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https://www.facebook.com/groups/38612742174/

EXPOSURE
HOW A DIGITAL CAMERA WORKS

The lens brings light from the scene into focus inside the camera so it can expose an image.

The aperture is a hole that can be made smaller or larger to control the amount of light entering the camera.

The shutter is a device that can be opened or closed to control the length of time the light enters.

A Quick Review

It's all About The Exposure

When you press the shutter release button of a digital camera, a metering cell measures the light coming through the lens and sets the aperture and shutter speed for the correct exposure.

When the shutter opens for that nanosecond, each pixel on the image sensor records the brightness of the light that falls on it by accumulating an electrical charge.

The more light that hits a pixel, the higher the charge it records.

When the shutter closes to end the exposure, the charge from each pixel is measured and converted into a digital number. The series of numbers can then be used to reconstruct the image by setting the color and brightness of matching pixels on the screen or printed page.

Light Sensitivity ISO Ratings

An ISO (International Organization for Standardization) number that appears on the film package specifies the speed, or sensitivity, of a silver-based film. The higher the number the "faster" or more sensitive the film is to light.

Each doubling of the ISO number indicates a doubling in film speed so each subsequent film is double the speed of the preceding number.

Just like in the film days, Image sensors are also rated using equivalent ISO numbers. Just as with film, an image sensor with a lower ISO requires more light for a good exposure than one with a higher ISO.

To get more light, you need a longer exposure time that can lead to blurred images or a wider aperture that gives you less depth of field.

But what is ISO?

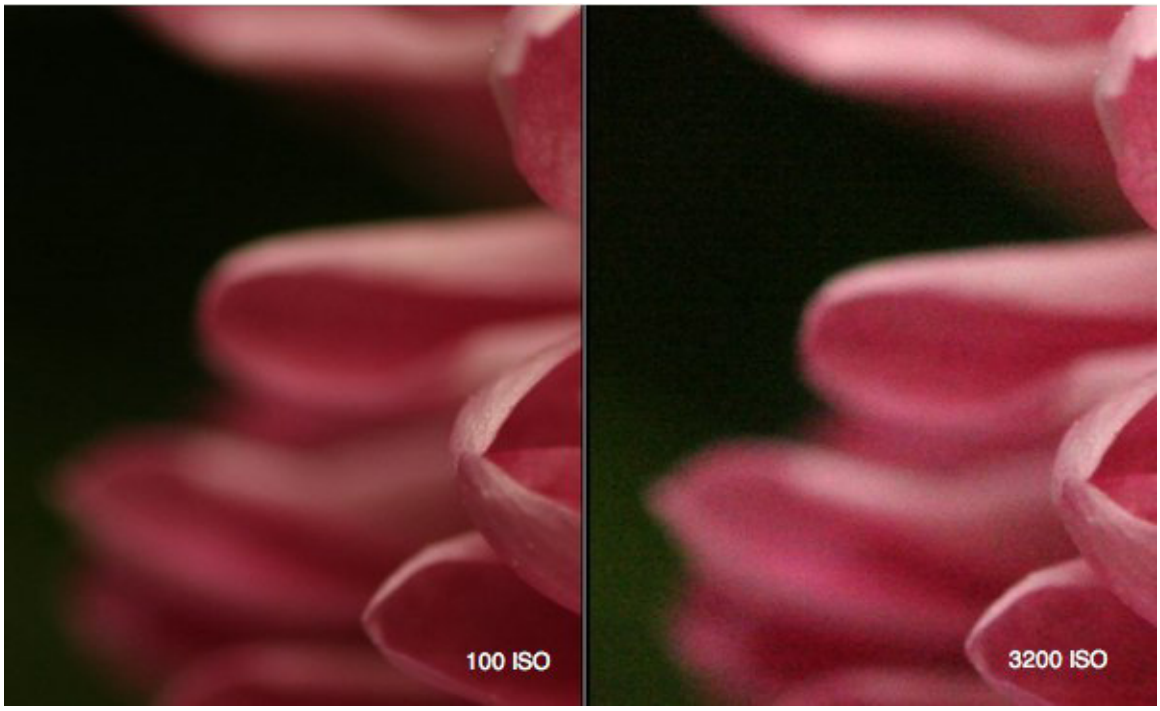
Your ISO allows you to make pictures in low light situations.

It is basically a measure of your digital sensor's sensitivity to light. The higher the number, the more sensitive to light your sensor becomes.

