menu is displayed</li> </ul>	<p><b>12. Erase Button</b></p>  <p>✓ Use this button to erase unwanted images.</p>
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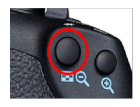


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**PARTS OF DSLR CAMERA**

<p><b>13. Focus Point Selection Button</b></p>  <p>Use this button to go into AF point (autofocus) selection mode during AF shooting. You can then select any of the AF points manually using the Multi-controller keys.</p>	<p><b>14. Live View Shooting/ Movie Shooting Switch</b></p>  <p>Use this button to turn on or turn off the Live View function. Pressing the button once displays the Live View image on the LCD monitor, and the camera is ready for Live View shooting. To record a movie, set the shooting mode to "Movie Shooting" on the mode dial (T6), and press this button to start recording. To stop, press the button again.</p>	<p><b>15. Dioptic Adjustment Knob</b></p>  <p>✓ Use this knob to adjust the clarity of the viewfinder image according to your eyesight. To do so, turn the knob while looking through the viewfinder.</p>
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### PARTS OF DSLR CAMERA

Settings on Quick Control Screen


**1** Shooting Mode: Displays the lens or icon corresponding to the shooting mode you have selected as you turn the Mode Dial.

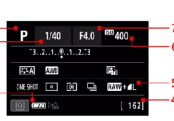


**2** Shutter Speed: Displays the time interval during which the shutter is open. Increasing the parameter value shortens the time interval the shutter remains open.




**3** Image Recording Format/Quality: Displays the image-recording quality that is currently selected. The icon here indicates that the camera is set to record in the Large JPEG format.

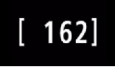





**Battery Level**: Displays the remaining battery level with an icon. The illustration here shows the state when the battery level is still full; the icon display changes as the battery level decreases.




**Shots Remaining**: Indicates the number of remaining shots that can be captured. The number varies with the capacity of the memory card in use as well as the image-recording quality you have selected.



**ISO Speed**: A higher ISO speed makes it easier to capture shots of a dimly-lit scene. Generally, ISO 100 is used as the standard setting. In the ISO Auto setting, the optimal value is automatically selected according to the scene. You can also choose to set the ISO speed manually.



**Aperture Value**: This value indicates the extent to which the aperture blades inside the lens are open. A smaller value means the aperture is more widely open, which allows more light to be captured. The aperture value is also known as the F-number, which varies with the lens in use.



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### PARTS OF DSLR CAMERA

**1. Focus Mode Switch**



Use this switch to set the focusing mode to Automatic (AF) or Manual (MF).

**2. Speaker**



Audio sound of a recorded movie can be played back through the speaker. During movie playback, turning the Main Dial allows you to adjust the volume level. Not only so, you can also select and play back the background music from the menu screen.

**3. Strap Mount**



✓ Pull the end of the strap through the eyelet, and secure it firmly while ensuring that the two ends of the strap are well-balanced.

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**Pentaprism**

- The pentaprism is a mirror placed at a 45-degree angle behind the camera lens. The mirror projects the light captured from the lens to the viewfinder. Before pentaprisms were introduced, photographers always had to look downwards when taking photos, which is not ideal for some subjects and would only allow you to take photos at hip-level. Pentaprisms got rid of this problem and now defines single-lens reflex or SLR cameras.

The diagram illustrates the light path in a camera. Light from an object (labeled 'IMAGE') passes through the 'LENS' and hits the 'REFLEX MIRROR'. The mirror reflects the light upwards into the 'PENTAPRISM', which is a five-sided prism. The light then exits through the 'VIEWFINDER EYEPIECE'. An 'IMAGE SENSOR' is also shown, which captures the light directly from the lens.

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**Image Sensor**

- The digital sensor of a camera is one of its most delicate parts. This sensor captures the light coming from the lens to create an image. Modern cameras use different types of sensors for capturing images.

A close-up photograph of a camera's internal image sensor, showing a colorful, rainbow-like pattern on the sensor surface, surrounded by various electronic components and circuitry.

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**Image Sensor**

- APS-C (APSC)  
A term used to describe the size of the digital imaging sensors used in almost all compact DSLRs. The name is derived from the APS (Advanced Photo System) film format that was introduced in 1996 for the amateur point-and-shoot market. The APS format is about half the size (23.6 x 15.8mm) of a standard 35mm frame (24 x 36mm) and has a 1.5x magnification factor (multiply the focal length x 1.5) for determining the 35mm equivalent focal length of lenses used on APS-C format cameras. APS-C format DSLRs from Nikon, Pentax, Fujifilm, and Sony (Alpha) contain APS-C sized imaging sensors. Canon compact DSLRs, which include EOS Rebel-series DSLRs, contain APS-C format imaging sensors that are slightly smaller than competitive compact DSLRs (22.3 x 14.9mm, so the lens factor for these cameras would be 1.6x). Although it does further reduce the effective field of view of your lenses, they are slightly more telephoto than their 1.5x brethren.

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**Image Sensor**

- APS-H (APSH)  
 APS-H format imaging sensors (1.3x) are smaller than full-frame (24 x 36mm) imaging sensors but larger than APS-C (1.5x) imaging sensors. Although currently only available in Canon's high-speed 1D series (not 1Ds) cameras, APS-H format sensors were also used in Leica's first digital rangefinder, the M8, as well as Leica's short-lived add-on digital back for the now-discontinued Leica R reflex camera system.
- CCD (Charge-Coupled Device)  
 A semiconductor device that converts optical images into electronic signals. CCDs contain rows and columns of ultra small, light-sensitive mechanisms (pixels) that generate electronic pulses when electronically charged and exposed to light. These pulses work in conjunction with millions of surrounding pixels to collectively produce a photographic image. CCDs and CMOS (Complementary Metal Oxide Semiconductor) sensors are the dominant technologies for digital imaging.

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**Image Sensor**

- CMOS (Complementary Metal Oxide Semiconductor)  
 A type of imaging sensor, CMOS chips are less energy consuming than CCD-type sensors and are the dominant imaging technology used in DSLRs. Although once considered an inferior technology compared to CCD sensors, CMOS sensors have vastly improved and now represent the more common sensor technology.

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**Crop Factor Ratio**

Full Frame	APS-H	APS-C (Nikon DX, Pentax, Sony)	APS-C (Canon)
Micro / Four Thirds	1 inch	2/3"	1/2" 1/3"

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**Topic 2:**  
**Exposure**

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**What Is Camera Exposure?**

- Camera exposure is the overall brightness or darkness of a photograph. More specifically, it's the amount of light that reaches the film or camera sensor when a picture is being taken. The more you expose the film or camera sensor to light, the lighter your photo will be. The less light, the darker your photo will be.
- **How Do You Determine the Correct Exposure?**
- There are three ways for your camera to control the amount of light that reaches the film or the image sensor; these three together constitute the exposure triangle:
- **Shutter speed:** This is how long the shutter is open, expressed as a measurement of time. For example, 1/100 means that your shutter is open for 1/100th of a second. The longer the shutter is open, the brighter the photograph will be, as there was more time to let in the light.

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**How Do You Determine the Correct Exposure?**

- **Aperture:** This is how big the opening is that lets light in, expressed in f-stops. F-stops are counterintuitive, because the larger the number, the smaller the opening. For example, f/2.8 allows twice as much light into the camera as f4, and 16 times as much light as f11. Aperture affects the depth of field: Larger openings create a shallower depth of field, while smaller openings make more of the image in focus.
- **ISO:** This is how sensitive your camera's sensor is to light, expressed in a number. The higher the ISO number, the more sensitive your camera will be to light.

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 **4 Types of Exposure**

- Tinkering with the shutter speed, aperture setting, and ISO setting will produce different types of exposures, including:
- Overexposure: Overexposure happens when the film or camera sensor is exposed to too much light. As a result, the photograph loses highlight detail and the bright parts become washed out.
- Underexposure: Underexposure happens when the film or camera sensor is not exposed to enough light. As a result, the photograph loses shadow detail and the dark parts are almost all black.
- Long exposure: Long exposure, also called time exposure or slow-shutter photography, is a technique that captures a subject over an extended period of time. The static elements of the photo contrast with the elements in motion, which create blurs, smears, and trails. Long exposure is commonly used in night photography.

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 **4 Types of Exposure**

- Double exposure: Double exposure, also called multiple exposure, is a technique where the camera shutter opens twice to expose the film to different images. As a result, the photograph combines the two exposures into a single image, which are laid on top of one another.
- **How to Set Exposure on a Camera**
- In digital photography, you can set the camera exposure mode with the click of a button or turn of a dial. There are three main camera modes and exposure settings:
- Manual exposure: You set a specific shutter speed, aperture, and ISO. This is useful if you want complete control of your camera settings and you have time to adjust them for each shot.

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 **How to Set Exposure on a Camera**

- Shutter priority: You set a specific shutter speed and the camera automatically selects the aperture. This is useful when you want to control the depth of field.
- Aperture priority: You set a specific aperture and the camera automatically selects the shutter speed. This is useful when you want to control the depth of field.

Both shutter priority mode and aperture priority mode have their uses and you'll find yourself switching back and forth, depending on what you're shooting. It often makes sense to set your ISO to Auto when you're shooting in these modes so that the camera has more flexibility to make decisions to get the shot right.

