



CORE PHOTOGRAPHY FUNDAMENTALS

You won't be able to take a good picture
unless you know these four things

1. Shutter speed

The **shutter speed** is also referred to as the **exposure time**, or sometimes just an **exposure**. In all DSLR cameras, there is a piece of cloth or plastic that is between the lens and the camera's sensor. This cloth is called the “shutter”. When you push the button on your camera to take a picture, it opens the shutter for a duration of time and records the light that is being exposed to your camera's sensor. After that, the shutter shuts back up again to stop the exposure from taking place and saves the picture to your memory card.

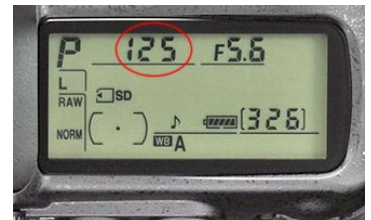
You can set your camera to take different durations of shutter speed. Here are some examples:

B or BULB, 30”, 25”, 20”, 10”, 5”, 1”, ½, 1/5, 1/10, 1/100, 1/250, 1/500, 1/1000, 1/4000, 1/8000

Let's go over this chart from left to right. On the very left we see “B or BULB”. BULB mode is basically a manual setting for shutter speed. It means that if you hold your finger down on the shutter button for 5 seconds, the exposure will be taking place during the 5 seconds you have your finger on the button. If you hold it down for 50 seconds, the exposure will be 50 seconds.

After BULB mode, moving to the right of the scale, we see 30”. This obviously means 30 seconds, and is the usually longest shutter speed available on most DSLR cameras. You can get into longer exposure times by either using a cable release, a wireless remote, or simply holding the shutter button down for a really long time in BULB mode. When it comes to going past the camera's maximum shutter speed, not all cameras are alike, so you will have to figure out which method works with your specific camera.

Next, after 30”, the shutter speed simply gets faster and faster. As you can see, everything after 1” turns into fractions of a second. Most camera's just display a number like “125” to represent “1/125th of a second”, so don't get confused and mistake “125” for “125 seconds”. Look at it as a fraction.



- Shorter shutter speed = darker image / freeze frame
- Longer shutter speed = brighter image / motion blur
- You will need to use a tripod in order to get a good result if your shutter speed is longer than 1/60th of a second. 1/60th and slower is too slow for hand-held photography.



Here is a popular long exposure trick that you have probably seen a dozen times: Traffic.

The reason why the moving car lights look like long lines is because this photograph had an exposure time of 15 seconds. If the exposure time was $1/200^{\text{th}}$ of a second, the car lights would look like dots and not lines (just like they do in real life).

You might be asking “How come I can't see the actual cars?”. The reason why you can't see the actual bodies of the cars is because they are in constant motion and not enough light was shining on them to make a noticeable trail. This technique is called “light painting” and is the same technique used when waving a flashlight in front of a camera. The reason why you can't see the hand waving the light in front of the camera is because they don't have enough light hitting them while they are moving around. If they were wearing glowing clothing, however, then that would be a different story.



The opposite is also true. If you were holding a candle in front of you but you were completely *still*, then your body would appear in the photograph. This is why we can see the trees and in the photograph above, because the foreground was stationary and was being lit up by the sky (and also a little bit by the traffic as well).

Check out my [blog post about various long exposure effects](#) to get some ideas.

- *Additional Resources on Shutter-speed:*
http://en.wikipedia.org/wiki/Shutter_speed
- <http://www.digital-photography-school.com/shutter-speed>
- <http://www.smashingmagazine.com/2008/08/24/45-beautiful-motion-blur-photos/>



Here's a trick you can put away in your bag of tricks: Put your camera into Shutter Priority mode and set the shutter speed anywhere between $1/5^{\text{th}}$ of a second to $1/30^{\text{th}}$ of a second and then take a picture of a moving car or bicyclist in motion. Make sure to start your pan before you take the picture, so the pan is already taking place before you hit the shutter button. Everything will appear smooth, and if you nailed it just right, the bicyclist will be clear but the background will be blurred. Using a tripod helps.

2. Aperture

The [aperture](#) is how wide the hole in your lens is. It is very similar to your eyeball's pupil. The bigger the diameter, the more light comes through your lens and onto the sensor. So, the bigger the opening = the brighter the image! Sometimes you will hear people refer to the aperture as the "F-Stop" number. It's the same thing.



