

Photography Basics - Exposure

Bais Elements of Photography

- Exposure
- Focus
- Composition

The basic elements of photography - Exposure

Exposure is the overall brightness or darkness of a photograph. More specifically, it's the amount of light that reaches the camera sensor when a picture is being taken. The more you expose the camera sensor to light, the lighter your photo will be. The less light, the darker your photo will be.

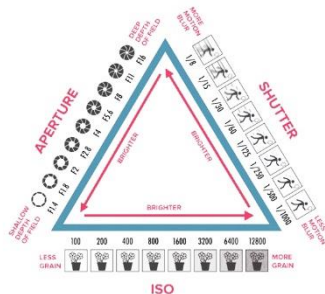


Under Exposed Correct Exposed Over Exposed

How do we determine correct exposure?

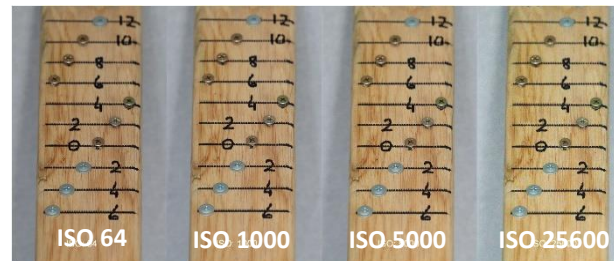
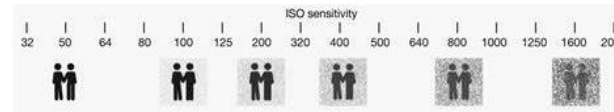
There are three ways for a camera to control the amount of light that reaches the camera sensor; these three together constitute the exposure triangle:

- ISO
- Shutter speed:
- Aperture:



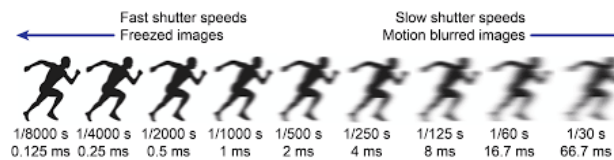
What is ISO?

ISO originally referred to the sensitivity of film—it's "light gathering" ability. The higher the ISO rating, the greater the film's ability to capture images taken in low light. High ISO film was called fast film—it required a shorter exposure than a low ISO film. For digital photography, ISO refers to the sensitivity—the signal gain—of the camera's sensor.



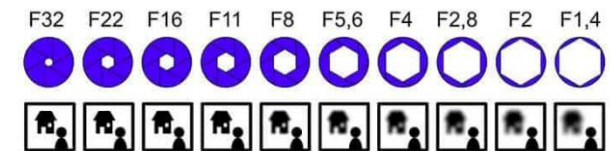
What is Shutter Speed?

Shutter speed is a measurement of the time the shutter is open, shown in seconds or fractions of a second: 1 s, 1/2 s, 1/4 s ... 1/250 s, 1/ 500 s, etc. The faster the shutter speed, the shorter the time the image sensor is exposed to light; the slower the shutter speed, the longer the time the image sensor is exposed to light.



What is Aperture?

Aperture refers to the opening of a lens's diaphragm through which light passes. It is calibrated in f/stops and is generally written as numbers such as 1.4, 2, 2.8, 4, 5.6, 8, 11 and 16. Lower f/stops give more exposure because they represent the larger apertures, while the higher f/stops give less exposure because they represent smaller apertures.

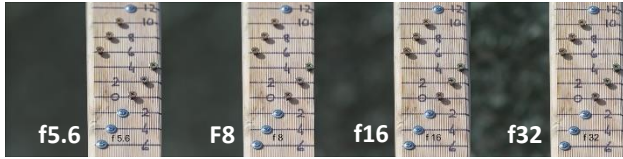


How aperture affects depth of field (DOF)

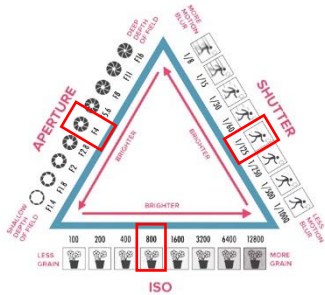
Depth of field is the zone of acceptable sharpness in front of and behind the subject on which the lens is focused. Simply put how sharp or blurry is the area behind your subject.

- The lower the f/stop—the larger the opening in the lens—the less depth of field—the blurrier the background.
- The higher the f/stop—the smaller the opening in the lens—the greater the depth of field—the sharper the background.