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**Aperture**

- Aperture is the size of the hole in the diaphragm that allows light in to the camera.
- The larger the hole, the more light enters in the camera in a given time.
- Aperture values (Av) are measured using f-stops shown as f/# (i.e. f/16).
- A change of 1 f - stop doubles or halves the light entering the camera.
- Smaller f - numbers represent wider apertures, and larger f-numbers are smaller apertures.
- The wider the aperture used, the less time – i.e. the faster shutter speed – is needed to properly expose the image.
- Conversely, the slower the shutter speed, the smaller the aperture needs to be.
- Think of a window. The larger the window, the more light gets through and the room is brighter.

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**Aperture**

Larger Apertures (larger openings in lens) ← → Smaller Apertures (smaller openings in lens)

f/1.4   f/2   f/2.8   f/4   f/5.6   f/8   f/11   f/16

- The image shows common f-stop values and how they appear
- A change of 1 f-stop doubles or halves the light entering the camera
- Smaller f - numbers represent wider apertures, and larger f-numbers are smaller apertures

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**Aperture**

f/2.8   f/4   f/5.6   f/8   f/11   f/16   f/22

Larger/Wider Aperture ← Aperture Size → Smaller/Narrower Aperture

More ← Amount Of Light Reaching The Sensor → Less

Shallow ← Depth Of Field → Deep

Very Blurry ← How Blurry The Background Is → Not Blurry At All

- The Av controls the amount of depth of field in an image
- The wider the aperture, the more shallow the depth of field, and vice versa

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## Aperture

- Aperture is the key to creative control in photography, and knowing how to adjust aperture will give you greater flexibility in capturing the perfect photograph.
- In photography, the nuts and bolts of crafting amazing images is the exposure triangle: aperture, shutter speed, and ISO. In order to get a properly exposed photo, all three elements must work in harmony. If one part of the exposure triangle changes, the other two need to change as well. Of the three, aperture is the most crucial in controlling how your image will look.
- Aperture means an opening. In photography, aperture refers to the hole in the middle of the camera lens which allows light to pass onto a digital camera's image sensor or the film strip on a film camera. The aperture is made of a series of interlocking metal blades that open and close like an iris. Both aperture and shutter are the same mechanism—they both open and close when you click the shutter button. Shutter speed determines how long the aperture remains open.

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## What Is an F-Stop?

- F-numbers are the mathematical relationship between your camera's focal length and the size of your aperture:
  - $\text{Focal Length} / \text{Diameter of Aperture} = \text{F-Stop}$
- This means that aperture remains consistent across different cameras and focal lengths—the same f-stop will create the same exposure, no matter your camera's focal length.
- For example, say you have two cameras: one with a focal length of 90mm the other with a focal length of 60mm. An  $f/4$  aperture setting on the 90mm lens creates an opening that is 22.5 mm (a quarter of the focal length), while that same aperture on the 60mm lens results in a 15mm wide opening (which is still a quarter of the focal length). Both cameras will produce the exact same image with the same depth of field and the same exposure, as long as the shutter speed and ISO remain consistent.

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## How to Adjust Aperture on Your Camera

- You can manually set the aperture on your digital camera in one of two ways:
  - **Manual Mode:** Written as "M" on most cameras on the top dial of camera, which takes your camera out of auto mode. In this mode, you also have control over shutter speed.
  - **Aperture priority mode:** Written as "A" or "Av" on your camera. In this mode, your camera automatically adjusts the shutter speed according to the aperture you chose.
- On some cameras, you select the aperture on the display screen. On other cameras, you select the aperture on the lens

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**Advantages of Controlling Aperture Manually**

- Controlling the size of your camera's aperture manually let you control two things: exposure and depth of field
- Exposure:** The amount of light coming into your camera. Controlling your aperture manually allows you to adjust exposure and image brightness beyond what the automatic settings on your camera will allow. If you are photographing when it is dark, you can select a lower f-stop—opening your aperture wider—ensuring your image isn't underexposed (too dark). If you are photographing where there is a lot of light, you do the opposite—select a higher f-stop, which closes the aperture—to make sure your photo isn't overexposed.
- Depth of field:** How much of your image will be in focus. Adjusting aperture also controls the depth of field which how much of your image will be in focus.

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**How Are Shutter Speed and Aperture Related?**

- You may also adjust your aperture depending on your shutter speed.
- Compensate for a quick shutter speed:** A quick shutter speed will avoid motion blur or capture quick movements clearly, but it does not let in much light. You can compensate for this decreased light by using a larger aperture (remember, a lower f-stop) to let in more light.
- Compensate for a slow shutter speed:** A slow shutter speed lets in a lot of light and can be used to capture an image in low light without a flash or to blur the motion of a moving subject. You can compensate for this increased light by using a smaller aperture (higher f-stop) to ensure your image isn't overexposed.

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**Aperture**

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**Shutter Speed**

**SHUTTER SPEED**

**MOTION**

**LIGHT**

- Controls the amount of time the shutter or curtain is open
- Shutter speed is measured in fractions of seconds
- Depending on the camera, it may show the shutter speed without the numerator, i.e. 250 instead of 1/250
- Common shutter speeds are 1, 1/2, 1/4, 1/8, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500, 1/1000
- A fast shutter speed freezes the action of an image
- Conversely, as low shutter speed blurs the action of an image

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**Shutter Speed**

- The shutter is the device that quickly opens and closes to let light pass onto your camera's image sensor, thereby creating an image. The shutter is a series of interlocking metal slats, like an iris. Shutter and aperture go hand-in-hand, as they are part of the same mechanism: Shutter speed controls how quickly this shutter opens and closes, while aperture controls how wide the shutter opens. How long the shutter remains open determines your image exposure, which is the amount of light that hits your digital camera's sensor.

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**What Is the Difference Between Fast and Slow Shutter Speeds?**

- Shutter speed is expressed in units of time: fractions of a second or several seconds. A higher (or faster) shutter speed allows less light to hit the camera sensor or film strip (if using an analog camera). Conversely, a lower (or slower) shutter speed allows more light to pass into your camera.
- The focal length of your camera's lens can help you determine a base shutter speed. For example, if you have a 50mm lens, start shooting with a shutter speed above 1/50 and play around from there.
- **When to Use Fast Shutter Speed**
- A fast shutter speed allows less light into the camera. Use a fast shutter speed in bright lighting conditions, like on a sunny day, to minimize the chance of overexposure (the presence of too much light, which results in a blown out image with little detail). You can also use a high shutter speed to create sharp images and freeze movement, like a car driving past or a person running.

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**What Is the Difference Between Fast and Slow Shutter Speeds?**

- **When to Use Slow Shutter Speed**
- Slow shutter speeds allow more light into the camera, which makes a slow shutter speed great for nighttime or low light conditions. At these slow speeds, you will need a tripod to avoid camera shake or a blurred image. You can also use a slow shutter speed to create images with blurred movement, like ocean waves that appear as a mist.
- **How to Set the Shutter Speed on a Camera**
- Setting your shutter speed manually allows more creative flexibility with your photography. Most digital cameras allow you to set shutter speed manually in one of two ways:
  - **Manual Mode:** Set via the setting dial on top of the camera or within the settings on the viewfinder and indicated as “M” on most digital cameras. Manual mode allows control over shutter speed, aperture, and ISO.
  - **Shutter priority.** Written as “S” on many cameras. In shutter priority mode, you set the shutter speed while the camera automatically adjusts the corresponding aperture and ISO for the surrounding lighting conditions.

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**4 Ways to Use Shutter Speed Creatively**

- **Burst Mode.** Hold your camera’s shutter button down to go into burst mode, where multiple images are fired off in quick succession until you release the button. Burst mode is great when used with a fast shutter speed (around 1/1000) for capturing dramatic, fast-moving moments—like in sports photography or wildlife photography.
- **Long Exposure.** Long exposure images, done with a long shutter speed, result in intentionally blurred photographs. For example, a nighttime street scene in which the cars appear only as streaks of light, or a waterfall that appears only as a smoky, white blur.
- **Light Painting.** Use a slow shutter speed (over 2 seconds) and a flashlight to “paint” a photograph—writing a word or drawing a simple symbol in light.
- **Panned Image.** A panned image gives the illusion of speed by following a moving subject, like a person running or a bird flying. Panned images require a slow shutter speed (over 1 second) and a tripod in order to track moving objects with the camera smoothly.

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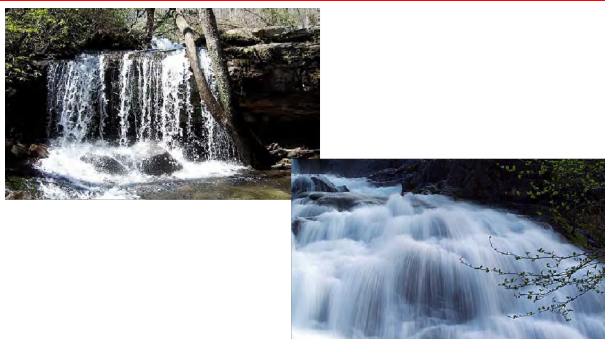
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**Shutter Speed**



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**Shutter Speed**

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**ISO**

ISO 100    ISO 200    ISO 400    ISO 800    ISO 1600

- Sensitivity of light
- The higher the ISO number the quicker the sensor reacts to light.
- In the "old days" this was film speed.