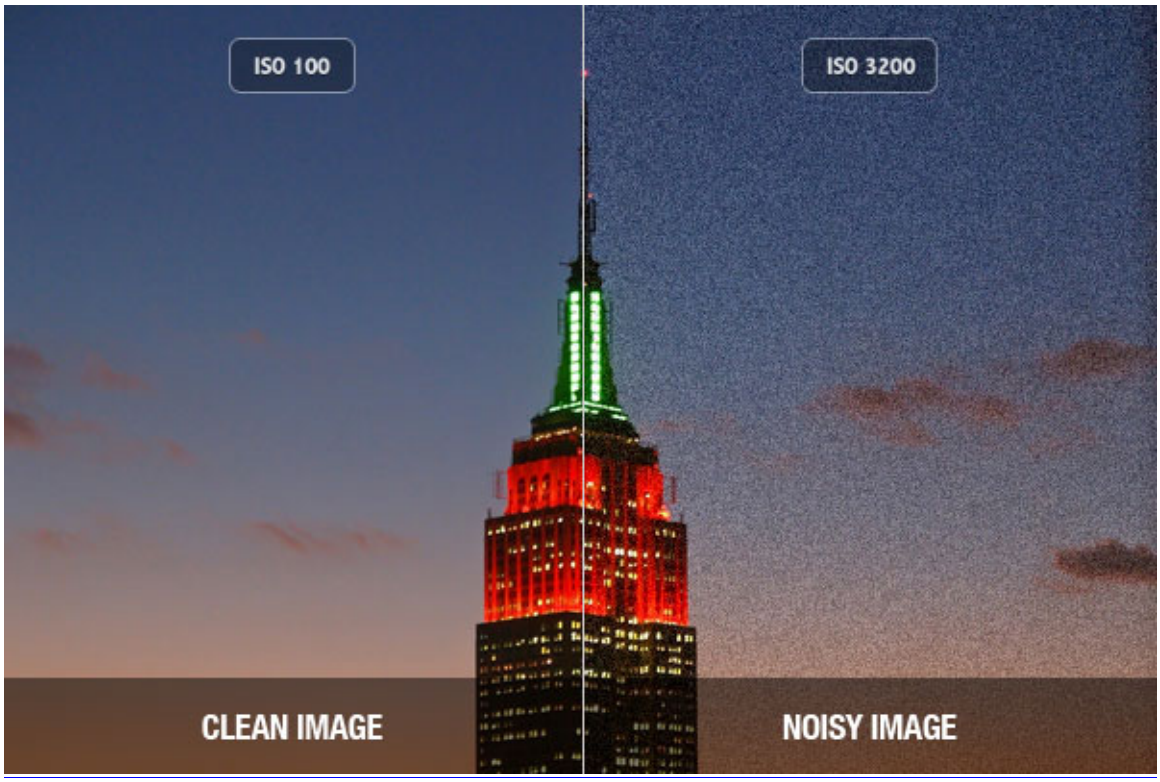
Read more: http://digital-photography-school.com/moving-toward-manual-settings-understanding-iso-a-beginners-guide#ixzz0wKKqd5ZZ

DO THIS: Get in the habit of checking your ISO every time you create a photograph.

Many photographers have been disappointed at the end of a shoot to find that they'd forgotten to check what ISO setting they'd left their camera on in their last shoot. There's nothing worse than thinking you're shooting at an ISO of 100 only to find you forgot to switch it back from 1600.



Read more: http://digital-photography-school.com/how-to-choose-the-right-iso-for-your-digital-photography#ixzz0wKKMCD1D



Read more:
http://www.exposureguide.com/iso-sensitivity.htm

A. ISO: Control the Sensitivity of Your Camera's Sensor

See pages 20-21: *Understanding Exposure*

An ISO (International Organization for Standardization) number that appears on the film package specifies the speed, or sensitivity, of a silver-based film. The higher the number the "faster" or more sensitive the film is to light.

In analogue (Film, remember that?) photography, ISO measures the sensitivity of the film used. What you do need to remember is that a higher ISO will give you a brighter image but that the image will have more noise.

If you've purchased film, you are already familiar with speeds such as 100, 200, 400 and the very fast 800. Each doubling of the ISO number indicates a doubling in film speed so each subsequent film is double the speed of the preceding number.

Image sensors are also rated using equivalent ISO numbers. Just as with film, an image sensor with a lower ISO requires more light for a good exposure than one with a higher ISO.

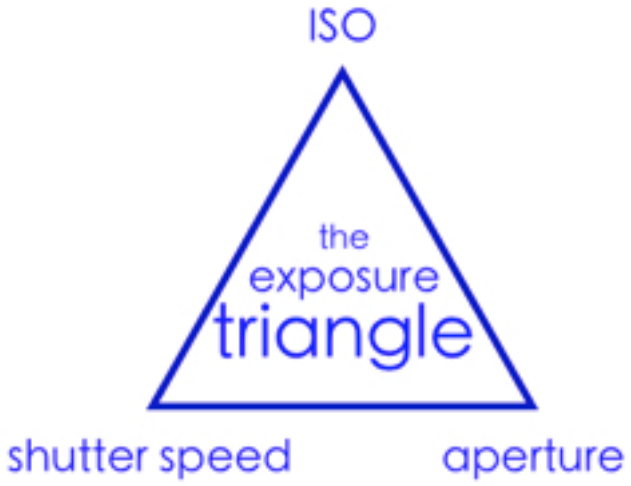
To get more light, you will need a longer **exposure time** that can lead to blurred images or a **wider aperture** that gives you less depth of field. All things being equal, it's better to get an image sensor with a higher ISO because it will enhance freezing motion and shooting in low light. Typically, ISOs range from 100 (fairly slow) to 3200 or higher (very fast).

Some cameras have more than one ISO rating. In low-light situations, you can increase the sensor's ISO by amplifying the image sensor's signal (increasing its gain). Some cameras even increase the gain automatically. This not only increases the sensor's sensitivity, it also increases the noise or "grain," making the images softer and less sharp, analogous to the grain increase is higher film speeds.

Rule: Use the lowest ISO you can afford!! Always default to ISO 100 or 200, the lowest number your camera offers, then increase sensitivity as needed when available (ambient) light is low.

Exposure Control

The Photographic Triangle



How to make an image brighter or darker

There are three factors that affect how bright your image looks:

1) **Aperture:** the size of the opening in the lens when a photograph is taken.
2) **Shutter Speed:** The amount of time that the shutter is open.