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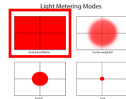
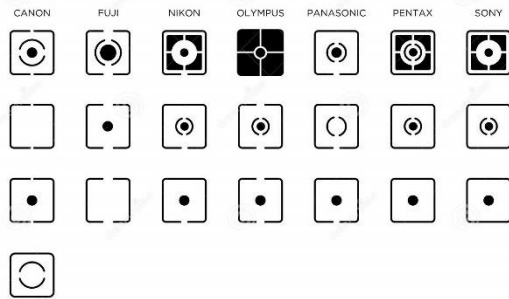
The Exposure Triangle



ISO = 800	ISO = 1600	ISO = 1600
SS = 1/125	SS = 1/125	SS = 1/250
f = 4	f = 5.6	f = 4

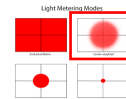
Metering modes

METERING MODE ICON



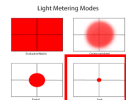
Matrix (Nikon), Evaluation (Canon), Multi (Sony)

Evaluative metering meters the overall scene in multiple sections in the viewfinder and combines the results to find the correct exposure based on the subject's position and lighting conditions. This is the default metering on most DSLR cameras and can be used for the majority of your photography.



Centre-weighted (Nikon), (Canon), Centre (Sony)

Centre-weighted metering mode focuses on the centre of your frame when determining the best exposure values, while still considering its surroundings. In some cameras, the size of the circle in the centre can be adjusted to suit your needs.



Spot (Nikon), (Canon), (Sony)

Nikon - Spot metering mode causes your camera to only evaluate whatever is at the focal point in your shot and completely ignores the light in the rest of the scene.

Canon & Sony - Spot metering is similar to partial metering, but covers a much smaller area of the scene, usually less than 2% and right in the middle of the frame.

Metering modes – When to use

Matrix:

- Evenly lit scenes (either full sun or full shade)
- When using flash

Centre-weighted:

- Portraits
- Macro
- When the important part of the photograph will stay in the centre of your frame
- Concerts
- Mixed lighting
- Stage performances
- Situations where you know there will be bright highlights but are unable to spot meter on the fly

Spot:

- Backlit images
- Silhouettes
- High-contrast situations
- Snowy landscapes
- When your subject is not filling the largest portion of your frame

The Histogram

A histogram is a bar graph of a frequency distribution in which the widths of the bars are proportional to the classes into which the variable has been divided and the heights of the bars are proportional to the class frequencies.

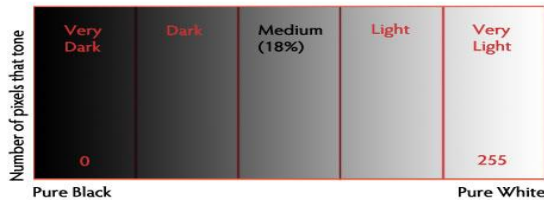


Anyone else confused? So, what does a histogram really do? And how do you read it?

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How to read the Histogram

A histogram is a graphical representation of the pixels in your image. The left side of the graph represents the blacks or shadows, the right side represents the highlights or bright areas, and the middle section represents the midtones (middle or 18% grey). The heights of the peaks represent the number of pixels of a particular tone (with each peak corresponding to a different tone). Each tone from 0-255 (0 being black and 255 being white) is one pixel wide on the graph, so imagine the histogram as a bar graph all squished together with no spaces between each bar.

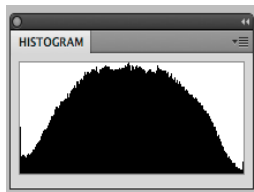


What can we learn from the histogram

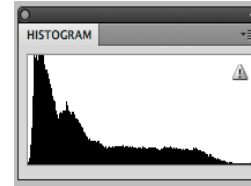
We can tell that an image is well-exposed if it reaches fully from edge to edge without a gap on one side of the graph, and it isn't heavily going up one side or the other. In an ideal world, the graph should just touch the left and right edges of the histogram, and not spill up the sides. The graph should also have a nice arch in the centre.

However, this "ideal histogram" doesn't always apply in every situation for every scene.

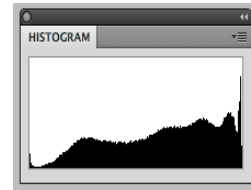
This is how an ideal histogram might look, evenly distributed, edge to edge, not up the sides.



This is a histogram for a dark subject. It is not wrong; it is just more shifted to the left to represent the tones of the subject. This might be a black cat on dark pavement.



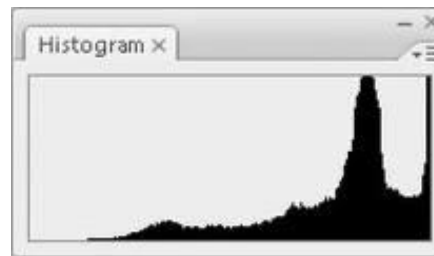
This is a histogram for a light subject (e.g., a white cat) with mostly light tones in the scene and few dark areas. See how it is shifted to the right compared to the dark subject? This is what you want, assuming your scene is mostly light toned. If you change your exposure to keep the graph centred, you will end up with a grey cat, not a white one.