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**ISO**

- ISO refers to light sensitivity and is perhaps the most nebulous and least understood of the three.
- ISO is a camera setting that determines your camera's sensitivity to light. In terms of image quality, a low ISO value means your image will be darker and have less grain (or noise).
- A high ISO number means your image will be brighter and have more grain. The letters "ISO" stands for International Organization for Standardization, the group that established the standards for light sensitivity in film.
- The term stuck and still refers to light sensitivity in digital photography.

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**What ISO Numbers Mean?**

- Most digital cameras have the following ISO values:
- ISO 100, ISO 200, ISO 400, ISO 800, ISO 1600, ISO 3200, ISO 6400
- Each ISO number represents a doubling of the image sensor's light sensitivity. For example, a camera set to ISO 200 is twice as sensitive to light as one with an ISO 100 setting.
- A low ISO means your camera is less sensitive to light and is better suited to bright situations. A higher ISO means your digital camera becomes more sensitive to light and will take better photos in darker settings.

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**How to Determine the Best ISO Settings**

- Here's an idea of what the ISO numbers mean for particular lighting conditions.
- ISO 100-200: Best for bright daylight. Results in a crisp image with little grain or noise. Your camera's default ISO base setting will likely be in this range.
- ISO 200-400: Slightly less ambient light, such as indoors during the daytime or outdoors in the shade.
- ISO 400-800: Indoors, with a flash.
- ISO 800-1600: Low light indoors or at night when you can't use a flash.
- ISO 1600-3200: Extreme low-light conditions without a flash. Your image will have a lot of grain or digital noise because of the low light.
- ISO settings lower than 100 or higher than 6400 are typically reserved for specialized camera uses, such as night photography, freezing extremely fast movement, or using a long lens on a handheld camera.

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**Shutter Speed**



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**Shutter Speed**

ISO 3200

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**What Is the Exposure Triangle?**

- The exposure triangle (or exposure value) in photography is a principle that determines the amount of light that reaches your camera sensor. The exposure triangle has three parts:
  - Shutter Speed
  - Aperture
  - ISO
- Whether with film or digital photography, in order to achieve a properly exposed photo, you need to make sure that all three elements are working in harmony. That means that if one element changes, the other two need to change as well.

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**Exposure Triangle**

all in focus

motion blur

bokeh

SHUTTER

ISO

APERTURE

freeze frame

noisy

clean

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**What Is the Exposure Triangle?**

- **How Aperture, Shutter Speed, and ISO Work Together in Photography**
- All three of these camera settings work in conjunction with one another to achieve the correct exposure for your images. **For example, if you open up the aperture to let in more light, you will need to use either a fast shutter speed, or a low ISO to compensate.**
- **Exposure Triangle Cheat Sheet**

Use the following guide to get the right exposure and effect every time you snap a photo:

- Shutter speed: How long the shutter is open, expressed as a measurement of time. 1/100 = 1/100th of a second.
- Aperture: How big the opening is that lets light in, expressed in F-stops. The larger the number, the smaller the opening.

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**What Is the Exposure Triangle?**

- **Exposure Triangle Cheat Sheet**
- ISO: How sensitive your camera's sensor is to light. The higher the ISO number, the more sensitive to light.
- **Motion blur:** Longer shutter speed, lower aperture, lower ISO
- **Frozen motion:** Higher shutter speed, higher aperture, higher ISO.
- **Night shots:** In low light scenarios, manual mode, lower aperture, lowest ISO, shutter speed varies based on type of image.
- **Depth of field:** Larger aperture and longer focal length corresponds with shallower depth of field. Small aperture and shorter focal length corresponds with larger depth of field.

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**3 elements of EXPOSURE**

**Shutter Speed**

- Controls the duration of how much light is allowed to reach the sensor

**Aperture**

- Controls the amount of light going into the camera

**ISO**

- Controls the sensitivity of your camera's sensor to light

**By changing 1 setting, the others will be affected**

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**3 elements of EXPOSURE**

**SUN TANNING**

Time laying out = Shutter Speed  
 Longer = Tan  
 Too long = Over Exposed

Sunscreen = Aperture  
 Blocks the sun at different rates (depending on SPF)

Your skin type = ISO  
 some people are more sensitive than others

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**Exposure Triangle**

The diagram illustrates the Exposure Triangle with three axes:

- Aperture:** Ranges from small aperture (F32) to large aperture (F1.4). Values shown: F32, F22, F16, F11, F8, F5,6, F4, F2,8, F2, F1,4.
- Shutter:** Ranges from fast shutter speed (1/1000) to slow shutter speed (1/2). Values shown: 1/1000, 1/500, 1/250, 1/125, 1/60, 1/30, 1/15, 1/8, 1/4, 1/2.
- ISO:** Ranges from low sensitivity (ISO 50) to high sensitivity (ISO 25600). Values shown: ISO 50, ISO 100, ISO 200, ISO 400, ISO 800, ISO 1600, ISO 3200, ISO 6400, ISO 12800, ISO 25600.

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**Topic 2:  
Depth of Field**

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**Depth of Field**

- Depth of field is the area of **acceptable sharpness in front of and behind the subject** which the lens is focused. Put simply, it refers to how blurry or sharp the area is around your subject.
- A **shallow depth of field refers to a small area in focus**. Often the subject is in focus, while the background is blurred. This is best for portraits, and one way to adjust this is with aperture.
- A **deep depth of field captures a larger area in focus**, often keeping everything in the image sharp and clear. This is best for landscapes by using a large aperture.
- There are multiple ways to adjust depth of field, including aperture, the distance between the camera and the subject, the focal length of the lens, and even the size of the camera's sensor.

**WHAT AFFECTS THE DEPTH OF FIELD?**

- **Aperture**
- **Camera-subject distance**
- **Focal length of lens**
- **Size of camera sensor**

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**Depth of Field**

- When you're shooting an image, you're also telling a story to the viewer. It's your job to tell them where they should be looking and directing their attention to the photo's key elements. There are several tools you can use to tell the "story" of your image. One of those tools is depth of field (DoF).
- In simplest terms, depth of field is how much of your image is in focus. In more technical terms, depth of field is the distance in an image where objects appear "acceptably in focus" or have a level of "acceptable sharpness."
- **Why Use Depth of Field in Photography?**
- Controlling the amount of the photo that is in focus is one of the photographer's **best tools to help draw the viewer's eye where you want it**. For example, landscapes are typically shot so that everything is in focus, so photographers will shoot at small lens apertures (e.g. f11 or f16).
- However, you can create layering in your image by having only part of the photo in focus. If you have some foreground objects out of focus (for example, some leaves), they will give your image depth; the viewer will really feel like they're looking through those leaves at your main subject. To achieve this effect, shoot at a wider lens aperture (e.g. f2.8 or f1.4).

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**Depth of Field**

- **What Factors Affect Depth of Field?**
- A few different factors affect depth of field in digital photography, regardless of whether you're using a DSLR camera or a smartphone. These factors are: focal length, aperture, camera-subject distance, and sensor size.
- As you come to understand these factors, and the camera settings that control them, you'll be able to manipulate this photographic effect to increase depth of field, improve image quality, toggle between sharp focus and soft focus, and generally bring more variety to your photographic portfolio.
- **How Does Focal Length Affect Depth of Field?**
- The focal length of a camera lens contributes to depth of field: a **longer focal length corresponds to a shallower depth of field and a shorter focal length corresponding to a longer depth of field**.

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 **Depth of Field**

- Generally, a wide angle lens has a deeper depth of field than telephoto lenses, which can offer an impressive focus distance but are sometimes more limited in options. A zoom lens, on the other hand, offers multiple focus distances, and can thus perform a wide array of photographic tasks.
- In photography, the letter “f” stands for focal length of the lens. A large f means the lens allows one to choose a focal point far in the distance. Focal length is crucial in measuring the next component in depth of field photography: the aperture.
- **How Does Aperture Affect Depth of Field?**
- Being able to understand how aperture affects the relationship of a subject to its background is one of the first steps to becoming a better photographer.
- Aperture is how big the opening is that lets light in, expressed in F-stops. F-stops are counterintuitive, because the larger the number, the smaller the opening. So a small f equals a large aperture.

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 **Depth of Field**

- For example, f2.8 allows twice as much light into the camera as f4, and 16 times as much light as f11. Aperture affects the depth of field: **larger openings create a shallower depth of field, while smaller openings make more of the image in focus.**
- F-stop numbers are not uniform across all photography equipment, and can depend on the type of camera you have. Most photographers who have photographed with a Nikon or Canon camera will however be familiar with some common f-stops on the aperture scale:
- f/1.4 (a very large aperture to let in as much light as possible)
- f/2.0 (lets in half as much light as f/1.4)
- f/2.8 (lets in half as much light as f/2.0)
- f/4.0, f/5.6, f/8.0, f/11.0, f/16.0, f/22.0, f/32.0 (the smallest standard aperture, lets in almost no light)
- Remember that every f-stop number represents an aperture setting in relation to the lens’s maximum aperture. The larger the value of the f-stop number’s denominator, the less light will reach the camera sensor.

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 **Depth of Field**

- **How Does Camera-Subject Distance Affect Depth of Field?**
- Camera-subject distance is the distance between your camera and your subject. **The shorter the camera-subject distance—or, in other words, the closer you are to your subject—the shorter the depth of field.**
- Envision you have eight feet of space in front of you, before you hit a wall. If your subject is flush against the wall and your camera is eight feet away, the depth of field is zero (and the desired effect won’t show in your image). Now imagine your subject moves to within a foot of the camera. Suddenly, the depth of field has grown, and the effect will render in your image.