3) **ISO:** The measure of a digital camera sensor's sensitivity to light

APERTURE - Defines the size of the opening in the lens. Aperture is metered in f-numbers. Today, digital cameras allow you to change aperture in 1/2 or 1/3 ev steps.

Aperture settings are called f-stops and each f-stop lets in half as much light as the next larger opening and twice as much light as the next smaller opening.

f/1, f/1.4, f/2, f/2.8, f/4, f/5.6, f/8, f/11, f/16, f/22, f/32

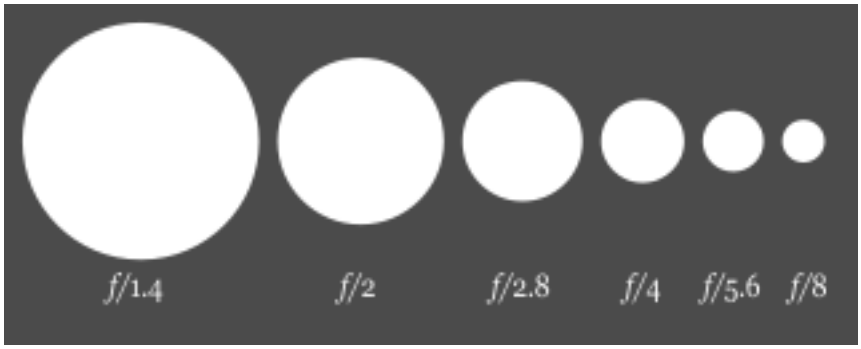


Diagram of decreasing apertures, that is, increasing f-numbers, in one-stop increments; each aperture has half the light gathering area of the previous one. The actual size of the aperture will depend on the focal length of the lens.

Typical one-third-stop f-number scale

f/#	1.0	1.1	1.2	1.4	1.6	1.8	2	2.2	2.5	2.8	3.2	3.5	4	4.5	5.0	5.6	6.3	7.1	8	9	10	11	13	14	16	18	20	22

Imagine your camera is like a window with shutters that open and close.

Aperture is the size of the window. If it's bigger more light gets through and the room is brighter.

Shutter Speed is the amount of time that the shutters of the window are open. The longer you leave them open the more that comes in.

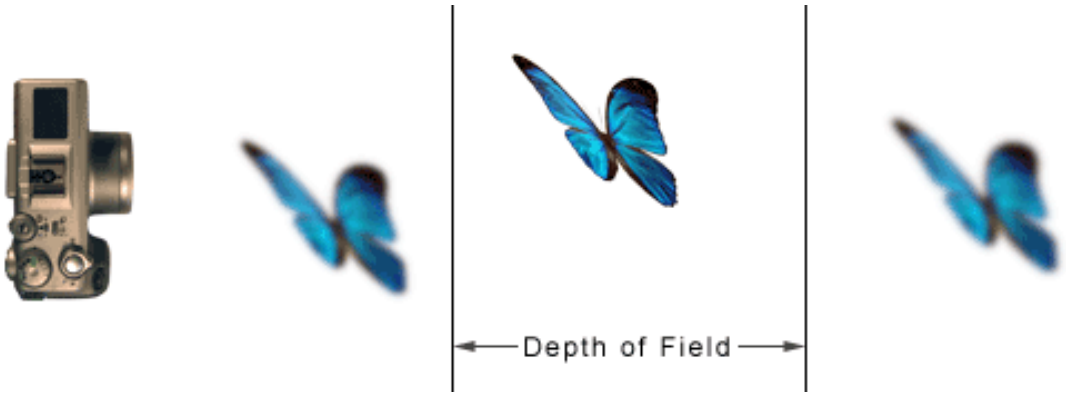
There are a number of ways of increasing the amount of light in the room.

You could increase the time that the shutters are open (decrease shutter speed), you could increase the size of the window (increase aperture).

Read more: http://digital-photography-school.com/learning-exposure-in-digital-photography#ixzz0wKJQ14xT

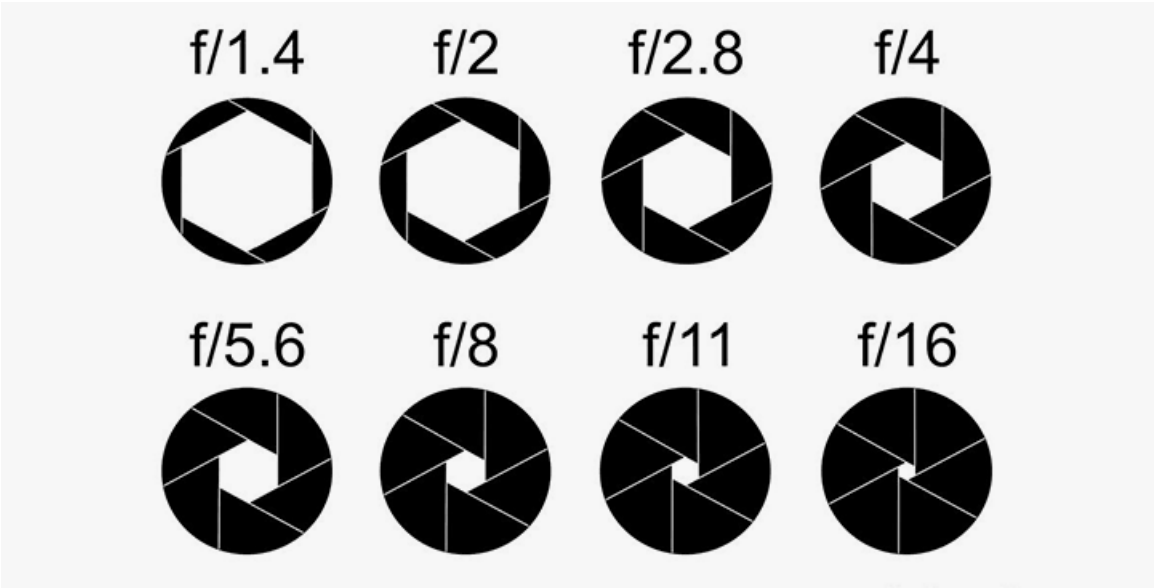
Aperture Control: Depth of Field – Selective Focus