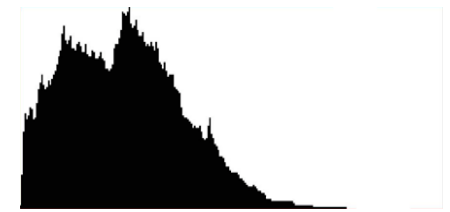
When the histogram tells you to adjust your exposure

Gaps on either end indicate you are missing information, and your exposure can be shifted safely without losing detail. When your graph is shifted too far in one direction or the other direction, so that it does not even touch the other edge, you can safely shift your exposure to cover more of the range of tones.

This graph shows an overexposed image; notice the gap on the left side indicating a lack of any blacks in the image. It also means you will lose lots of detail in the white areas that may not be recoverable. In this case, shift to give your image less exposure and shoot the scene again.



This graph shows the opposite. Now we see a gap on the right side of the graph indicating there are no whites represented, so the image will be dark – too dark. You can safely give the image more exposure until you see the tones just touch the right edge of the histogram.



What do the spikes up the side mean?

Spikes up the left or right edge of the histogram indicate "clipping" of that tone and a loss of detail in that area. Clipped areas are often unrecoverable, especially in the highlights. It is generally advised to expose so that your graph just touches the right edge (which indicates that you have kept your highlight details). It is usually easier to recover some shadow detail and retain a decent image than to try and create highlight detail that isn't in the file.

The graph shows an image with extreme contrast, lots of blacks, a spike of white, and not much in the middle.



Photography Basics - Exposure

Making sense of shooting modes

Auto Mode - Automatic Exposure is when the camera chooses the optimum shutter speed, aperture, ISO and flash settings for your shot. All you need to do is point and shoot.



This can be good if you have no idea of what settings to choose and when you need to shoot quickly.

Program Mode - When this mode is selected, the camera automatically sets the shutter speed and aperture to achieve what it believes is the best possible exposure for the metering information of whatever scene the photographer has framed. This is *almost* like using a simple point-and-shoot camera in that almost every setting on the camera is controlled by the camera itself. "Almost" because this mode will not automatically deploy your built-in flash, nor will it change your ISO or color space or other more specific settings



Aperture Priority Mode (A / Av)

- The Aperture Priority mode allows the photographer to set a specific aperture while allowing the camera to calculate the proper exposure and assign an appropriate shutter speed. This allows the photographer to change aperture, and therefore change the depth of field of the image, while the camera does the necessary calculations to automatically set your shutter speed.

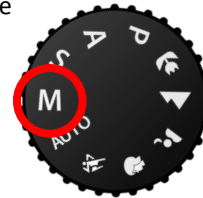


Shutter Priority Mode (S / Tv) -

This is the opposite of the Aperture Priority mode. When you select this mode, you control the shutter speed, and the camera controls the aperture. Again, the result is that the camera is looking for a balanced exposure by assigning an aperture to your chosen shutter speed.

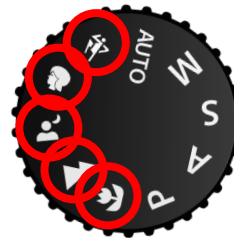


Manual Mode (M) - The camera's manual mode takes you back to the early days of photography, before computer intervention, when the photographer selected a combination of shutter speed, aperture and ISO to get the desired exposure. This is likely the most intimidating mode of the group.



Manual Mode (M) with Auto ISO - The photographer selected a combination of shutter speed and aperture. ISO is set to Auto to get the desired exposure.

Sports Mode - Sports mode cranks up your shutter speed to freeze action. Usually, it will disable the flash as well.



Portrait Mode - This is like selecting Aperture Priority and opening your aperture to get shallower depth of field. However, depending on the camera, it may also enhance skin tones and soften skin texture automatically.

Night Portrait Mode - This mode should fire off the flash while keeping a slower shutter speed that allows background lighting to remain in the scene.

Landscape Mode - This mode generally maximizes your depth of field, and it may even make the scene's colors more vibrant.

Macro Mode - For close-up photography, the camera will either open the aperture to give the image very shallow depth of field or narrow the aperture for the opposite effect. Check your manual to see exactly what your camera does when you select this mode.

What is White Balance?

In non-technical terms, white balance is how warm or cool the overall colors in your photograph look.

Colour Temperature	Light Source
1000-2000K	Candlelight
2500-3500K	Tungsten Bulb (Household variety)
3000-4000K	Sunrise/Sunset (Clear Sky)
4000-5000K	Fluorescent Lamps
5000-5500K	Electronic Flash
5000-6500K	Daylight with Clear Sky (Sun Overhead)
6500-8000K	Moderate Overcast Sky
9000-10000K	Shade or Heavily Overcast Sky