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 **Depth of Field**

- **How Does Sensor Size Affect Depth of Field?**
- Camera sensor size is the final important factor in depth of field. If the other factors are the same—aperture, focal length, camera-subject distance — a larger sensor will have a shallower depth of field. In general, cameras with smaller sensors have larger depths of field.
- Sensor sizes vary between models of cameras; cameras with full-frame sensors have a lot of surface area whereas cameras with the newer APS-C sensors have smaller surface areas. Sensor size is an important factor when it comes to selecting a camera to use, since it directly impacts the quality of your photos (and thus, your creative expression).

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 **Depth of Field**

- **Does Shutter Speed Affect Depth of Field?**
- One factor that doesn't affect depth of field? Shutter speed.
- While changing your shutter speed may result in a different effect on your depth of field, what's actually happening is your aperture is changing to balance the new amount of light.

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 **Depth of Field**

- **How to Add Depth of Field to Your Photos on an iPhone in 6 Steps**
- Starting with iPhone 7 Plus and iOS 10.1, any iPhone with a dual camera can take photos with depth of field similar to a DSLR.
- Open your Camera app.
- Swipe to "Portrait Mode."
- Lock in your subject.
- Follow any directions on the screen.
- Once the "depth effect" sign appears, lock in your focus on your subject again. Adjust the brightness to your desired effect, then hit the shutter.
- Be sure to keep your iPhone steady when using this mode (or consider using a tripod), as the process takes a little longer than a regular photo. If you phone moves, the resulting image may be blurry.

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**Depth of Field**

- **How to Decrease Depth of Field in Your Photos**
- Let's say that you want to create a shallow depth-of-field effect in your photos, where you single out one aspect of the photo to be in focus. Typically this would be your foreground subject, with the background somewhat blurred. To create a shallow depth of field on a DSLR, you will want to:
  - Use a wider aperture. The more light you let in, the easier it is to create that shallow depth of field.
  - Use a telephoto lens to photograph an object that is relatively close. The increased focal length (larger f number) of a telephoto lens presents more opportunities to a photographer. While some amateurs believe that such lenses are only used to photograph distant objects with a uniformly sharp focus, they can actually be used to create a fantastic shallow depth effect in close-up portraits.

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**Depth of Field**

- Physically get closer to your subject. If you don't own a telephoto lens, that's no problem. By getting physically closer to the object you are photographing, you can enjoy all the advantages that a longer lens would otherwise provide—including the ability to focus in a way that produces a shallow depth of field.

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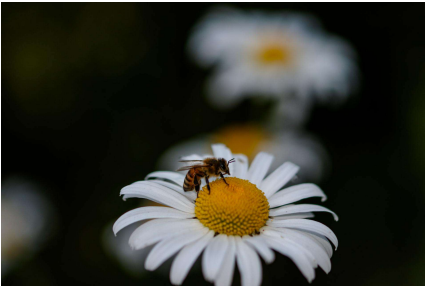
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**6 Examples of Depth of Field in Photography**

**Macro.** Macro photography is when you take photos of very small things in a larger-than-life size. So, for example, a large photo of an insect. In macro photography, you're going to use a very shallow depth of field. Try an aperture of f/2.8, f/4 or f/5.6. You'll also want to your camera-subject distance to be very small. You'll also want a longer focal length and for your focus point to be very close to your camera.



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**6 Examples of Depth of Field in Photography**

**Deep.** A large or deep depth of field will put a longer distance into focus. Landscape photography is a good example of a large or deep depth of field. In order to achieve a large or deep depth of field, you want a smaller aperture, which means the larger F-stops, i.e. a maximum aperture of  $f/22$ . Additionally, you'll need a shorter focal length and to be further away from your subject.



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**6 Examples of Depth of Field in Photography**

**Shallow.** A shallow depth of field is good for focusing on an option that closer to your camera. For example, a close up of bee hovering over a flower would require a shallow depth of field. In order to achieve a shallow depth of field, you want a large aperture, which means the smaller F-stops, i.e.  $f/2.8$ . Go with a longer focal length and stand relatively close to your subject.



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**6 Examples of Depth of Field in Photography**

**Landscape.** Because landscapes have a very large depth of field—you want basically everything to be in focus—you want a smaller aperture. As you know, that means larger F-stops. Try  $f/22$  and adjust from there. You'll need a shorter focal length and to be far away from your subject



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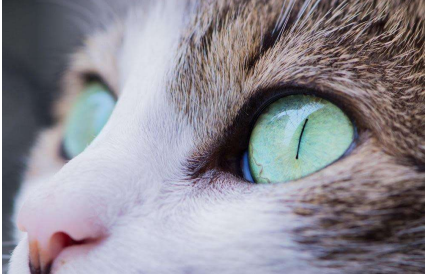
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**6 Examples of Depth of Field in Photography**

**Close-up.** For a close-up photograph, you want a shallow depth of field. That means a larger aperture or smaller F-stop. It also means a longer focal length and that your camera-subject distance needs to be short.



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**6 Examples of Depth of Field in Photography**

**Bokeh.** Bokeh is one popular photography method that utilizes depth of field. When shooting bokeh, set your lens to the lowest aperture.



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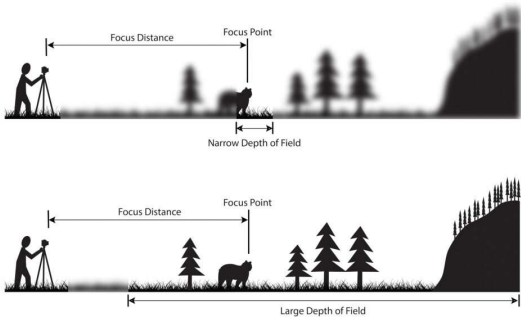
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**Depth of Field**



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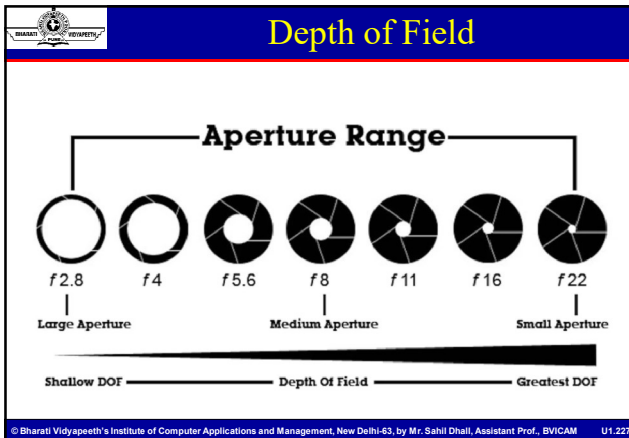
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**Topic 2:**  
**Exposure Metering System**

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**Depth of Field**

- Every modern DSLR has something called "Metering Mode", also known as "Camera Metering", "Exposure Metering" or simply "Metering".
- Metering is how your camera determines what the correct shutter speed and aperture should be, depending on the amount of light that goes into the camera and the ISO.
- Photographers had to use hand-held light meters to determine the optimal exposure.
- DSLR has an integrated light meter that automatically measures the reflected light and determines the optimal exposure.

- The most common metering modes in digital cameras today are:
  - A. Matrix Metering (Nikon), also known as Evaluative Metering (Canon)
  - B. Center-weighted Metering
  - C. Spot Metering

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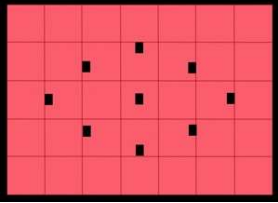
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**Matrix / Evaluative Metering**

- Matrix Metering or Evaluative Metering mode is the **default metering mode** on most DSLRs.
- In this metering mode, **the meter divides the scene up into a grid and analyzes each segment for highlight and shadow (bright and dark) information.**
- Once that data is collected, **it calculates the average value** and bases the exposure on that average.
- Many of the newer DSLR's not only average the grid, but place additional emphasis on the focusing points that are in use during that particular image capture.
- One of the key factors (in addition to color, distance, subjects, highlights, etc) that affects matrix metering, is **where the camera focus point is set to.**



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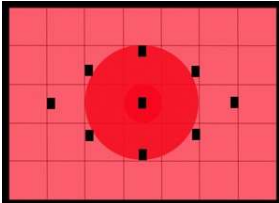
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**Center-Weighted Metering**

- This method of metering lays the most importance on the central portion of the frame, which can be as much as 75% or more, while little or no importance is given to the corners of the frame.
- Many pro DSLR's will allow you to adjust the diameter of the center weight area.
- This mode of metering is preferred by many photographers and has a reasonable level of accuracy.
- Compared to Matrix Metering, Center-weighted Metering does not look at the focus point you select and only evaluates the middle area of the image.



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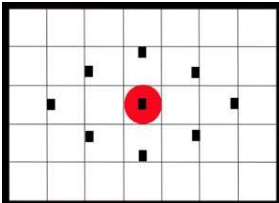
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**Spot Metering**

- This mode measures the light from a very small part of the scene only.
- Spot Metering only evaluates the light around your focus point and ignores everything else. It evaluates a single zone/cell and calculates exposure based on that single area, nothing else.
- The area measured is typically the center of the image, using approximately a 3 to 7 degree range of measurement.
- It is usually less than 5% of the area of the frame.
- This is a very accurate metering mode. It will provide precise readings from small areas of your scene and is most effective in high contrast situations.