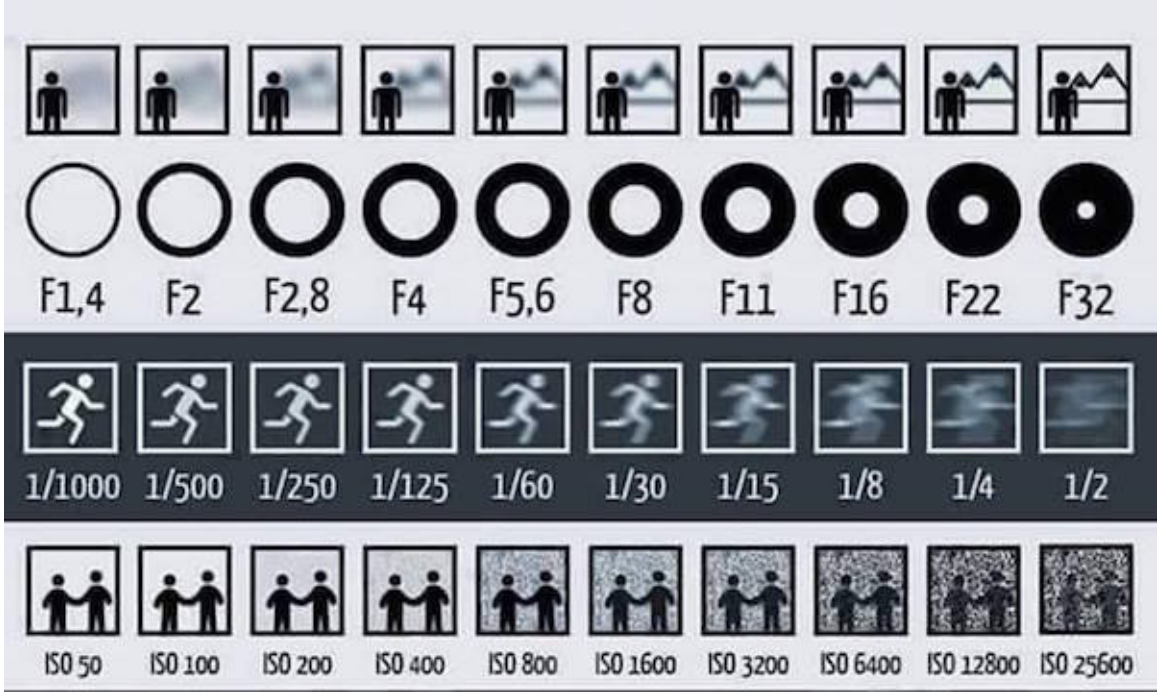
If you can control your camera's **aperture**, you can control **depth of field**-the area from foreground to background that's sharp in the image. This allows you to either throw the background out of focus or keep both the subject and the foreground sharp; you can better predict your photograph's results.



What a lens looks like, opened up to full aperture opening (right), and stopped down (left):


MC ROKKOR-PG
1:1.4 f=50mm
LENS MADE IN JAPAN
MINOLTA
337805
MC ROKKOR-PG
1:1.4 f=50mm
LENS MADE IN JAPAN
MINOLTA
337805


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



Open apertures give you narrow DOF (Depth of Field)

See page 32-39 *Understanding Exposure*

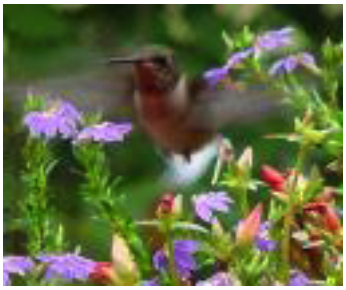
Shutter speed

The effect of exposure in night photography: Longer shutter speeds result in increased exposure.