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**Topic 2:  
Rules and Compositions**

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**Compositions**

- Composition in photography refers to the **position of elements inside the frame** and how they interact with each other.
- The **composition** of your photograph **impacts the way it's perceived by others**.
- When you choose what to fit inside the frame and what you leave out, where to position each element and so on, you're capturing a scene with your unique vision.
- Learning the "rules" of **composition enables you to communicate your message with maximum impact**.
- The "rules" of composition are just guidelines and should not be applied to every picture—following them too closely may lead to dull and predictable work.
- Successful compositions **allow the eye to travel around the frame** in the intended order, pausing at points of interest along the way.

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**Elements of Composition**

**The first six elements of composition are simply different types of objects you may find in a photo, ranging from simple to complex. These elements do not depend on anything else in a photo, or upon the borders of your composition itself.**

**POINTS**

- The simplest element of composition is a point.
- A point is just a **small area of interest in a photo, or the intersection between areas of interest**.
- Stars in the sky in a photograph are "points," and so is an out-of-focus light in the background.
- Points matter in photography because they are one of **the most fundamental ways to draw our attention – to add interest to a particular area**.

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## Elements of Composition



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## Elements of Composition

**LINES**

- In contrast to points, which draw a viewer's attention, lines are more like a path for a viewer to follow. Or, they are a boundary: the division between sky and ground, for example.
- Like points, lines in photography are not defined as rigidly as lines in geometry. Photographically, anything that connects two parts of a photo or stretches across your composition is a line.
- Lines also serve an important function of connecting two different elements of your photo. They can give an image structure, which is a crucial part of making an image feel deliberate and intentional. A path leading from foreground to background has a way of making the image feel connected.

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## Elements of Composition



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 **Elements of Composition**

**SHAPES**

- Shapes can be anything, from the crescent moon to the shape of a smiling face. Each variety of shape has its own emotional impact on a photo, and it's impossible to generalize.
- Sometimes, shapes are just the object itself. If you're photographing the sun, it makes a circular shape.
- Other times, shapes are more conceptual, like a curved cloud over a curved valley that gives the entire photo a circular composition. Both types of shapes matter.
- The first attracts attention; the second gives the photo its structure.
- In photography, keep an eye out for shapes in your photo, either obvious or abstract.

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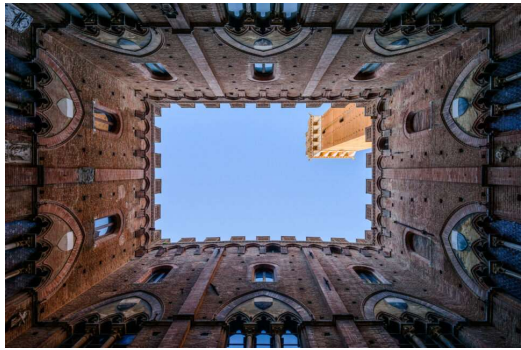
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 **Elements of Composition**



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 **Elements of Composition**

**TEXTURE**

- The texture of an object plays an important role in determining its emotional impact, as well as the amount of attention it draws.
- What mood do you capture when you photograph smooth pebbles and mist from a long exposure of the sea? What about jagged, rough mountains in high-contrast light?
- Sometimes, textures themselves may be the subject of your photo, like patterns in the sand or waves of water.
- More often, though, textures are individual elements of a larger photo – either giving your subject some dimension or filling in the spaces between subjects.
- Areas with more texture tend to draw extra attention. Sometimes, too much texture in “unimportant” areas of a photo can be distracting, making the overall photo appear too complex.
- In other cases, texture gives your subject a crucial sense of dimension, such as filling out the shape of a mountain landscape.

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 **Elements of Composition**

COLOR

- Other than black and white photography – a creative choice of its own – color makes a big difference to the composition of a photo, as well as the mood.
- Each color brings its own emotions to photography
- When you're composing your photos, recognize the colors contained within, and try to use their strengths to your advantage.
- Often, pairing a warm color with a cool color creates an interesting sense of contrast, leading to an eye-catching image.
- Similarly, photos with just one or two dominant colors present a very unified message – a message that can be highly successful if created with care.

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 **Elements of Composition**

TONE

- Another important element of composition is tone, both for individual objects and for the photograph as a whole.
- Although tone can refer to hues and intensity of color, it also relates to the brightness and darkness of an image, as well as its contrast.
- Photographs which employ tone successfully will carry the eye through the flow of a photo – much in the same way that musical tones carry listeners through the highs and lows of a performance.
- Brighter regions of a photo attract the eye. So do those with high contrast – both low-level contrast (sharpness) and broader juxtapositions of light and dark.

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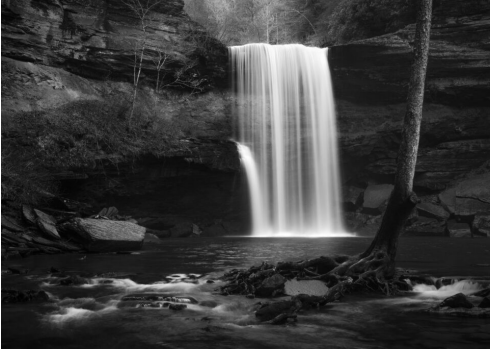
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 **Elements of Composition**



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 **Elements of Composition**

DISTANCE

- The simplest relationship between elements of composition is the distance between them.
- Distance matters for a few different reasons. To start, if some of your subjects are too close together – or if one subject crosses another – the results can be distracting.
- The most common compositional structures are simply a line (connecting two areas of interest) and a triangle (three).

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## Elements of Composition



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## Elements of Composition

**BALANCE**

- The next element of composition is balance, related closely to the concept of visual weight.
- Visual weight isn't complicated; it's just the amount of attention each object in your photo attracts. Every part your photo has some amount of visual weight to it.
- Balance is about the arrangement of visual weight in a photo. A balanced photo has similar levels of visual weight between the left and right halves; an imbalanced photo has more weight on one side or the other.
- Sometimes, a "lighter" element can balance a "heavier" element simply by being farther from the center of a photo – like balancing a child and an adult on a seesaw.

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## Elements of Composition



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**Elements of Composition**

SPACE (Positive and Negative)

- Positive space is any part of the photo that attracts attention. Areas with significant visual weight are usually positive space.
- Negative space is the “filler” between regions of positive space.
- Photos with high amounts of positive space feel crowded, while photos with high amounts of negative space feel empty.
- Positive and negative space depend quite a bit on other elements of composition, such as visual weight and distance.

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**Elements of Composition**



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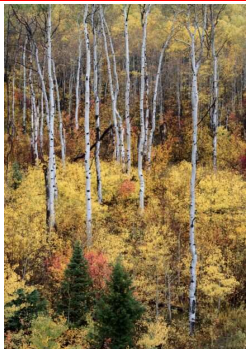
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**Elements of Composition**

PATTERNS

- In photography, patterns are everywhere.
- Even the reflection of a mountain in a pool of water is a pattern – one which should not be underestimated, since it ties the photo together.
- Patterns are arguably more obvious in manmade scenes, like architectural photography. But even natural scenes and living creatures have patterns, like feathers on a bird or waves crossing in the sea.



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 **RULES OF COMPOSITION**

**RULE OF THIRDS**

- The rule of thirds is the most talked up of the rules of composition.
- To practice this rule, divide the frame of your photograph with two equally spaced vertical lines and two similar horizontal lines.
- These lines and the four points at which they meet create areas on your frame for placing subjects and essential elements.

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 **RULES OF COMPOSITION**



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 **RULES OF COMPOSITION**

**GOLDEN SPIRAL**

- The golden spiral is another method that people often use to compose a shot.
- A curve starts from the corners and goes across the upper portion of the frame, spiraling towards the middle and the bottom.
- The concept is that movement and subjects should all fall on the curve and your most interesting portion of the frame should align closely with the middle of the spiral in the lower quadrant of the frame.

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## RULES OF COMPOSITION



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## RULES OF COMPOSITION

### LEADING LINES

- When we look at a photo, our eye is naturally drawn along lines.
- Leading lines direct the viewer through the image. A leading line paves an easy path for the eye to follow through different elements of a photo.
- Usually, these lines start at the bottom of the frame and guide the eye upward and inward, from the foreground of the image to the background, typically leading toward the main subject.

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## RULES OF COMPOSITION



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 **RULES OF COMPOSITION**

**SYMMETRY**

- We are surrounded by symmetry and patterns, both natural and man-made. They can make for very eye-catching compositions, particularly in situations where they are not expected.
- Another great way to use them is to break the symmetry or pattern in some way, introducing tension and a focal point to the scene.

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 **RULES OF COMPOSITION**

**VIEWPOINT**

- Before photographing your subject, take time to think about where you will shoot it from.
- Our viewpoint has a massive impact on the composition of our photo, and as a result it can greatly affect the message that the shot conveys.
- Rather than just shooting from eye level, consider photographing from high above, down at ground level, from the side, from the back, from a long way away, from very close up, and so on.

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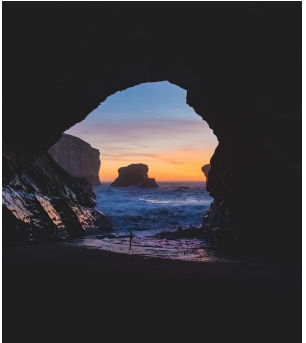
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 **RULES OF COMPOSITION**

**FRAME IN FRAME**

- Frames add a touch of drama and story to any photo..
- The view out of a window in a lighthouse or the view between large trees in a forest tell more than just the picture of the view itself.



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 **RULES OF COMPOSITION**

**RULE OF DIAGONALS**

- Like leading lines, diagonals are vertices that lead your viewer's eye, but instead of them being lead into your image, they're lead across the composition, which creates "movement".
- Tension is created by intersecting a diagonal line, which makes the eye focus towards this point. Have a look at this photo below of a model sitting on rocks on a beach.

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 **RULES OF COMPOSITION**

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**RULES OF COMPOSITION**

Head room

Nose/lead room

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**RULES OF COMPOSITION**

- Extreme Long Shot
- Long Shot
- Full Shot
- Knee Shot
- Cowboy Shot
- Mid Shot/Medium Shot
- Medium Close up
- Close Up
- Extreme Close Up

Shot Size Cheatsheet

EXTREME CLOSE UP (FACE)

CLOSE UP (FACE)

MEDIUM CLOSE UP (FACE)

MEDIUM SHOT (KNEE)

COMEBY SHOT (KNEE)

MEDIUM FULL SHOT (KNEE)

FULL SHOT (FEET)

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**Topic 3:**  
**Types of Lenses**

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**Lenses**

A camera without a lens is useless to a photographer. The lens is what focuses light from what you see through the viewfinder into a tiny, (typically) 35mm spot on the back of your film, DSLR, or mirrorless camera. If you remove the lens from your camera, the only kind of image you can produce is white light. Consequently, a high-quality lens can help you capture great photos even with a cheap camera, while a low-quality lens can make the best camera mediocre and the resulting image quality, poor.

A lens is a tool used to bring light to a fixed focal point. In a film camera, the lens sends the light to the film strip, while in a digital camera (like DSLRs or mirrorless cameras), the lens directs light to a digital sensor. Camera lenses are made up of a series of glass plates that are convex (curved outward) or concave (curved inward).

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**Lenses**



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**Camera Lens Characteristics**

All lenses filter and focus light so that it hits the sensor or film strip correctly. However, there are a variety of other factors that determine how a camera lens affects the look and quality of the final photo.

- **Focal length** is the measurement of distance (in millimeters) between the point of convergence of your lens and the sensor recording the image. The focal length range of a lens is expressed by a number, and that number tells you how much of the scene your camera will be able to capture. Smaller numbers have a wider angle of view and show more of the scene; larger numbers have a narrower angle of view and show less.

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Focal length size guide		
Focal Length	Type of Lens	What is it used for?
4mm - 14mm	Fisheye	Abstract, creative
14mm - 35mm	Wide angle	Landscape, architecture
35mm - 85mm	Standard	Street, travel, portrait
85mm - 135mm	Short telephoto	Street photography and portraits
135mm+	Medium telephoto	Sports, wildlife, action
300mm+	Super telephoto	Sports from a distance, nature and astronomy
35mm - 200mm	Macro	Close-up shots

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### Focal Length

Understanding focal length is key to understanding how your camera works. The focal length of a lens determines what your camera can focus on, and how your images are going to turn out. From selecting the right lens, to getting those picture-perfect shots, read on to learn more about focal length and how it impacts photography.

Focal length is the distance (measured in millimeters) between the point of convergence of your lens and the sensor or film recording the image. The focal length of your film or digital camera lens dictates how much of the scene your camera will be able to capture. Smaller numbers have a wider angle of view and show more of the scene, while larger numbers have a narrower angle of view and show less.

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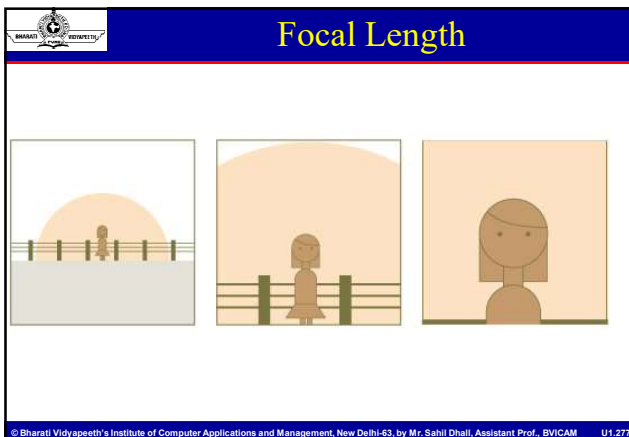
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**Focal Length**

**How Does Focal Length Affect an Image?**

- **Field of view.** Focal length determines how much of a scene is captured in an image. Shorter focal length lenses are called wide-angle lenses because they allow you to get a wider field of view in one image. Lenses with long focal lengths are called telephoto lenses, and have a smaller field of view.
- **Depth of field.** Lenses with long focal lengths tend to have a shallow depth of field, which means they can focus in on small objects (even faraway ones) at specific distances. Meanwhile, lenses with short focal lengths have a larger depth of field, which enables them to get a wider range of elements in focus.
- **Perspective.** Focal length can also change the perspective and scale of your images. A lens with a shorter focal length “expands” perspective, giving the appearance of more space between the elements in your photo. Meanwhile, telephoto lenses tend to stack elements in the frame together to “compress” perspective.

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**Focal Length**

- **Image shake.** Image shake is the blurriness and reduction in image quality that occurs from the vibration of pressing down the shutter release. When using a lens with a long focal length and tight perspective, your lens and camera are more sensitive to the slightest motion. Image shake can be prevented by using a tripod.

**How Does Crop Factor Impact Focal Length?**

- Crop factor is a photography term for the difference between your camera's sensor size and a traditional 35mm film frame. Crop factor affects your focal length because a “cropped” sensor captures less of the projected image than a “full frame” sensor, resulting in a photo that appears more zoomed in. For instance, some camera brands, including Canon and Nikon, make DSLR cameras with sensors smaller than 35mm. Nikon's DX cameras have a crop factor of 1.5, which means they're only 75% the size of a traditional film frame.
- Cameras with higher crop factors produce a narrower field of view that can create the impression of a longer focal length, even if you're using a lens with the proper focal length for your subject. To avoid taking photos that feel too zoomed in, multiply the focal length of any lens you plan to use by the crop factor of your camera sensor, then use the resulting number (your effective or equivalent focal length) to make any adjustments to your equipment.

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**Lenses**



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 **Camera Lens Characteristics**

- **Aperture** is how big the opening is that lets light in, expressed in f-stops. F-stops are counterintuitive, because the larger the number, the smaller the opening. For example, f/2.8 allows twice as much light into the camera as f4, and 16 times as much light as f11. Aperture affects the depth of field: larger openings create a shallower depth of field, while smaller openings make more of the image in focus.
- **Maximum Aperture.** Lenses will list a maximum aperture on the barrel, indicating the maximum width a lens aperture can open. Typically, lenses with a wider maximum aperture cost a bit more. A lens with a wide maximum aperture is great for low light situations, so if you are considering night photography, it might be worth the investment.

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 **Camera Lens Characteristics**

- **Depth of Field.** Controlling the amount of the photo that is in focus is one of the photographer's best tools to help draw the viewer's eye where you want it. For example, landscapes are typically shot so that everything is in focus, so photographers will shoot at small apertures (e.g. f11 or f16). The depth of field varies with the type of lens, due to maximum aperture.
- **Types of Camera Lenses**
  - There are two basic categories of camera lenses:
  - **Prime lenses.** Primes have a fixed lens focal length, making them faster and sharper. While prime lenses are less flexible due to the fixed focal length, they are also fast and lightweight, making them easy to travel with
  - **Zoom lenses.** Zooms use a series of lenses to allow different focal lengths from a single lens, making them more flexible but not as fast. They contain more glass, which aids in their flexibility, but they also tend to be bigger and heavier than prime lenses.

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 **What is a prime lens?**

- A prime lens is a classic style that has been around as long as cameras have. Prime lenses have a fixed focal range, which means that you can't zoom in or out.
- The main advantage of prime lenses is that they specialise in just one focal length. In other words, they are finely tuned to deliver on one specific type of photography, unlike a zoom lens which can be used in a multitude of cases.
- Because of this, prime lenses produce much higher quality images than a zoom lens in general, but you will need to know in which situation you can use them. For example, the 50mm prime lens, otherwise known as the Nifty Fifty, is perfect for portraits, as the focal length is seen to be as close to the human eye as possible.
- A 35 mm prime lens, on the other hand, is usually best employed by landscape photographers.

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 **What is a prime lens?**

- The Prime Lens is most commonly used in situations when the subject is mostly stationary and you, the photographer, can move around. These include Portrait, Wedding, Landscape, and Streetscape.
- The benefits of Prime Lenses include generally higher quality images compared to zoom-capable lenses, lighter weight, great for low-light or night photos.
- The downsides are that, obviously, you CAN'T zoom in if you want to, you need to carry multiple lenses in most cases, and you risk losing a shot while switching lenses.
- They come in all sorts of lengths from a 6mm fisheye lens or a 14mm ultra-wide-angle to a 50mm standard to a 600mm telephoto and pretty much every length in between and beyond.