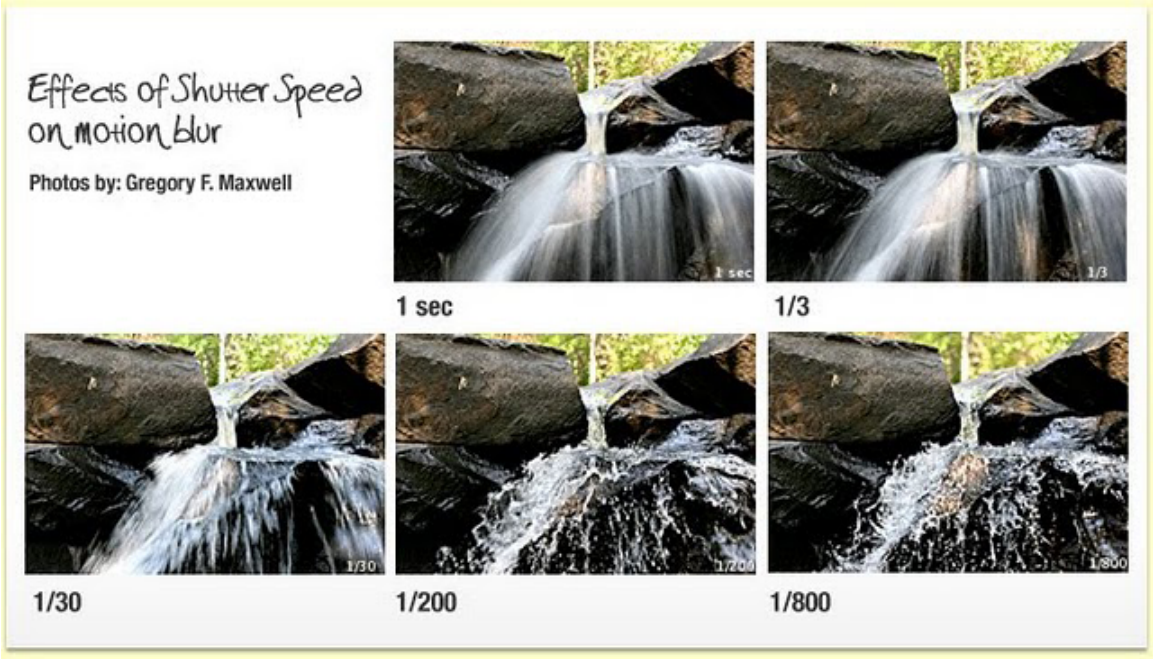
Where motion adds excitement

Shutter Speeds: Choosing a faster shutter speed allows you to freeze faster actions. You can control your shutter speed by selecting "shutter priority" mode and selecting either a low or a high shutter speed to get a desired effect.

Fast shutter speed: You can freeze hummingbirds in flight. Experiment with selecting shutter speeds in excess of 1,000/second. You will need a lot of light to get the proper exposure; your aperture will automatically select a wide open setting to allow enough light.

A fast shutter speed can freeze a hummingbird in flight. You can freeze water in motion, or use a slow shutter speed to show the graceful cascade of water in a waterfall.



<u>Shutter speed</u> – defines the exposure time i.e. the time for which the shutter is held open during the taking of a photograph to allow light to reach the sensor.

Shutter speed is metered in seconds or fractions of a second (e.g. 1s, 1/30s, 1/60s, etc.). Many cameras also have **bulb** shutter speed, which means that shutter is opened as long as you keep shutter release button pressed.

Traditionally shutter speed is set in a sequence so that each number (called f-stops) changes amount of light approximately two times (i.e. 1 ev) from the previous number.

This sequence is - 1s, 1/2s, 1/4s, 1/8s, 1/15s, 1/30s, 1/60s, 1/125s, 1/500s, 1/1000s, 1/2000s, 1/4000s etc. Modern cameras also allow you to change shutter speed in **1/2 or 1/3 ev steps.**

For a given set of illumination conditions and sensor ISO speed, there usually are several combinations of aperture and shutter speed that will make a correctly exposed image (e.g. f/4 - 1/500s, f/5.6 - 1/125s, f/8 - 1/60s).
Choices are more limited in dark or extremely bright conditions.

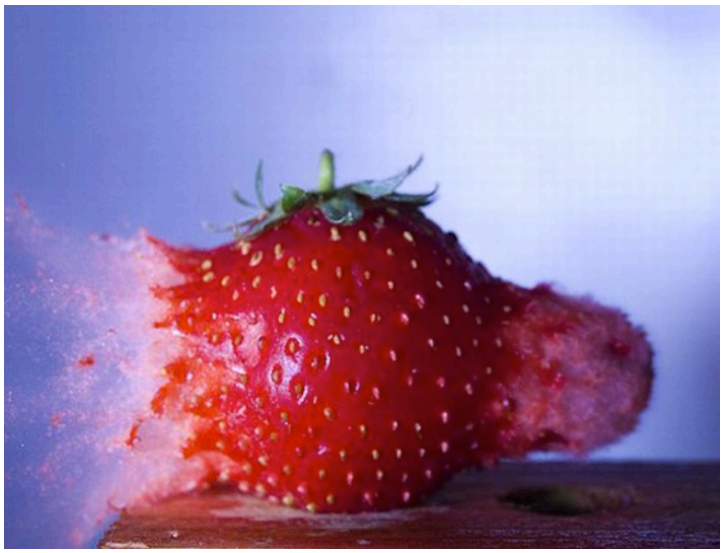
For example, in a night scene you might increase your ISO speed to a maximum number while opening the aperture, allowing more light in, increasing or decreasing shutter speed to get the best exposure.

For artistic/photographic reasons, you may want to use specific settings for some of these options.

To ensure the same brightness is maintained, you will then need to inversely change one of the other options. For example, if you are shooting a flower and want the background to blur out, you will want a short depth of field... such as a more open aperture, say F4 or F5.6.