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 **What is a zoom lens?**

- Zoom lenses are one of the most common types of lens that you'll need in your photography armoury, offering you a great range for photographing anything from people in the streets to wildlife in the African Savanna.
- Zoom lenses are incredibly versatile, with the most popular being the 70-200 mm lens that you'll see being used by wedding photographers. Zoom lenses have variable focal lengths, so with a 70-200mm lens for example, you can zoom from 70mm all the way up to 200mm.
- If you're travelling light, though, you can find zoom lenses with much more range, such as an 18 - 270 mm, allowing you to photograph both close up and in the distance.
- For budding photographers or anyone needing to photograph in a diverse range of scenarios or conditions, there's nothing that can really beat a good zoom range for quality and adaptability. It's the all-round lens that everyone needs!

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 **What is a zoom lens?**

- Whether you're at a sporting event, hiking outdoors, or in a situation that requires shooting far away and up close, the Zoom Lens can work for you!
- Zoom Lenses can come in different focal lengths. Generally, you might find a Zoom Lens that goes from 50mm to 200mm. That means you can get a nice family photo at the end of your hike (50mm) or you can get a close-up shot of that deer you saw along the way (200mm)!
- The downsides of a Zoom Lens are that they are usually heavier than Prime Lenses, not quite as sharp as proportionally priced Prime Lenses, and the aperture setting doesn't usually go as low, meaning low-light shots aren't as easy to get.

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## What is a zoom lens?

- They come in a variety of configurations. Some of the more typical ranges are the 16-35mm ultra-wide-angle, 24-105 standard zoom, 70-200mm telephoto zoom, and the 100-400mm telephoto zoom.
- This gives you greater flexibility in how you frame your image. It also means you may not need to buy and carry an extra lens. This can be especially helpful for travel where weight and space may be a consideration or for events when you may not have time to change a lens.
- A standard zoom lens is in the 24-105mm range. Another option is the 24-70mm lens. Some of the 24-70mm zooms are faster than the 24-105, offering an f2.8 aperture vs. f4 for the 24-105 lenses. This is very useful in low-light situations. However, the 24-105 gives you more reach. So it's a trade-off between reach and speed. You have to decide which is more important to you. Regardless, if you just want to carry one lens, the standard zoom is hard to beat. It works well for many types of photography – travel, family photos, landscapes, street photography, and events, for example.

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## Kit Lenses

- Most entry-level interchangeable-lens cameras come bundled with what's called a "kit" lens. Typically, it's something like an 18-55mm zoom lens, sometimes alongside a second kit lens in the 75-300mm range. These starter lenses are designed to provide a flexible focal range that allows the photographer to capture a wide range of subjects as they are learning more about photography, from wide-angle shots to normal or telephoto images.
- These lenses are often cheaply built and have one of the lowest price points among a manufacturer's lens lineup. They generally come with variable maximum apertures, meaning the maximum aperture possible on the widest focal length is larger than the maximum available on the telephoto end.
- While kit lenses can be a good place to start, photographers may want to upgrade their starter lenses or expand their collection with more specialized lenses, certain focal lengths, a larger maximum aperture, and/or lenses that have superior image quality.

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## Telephoto Lenses

- If a standard zoom lens isn't quite strong enough for your needs, then the next step up is a telephoto lens. These big lenses are found within a range of 100mm up to 600mm, sometimes even more.
- Telephoto lenses are bulky and may require a tripod to support them, making them nowhere near as practical as a standard zoom lens.
- If you are a professional wildlife photographer, sports photographer, or if you photograph the night sky and the stars, then a telephoto lens can be invaluable. For amateurs though, it's perhaps not within your budget.
- Telephoto lenses are great for wildlife, sports, portraits, even close-up photography, or any situation when you either can't get close enough or don't want to get too close to your subject.
- The downside of Telephoto is they are generally heavier, need a tripod to get the shot stable, and are expensive.

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 **Telephoto Lenses**

- For telephoto zooms, the typical ranges are 70-200mm, 100-400mm, and 150-600mm. There are other variations, but those are the basic ranges.
- The 70-200mm length is popular with portrait photographers because they allow you to zoom in for close-ups without crowding your subject. They also produce images that have a more compressed and more natural look than a wide-angle or even standard-length lens. Telephoto lenses also have less depth of field than wide-angle or standard lenses, an effect that helps separate the subject from the background by making the background appear out of focus.
- Many landscape photographers like the 70-200 length because it is smaller and lighter than something like the 100-400mm zoom, but still allows them to zoom in and isolate details. They can also be used for some limited wildlife photography as long as the subject isn't too far away.
- However, if birds and other wildlife are a priority, you'll be better off with a 100-400mm or 150-600mm lens. These are the workhorse lenses for wildlife. The 100-400 in particular is a versatile range. In addition to wildlife photography, the lens is found in the bags of many landscape photographers.

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 **Telephoto Lenses**

- Prime telephoto lenses run from around 85mm up to 800mm. There are some specialty lenses that are longer, but for practical purposes, most people will stick with something in the 85-800mm range, depending on the use.
- The shorter lenses, like the 85mm, are used mostly for portrait photography, while the longer lenses are used for wildlife and sports.
- As mentioned, the advantage of prime telephotos over their zoom cousins is that they tend to be sharper and faster. For example, the fastest f-stop of the Canon RF 100-500 is f7.1 when fully extended. The Canon RF 600mm lens goes down to f2.8. This means it captures more light, so you'll get less noise and be able to use a faster shutter speed.
- The Sony 200-600 zoom goes down to f6.3 at 600mm, while the Sony 600mm prime goes to f4. The extra speed comes at a hefty price, however. The Canon 600mm is \$11,999 and the Sony is \$12,999 compared to \$2895 for the Canon 100-500 Zoom and \$1995 for the Sony 200-600.

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 **Wide Angle Lenses**

- Wide angle lenses are ideal for fitting a large area into your frame. This is especially useful for landscape photography or street photography. With wide angle lenses, almost everything is in focus, unless your subject is very close to the lens.
- As the name suggests, wide-angle lenses give you a wider field of view – you capture more of the scene. In landscape photography, for example, this means you can photograph a wide open space. In real estate or architectural photography, it means you can capture more of a confined interior space. However, there's more to wide-angle lenses than just cramming more stuff into your pictures.
- First, wide-angle lenses give your greater depth of field than standard or telephoto lenses. Theoretically, this means you can get everything in your picture acceptably sharp with one shot if you use a wide-angle lens. Your f-stop, the actual focal length, sensor size, and where you focus also play a role in maximizing your depth of field. Nonetheless, if you want the foreground, midground, and background sharp, use a wide-angle lens.
- Wide-angle lenses also exaggerate the size of things in the foreground. They make the things closest to you look big and things further away look small. You can use this effect creatively when composing your images.

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## Wide Angle Lenses

- For example, in a classic landscape composition, you will usually have a strong foreground element – a flower, rock, tree, etc. – appear large in the image, while the background, which creates the setting, appears small.
- On the other hand, you probably don't want to use a wide-angle lens for a portrait because it will exaggerate the size of things closest to the camera, which in the case of a person could be a nose or belly.
- In addition, wide-angle lenses can create distortion, turning straight lines into curved lines. The effect can usually be corrected somewhat or completely using the Lens Correction and Transform panels in Lightroom and other software.
- Wide-angle lenses are available as either primes or zooms. Typical wide-angle or ultra wide-angle zooms are in the 16-35mm range or 14-24mm range.
- Most commonly used in landscape photos or night photography, they do require a certain amount of post-processing (photo editing with software) to avoid some of the distortion inherent in the lens.
- They are lightweight like Prime Lenses and capture a clear image of most of the field of view, but aren't useful for close-up, portrait, or when you want that blurred background (known as bokeh).

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## Superzoom Lenses

- For example, in a classic landscape composition, you will usually have a strong foreground element – a flower, rock, tree, etc. – appear large in the image, while the background, which creates the setting, appears small.
- On the other hand, you probably don't want to use a wide-angle lens for a portrait because it will exaggerate the size of things closest to the camera, which in the case of a person could be a nose or belly.
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**Lenses**



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**Lenses**

- Superzooms have a bit more reach than a standard zoom, usually going from around 24mm or so out to around 200mm, though there are lenses that go well beyond this range too. This makes them more versatile than standard zooms, but what you gain in flexibility you lose in quality. Superzoom lenses often aren't as sharp as standard zooms, especially in the corners of the frame. However, many people find them to be sharp enough, especially if all you're doing is posting your pictures online.
- Certain bridge and compact cameras are known for having built-in superzoom lenses with very powerful zoom capabilities.



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**Ultra Wide-Angle Lenses**

- An ultra wide-angle lens is a lens that provides an even wider view than a typical wide-angle lens. Generally, this refers to any lens that has a shorter equivalent focal length than 24mm on a 35mm full-frame camera.
- Ultra-wide lenses can be rectilinear (with straight lines rendered as straight lines) or curvilinear (with straight lines rendered as curved lines). More on this difference later, but lens manufacturers have in recent years created wider and wider rectilinear lenses for things like landscape photography.
- In 2020, the Chinese company Venus Optics introduced the Laowa 9mm f/5.6, which became the world's widest rectilinear lens for full-frame cameras.