Or, if you are doing a sports shot and want to show action blur, you will want a slower exposure time. Since this also lets in more light, you will also have to close down the aperture a bit to compensate and still get the correct exposure

Fun with fast shutter speeds:



Slow shutter speeds make magic and convey motion in a still photograph:


OLT
6
7


Q Photography

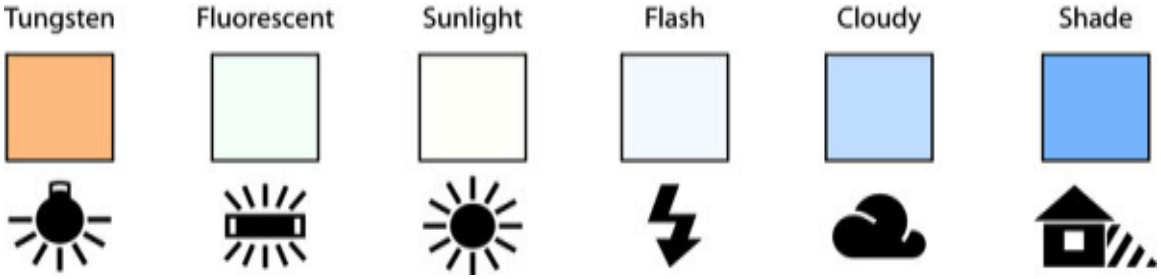

Q Photography

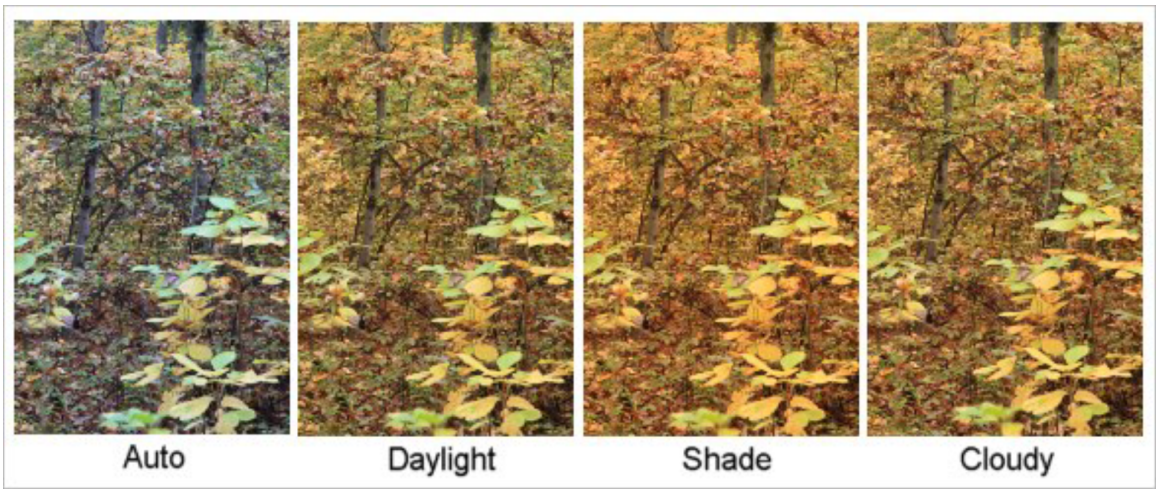
White Balance

If you come from the pre-digital world of film cameras, you may remember using filters to correct for incandescent or fluorescent lighting. Most people don't bother and their indoor pictures invariably have a weird yellow/orange or green cast. In the digital world, these correction filters are no longer necessary, replaced by a feature found in most -- even the entry-level -- digital cameras called, "White Balance."'

Even a pure white object changes color when the light shining on it changes. Daylight is a cold clear light but adds some heavy overcast or step into the shade and acquires a bluish tint. In a room lit with incandescent light bulbs, the light has a warm orange glow to it, while under fluorescent fixtures, colors take on an eerie yellow/greenish tint.

Many cameras give you a choice of white balance settings, indicated by icons such as a sun, a cloud, shade or a light bulb. For example, you should be able to choose among white balance for sunny, incandescent, fluorescent, cloudy, and flash light. The camera compensates for different lighting conditions, correcting for the color shifts.

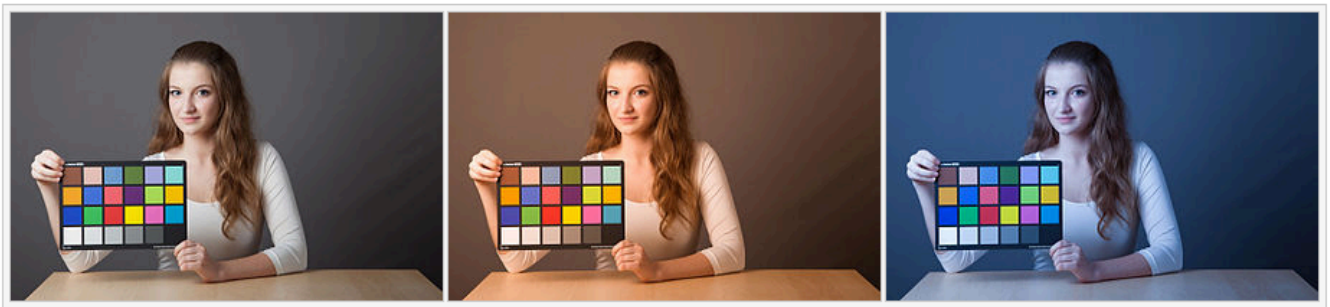




For more details on white balance, check out this resource:

Neutral light | Warm light | Cold light

Comparison of resulted colors as shot by the digital camera for different light qualities (color temperature): Neutral, Warm and Cold.[14]



Setting: As shot | Setting: Cloudy | Setting: Tungsten

Example of different white balance settings on digital camera for Neutral light.[14]

http://www.cambridgeincolour.com/tutorials/white-balance.htm

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Histograms

Many cameras now display a **histogram** and an **overexposed highlights indicator** that shows what areas are so overexposed they have gone pure white without any detail. Histograms let you know if you got the best possible exposure.

The histogram, like those found in most serious photo-editing programs such as Photoshop or iPhoto, allows you to evaluate the distribution of tones. Since most image corrections can be diagnosed by looking at a histogram, it helps to look at it while still in a position to reshoot the image.

How histograms work:

Each pixel in an image can be set to any of 256 levels of brightness from pure black (0) to pure white (255). A histogram is a graph that shows how the 256 possible levels of brightness are distributed in the image.

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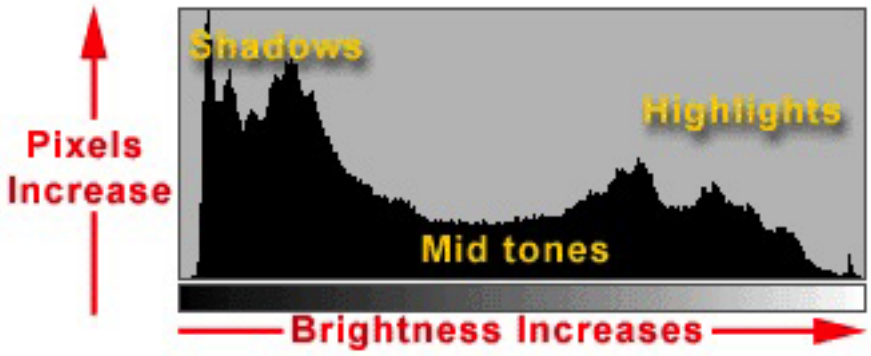
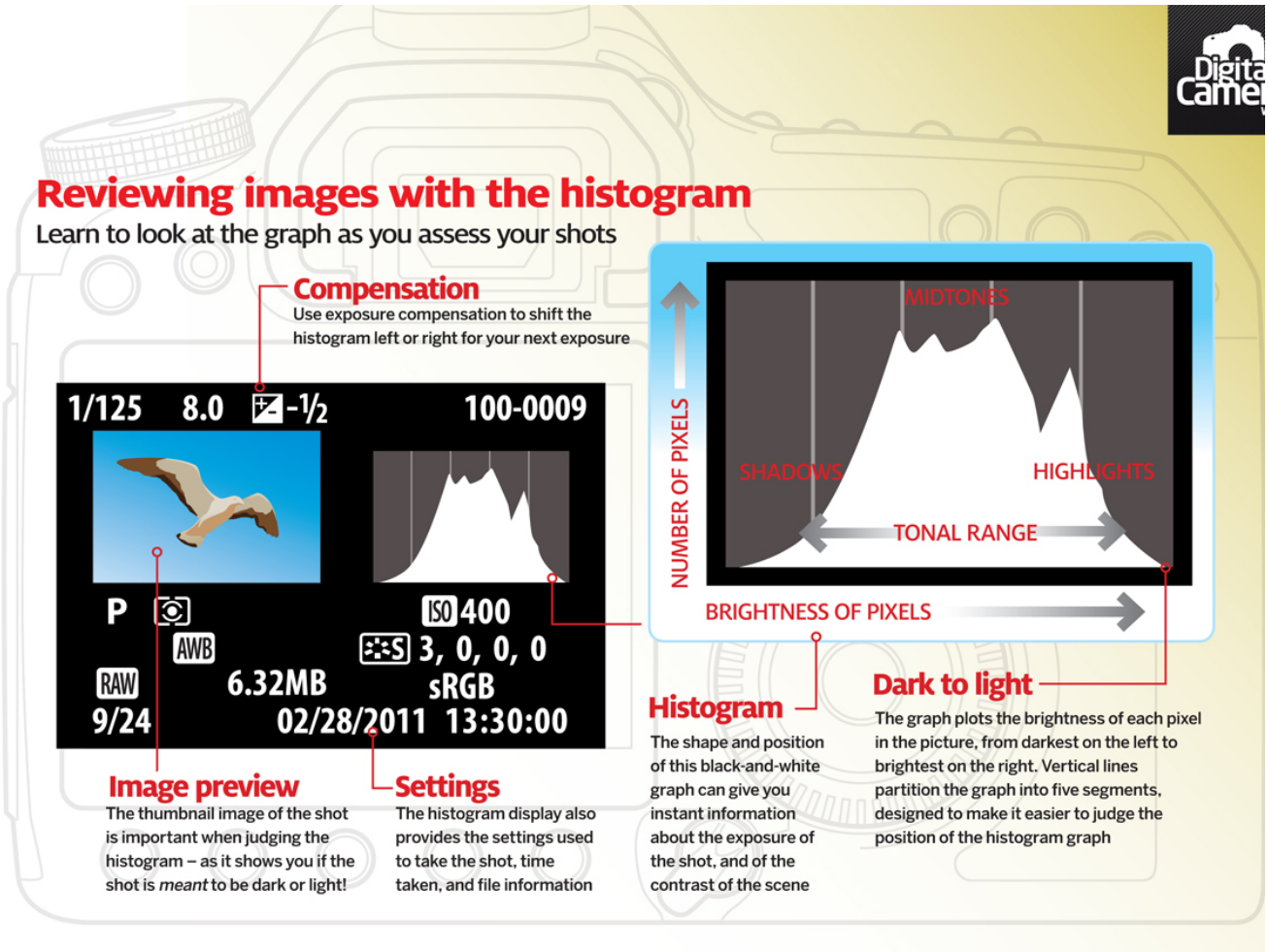
http://www.digicamhelp.com/what-is-a-histogram/