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**Super-Telephoto Lenses**

- Beyond short telephoto lenses of 85-135mm in 35mm terms and medium telephoto lenses of 135-300mm, lenses with focal lengths greater than 300mm on a 35mm full-frame camera are often referred to as super-telephoto lenses.
- These lenses can be used to capture faraway subjects — the moon, for example.



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**Macro Lenses**

- Macro lenses let you focus at very short distances so you can make close-up photos of small things like flowers, insects, small products like jewelry, electronic components, pharmaceuticals, or anything else worthy of a close-up. They also can be used to make interesting abstracts.
- A true macro lens produces a life-size image at its minimum focusing distance. This is represented as a 1:1 ratio. There are also ultra or extreme macro lenses that produce 2:1 or more magnification at the minimum focusing distance. On the other hand, some so-called macros offer less than 1:1. They can still produce interesting close-up images, but they have less magnification than a true macro. Be sure to check the specs if looking to buy a macro lens.
- Macro lenses come in a variety of focal lengths from 14mm ultra-wide-angle to 100mm or more telephoto. If you're just starting out with macro, you'll probably find a longer telephoto lens more useful. The longer lenses let you get close-ups without getting too close, so you won't block your own light or scare away the bug you want to photograph.
- You also get a shallower depth of field when doing close-up photography, which creates a softer background and more separation of your subject from the background. The downside of that, of course, is that your focus has to be spot on. If not, you could end up with an out-of-focus subject.

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**Lenses**



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**The Fisheye Lens**

- The Fisheye Lens is commonly used for situations when you want to see a lot of scenery in one shot. Real estate is one of the most common uses, as Fisheye Lenses allow for a single photo to show an entire room (such as the bathroom). But Fisheyes can be used for landscape photos, abstract art shots, cityscapes, and more. Because of the nature of Fisheye Lenses (major distortions), they aren't useful in most common situations, such as portrait or wedding photos.
- If you need to capture an even wider field of view, then you'll need to invest in a fisheye lens. These create the unusual "fisheye" effect, similar to a GoPro image.
- A fisheye lens is basically an ultra-wide-angle lens, offering an enormous field of view. These are more specialist lenses and aren't generally needed by most photographers. They are useful if you are photographing indoors or using your camera for design work. An ultra-wide-angle lens can have a focal length as low as 8mm.
- In conclusion, there are different types of camera lens for almost any situation you could find yourself in as a photographer. Knowing which lens is best for what scenario, will set you on your way to becoming a much-improved photographer.

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**The Fisheye Lens**

- Fisheye lenses (also known as curvilinear lenses) go in the opposite direction. They are ultra-wide angle lenses that intentionally distort the image by creating very curved lines.



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**Lenses**



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**Tilt-Shift Lenses**

- A tilt-shift lens is a specialty lens that lets you change perspective, eliminate distortion and alter depth of field by tilting or shifting the position of the lens in relation to the sensor. It's not a lens most photographers will ever use. However, they have their fans, especially among architectural photographers who use them to straighten the lines of tall buildings and interior walls.
- For example, if you stand near a tall building and try to take a picture of it with a standard lens, the top of the building will appear smaller than the bottom because it is further away. The edges of the building will converge near the top like two parallel lines receding into the distance.
- A tilt-shift lens lets you manually shift the lens, altering the plane of focus, in relation to the sensor. This makes the top of the building look as wide as the bottom, so the edges are straight parallel lines and don't converge. The building looks normal.

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 **Teleconverters**

- If you're looking for a longer reach for your telephoto lens, you don't always have to buy a longer lens. A cost-effective alternative is to add an accessory called a teleconverter, which is also known as a tele extender. These are short secondary lenses that attach to your camera at one end and your telephoto lens at the other.
- They usually come in either 1.4x, 2x, or 2.8x versions. A 1.4x would multiply the reach of your lens by 1.4, turning a 400mm lens into a 560mm lens. The 2x doubles the reach, turning a 400mm lens into an 800mm lens. A 2.8x turns a 400mm lens into a 1120mm lens.
- They only work on telephoto lenses such as a 70-200mm or a 100-400mm. They won't fit a standard or wide-angle lens. The downside of using a tele extender is that they reduce the amount of light reaching the sensor, which means you have to use a slower shutter speed or higher ISO. A slower shutter speed could add blur if you're trying to photograph a fast-moving subject like a bird in flight. A higher ISO may add noise.

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**Topic 4:**  
**Camera Accessories**

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**Camera Accessories**

- **TRIPOD**
- A tripod is an essential camera accessory for any photographer. It helps you keep your camera stable and frees up your hands.
- When you start investing in photography gear more, you'll only want the best DSLR accessories. And, when it comes to a tripod, you'll want to make sure it can hold the weight and provide stability.



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**Camera Accessories**

- **External Flash**
- External flashes are incredibly useful as they can make a photo look professional. If you use it properly, it will look as though the flash wasn't even fired. This will give your photos a natural look.
- The Godox V1 flash is the way forward. Use this in conjunction with the flash transmitter for the best possible combination.
- The Godox V1 flash is compatible with most of the brands, so you won't regret buying one.



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**Camera Accessories**

- **Creative Filters**
- Creative filters include UV, ND and color filters. They come in handy in various photography scenes. From photographing sunsets to creating long exposures, you can only benefit from the usage of creative filters.
- Remember to make sure you're getting the right size for your lens and that you're buying a circular (as opposed to linear) filter for a DSLR.



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**Camera Accessories**

- **Reflector**
- A reflector is an easy, yet fantastic accessory that should be part of your essential gear. By using a reflector, you can redirect light onto a subject or a scene.
- They are excellent tools for adding fill light or creating catchlights. Moreover, they don't need any batteries, cords or button.
- Reflectors are the first stepping stones into lighting techniques.



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**Camera Accessories**

- A memory card holder has one purpose: keeping your memory cards safe. They can hold anything you throw at it, such as CF cards, SD cards, and micro SD cards.
- Some even protect the cards from shock and water, making this one of the must-have camera accessories.
- It protects your memory cards from dirt, scratches, and it comes with a water-resistant upper.



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**Camera Accessories**

- **Flash Transmitter / Sync Lead**
- If you can afford one, this is a great way of experimenting with a flashlight and giving your photos a professional look. We are talking about the Godox Wireless Flash Trigger.
- Helps you to maintain distance from the subject with off flash light & trigger
- One of its most important uses is functioning as fill flash. However, it is great for creating cool effects, too.
- It's important to remember that anything that changes in the transmitter changes the external flash.



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**Camera Accessories**

- **Camera Strap**
- This camera strap is amazing and comfortable. You can change its length with one hand in seconds.
- If you don't own a neck strap, this is the first and most important of all of the must-have DSLR accessories.
- Maintains grip between hands and the strap when attached with the camera



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**Camera Accessories**

- **Remote**
- This is one of the best DSLR accessories for ensuring the best quality images and avoid blurry images
- Spending a lot of time with camera on a tripod is well maintained by the remote. When you're taking a long exposure, even the slightest movement will make your image less sharp.
- Be careful which one you buy, though. There are different remotes for different cameras — wireless and wired. Remote shutter releases are a godsend, especially in adverse weather.



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**Camera Accessories**

- **Lens Cleaner / Sensor Cleaner**
- Microfiber Cleaning Cloths to be the most versatile and useful.
- They're cheap, disposable and you can use them on your filters as well.
- Their anti-static nature is great at keeping dust away too. Use these for the most effective lens cleaning in the dirtiest conditions.
- The problem is only dust-related.
- To remove the dust, I use a Rocket Air Blaster to blow away any pesky particles inside my camera. It's incredibly effective and, once again, you won't have to break the bank.
- With this sensor cleaner and the lens clothes, you can put together an essential lens cleaning kit.



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**Camera Accessories**

- **Extra Memory Cards**
- Photographing events can take up a lot of place in your memory card. The bigger camera sensors get, the bigger the file sizes.
- Bigger files need more space. When in need of extra space, go for the SanDisk 64GB Extreme SDXC UHS-I Card.
- Space isn't the only thing memory cards need to possess. As cameras pump out bigger and bigger files, your memory card needs to keep up.
- Make sure you get the right card for your camera



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**Camera Accessories**

- **Extra Batteries**
- When you buy your camera, it comes with one battery. But you might find you need more for photoshoots your spend away from any electrical output.
- Three batteries put you at ease a lot more than only one.
- Shooting for long periods of time, in continuous bursts really drains your batteries. And you really don't want to be caught out halfway of your shoot.
- Batteries are an absolute must if you are considering to use a battery grip. Extra batteries are must have camera accessories, especially for those pursuing landscape photography.



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**Camera Accessories**

- **External Hard Drive**
- Whenever transfer is important photos onto my computer, make sure that you export them into an external hard drive at the same time. This means that I have access to separate back-ups.
- As you travel and prefer to work on laptop on location, you must have a portable external hard drive. This one doesn't need an external power source.



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## Camera Accessories

- **Memory Card Reader**
  - I didn't realise how slow transferring photos through your camera can be. This all changed when I needed to buy a memory card reader.
  - It gave me a huge speed boost and, as I take more and more photos, it saves me more and more time. A card reader is not only a must have but also one of the best camera accessories.
  - You can even use it alongside your camera if you need to add a lot of images to your computer ASAP.
  - The Transcend Multi-Card Reader is one of the best memory card readers out there as it gives you access to SD, Micro SD and CF cards.



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