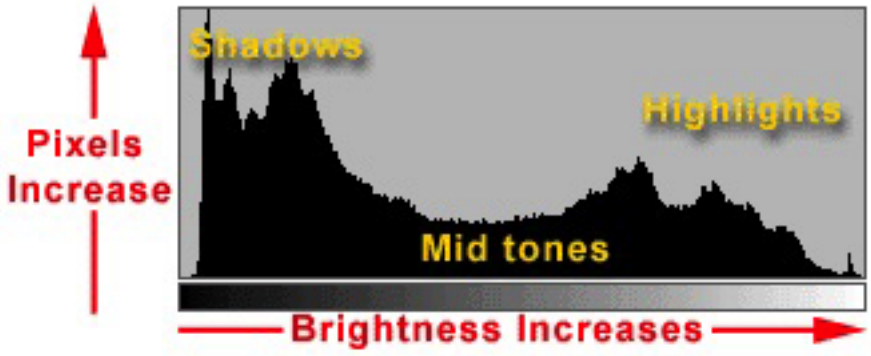


The horizontal axis represents the range of brightness from 0 (shadows) on the left to 255 (highlights) on the right. Think of it as a line with 256 spaces on which to stack pixels of the same brightness. Since these are the only values that can be captured by the camera, the horizontal line also represents the camera's maximum potential dynamic range.

The vertical axis represents the number of pixels that have each one of the 256 brightness values. The higher the line coming up from the horizontal axis, the more pixels there are at that level of brightness.

To read the histogram, you look at the distribution of pixels. An image that uses the entire dynamic range of the camera will have a reasonable number of pixels at every level of brightness. An image that has low contrast will have the pixels clumped together and have a narrower dynamic range.





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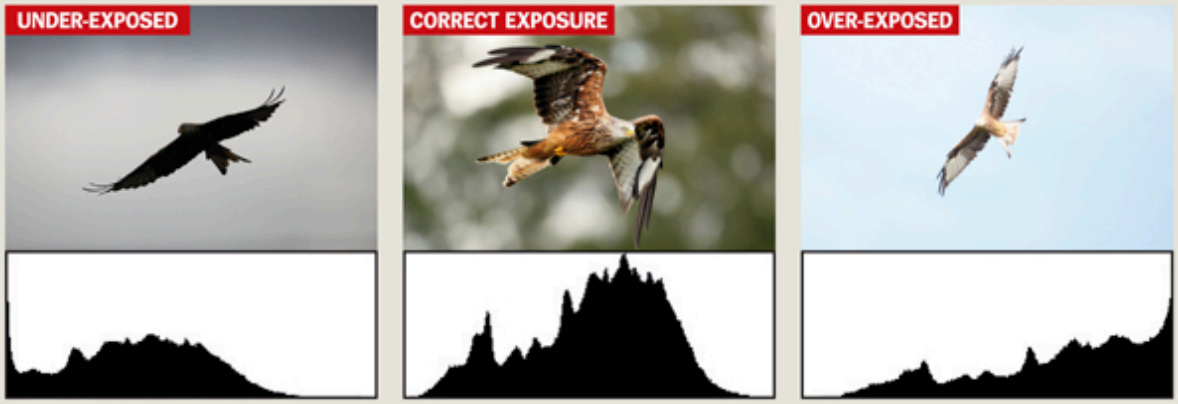

Too little light has been allowed onto the sensor, caused either by too fast a shutter speed or the aperture not being wide enough. This shot's histogram will be bunched to the left, known as 'clipping'. If printed, the clipped areas will appear black, and all shadow detail will be lost.

This correctly exposed image shows lovely crisp colours with light and dark tones throughout. A correct exposure on a histogram will have tonal values reaching as far to the right as possible without clipping the highlights. Note the tell-tale 'peaked' shape.

This shot is over-exposed, as too much light has reached the sensor. Notice how the histogram reveals that the tonal distribution is pushed over to the right. In the printed shot areas of the scene that should reveal detail will be blown out, and look wishy-washy as a result.

Master the Metering modes

MULTI-ZONE METERING
This is also known as Matrix, Evaluative and Multi-segment, among others, but all serve the same purpose. It's generally the default setting on your camera when you first switch it on. In this mode, the camera divides the scene into sections and takes a reading from each section to determine an overall reading for the whole scene.

SPOT METERING
This is the most accurate metering mode to use, because it enables you to take a reading from a small, precise area of a scene. However, it can sometimes take a bit of practise to be able to judge where a suitable midtone area is for the reading to be taken from. Your manual will tell you how to switch Metering modes.

CENTRE-WEIGHTED AVERAGE
Centre-weighted also takes a reading from the whole scene, but concentrates mainly on the central 60% of the frame. It's handy for portraits, especially where the model is central. This mode can get confused when an area near the edge of the frame strongly contrasts with the centre.

More histogram sources:
http://digital-photography-school.com/how-to-read-and-use-histograms/

http://www.kenrockwell.com/tech/histograms.htm