[video](#)



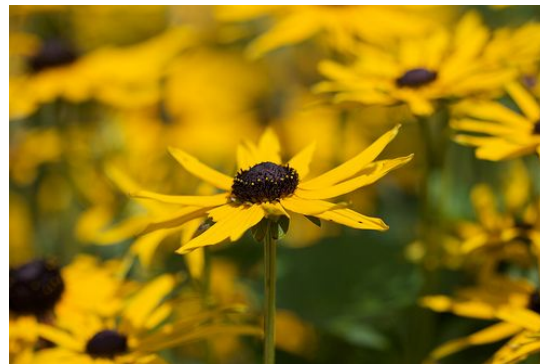
A higher f-number (like f16) = a smaller aperture = less light

A lower f-number (like f2.8) = a larger aperture = more light

There is also a side effect that comes with the aperture, and that is called [Depth of Field](#). To give an example of what depth of field is, take a look at the two examples below. The one on the left has an aperture opening of F11, and the one on the right has an aperture of 2.8.



F11



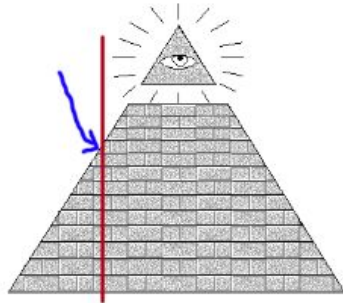
F2.8

As you can see, the depth of field determines how deep or shallow your plane of focus is. Using smaller F numbers (F1.8 etc.) will make the hole (aperture) in your lens wider, thus making your depth of field more shallow. Using larger F numbers (F16 etc.) will make the aperture smaller, creating a wider depth of field, making everything more sharp and in focus.

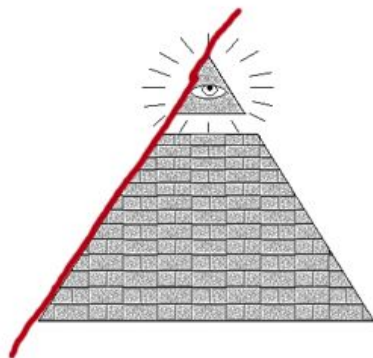
In order to make your depth of field as shallow as possible, do these things:

- Go down to the lowest F number your lens allows, like F1.8, 2.8, or 3.5, etc.
- Zoom in all the way if you are using a zoom lens - A 200mm lens at F2.8 will give a blurrier effect than a 50mm lens at F1.8.
- Get as close to your subject as possible with it still being in focus. - This will increase the distance between your subject and background, making the background more blurry.

Another thing you want to consider about depth of field is the angle at which your lens is facing your object.



Depth of field is always in the form of a plane and is parallel to the lens. In this example, the only area that will be 100% in focus is where the blue arrow is pointing, because that is where the focus plane meets the pyramid.



In this example, however, the camera lens lines up with the surface of the pyramid, so everything on the surface will be in focus. Keep this concept in mind when you are taking pictures, and you will know what to expect before your image is displayed on your preview screen.

Depth of field is very useful for isolating your subject from the background. It puts much more attention on the main subject rather than the distracting busy background.



200mm lens / F2.8 / 1/640 sec / ISO 400





One other thing that is really cool about using shallow depth of field is that if you are ever in a city at night time, the city lights will come out as big blurry blotchy dots. This effect is commonly referred to as [bokeh](#).

What makes a good bokeh lens?

The cheapest solution is currently what I use, and that is a [Nikon 50mm F1.8](#). The same lens is also available for [Canon](#).

There are thousands of different lenses and I simply don't have time to test them. Plus, the better ones can get very expensive. So for right now, my recommendation to you is a 50mm F1.8. If you got cash you want to spend, do a Google search for "good bokeh lens".



These lenses are also very good, but the quality really depends on what brand, structure of lens, etc:

50mm f1.4

35mm f1.4

85mm f1.2

A 70-200mm f2.8 will also work great.

Some articles about bokeh:
[Comparison of bokeh lenses](#)

[Bokeh Tests](#)

[Understanding Bokeh and your Lenses](#)

[Bokeh Charazterizations](#)



Getting Tack Sharp Photos with Deep Depth of Field

Okay, we've talked about using small apertures like f1.8 to get shots with *shallow* depth of field, but what about using apertures like F16 to get shots with a *deep* depth of field?

One draw-back is that the more you stop down the size of the aperture, the longer the shutter speed will have to be in order to compensate for the lack of light entering the lens. Using apertures like F8 and F11 can only be hand-held only if it is sunny outside. If it is darker or you are using an aperture smaller than F8 or maybe F11, you will have to use a tripod in order to keep everything sharp, which is always a good idea anyway.

Using deep depth of field is especially useful for two situations: Landscape Photography and Studio Photography.

It's good for landscapes because, in most cases, you want to get as much in focus as possible. It's also good for studio photography because you usually have a lot of light to work with and don't need to worry too much about motion blur because everything is frozen due to the flashes.

There are two things to keep in mind when using small apertures: lens dust and lens diffraction. We'll talk about them on the next page.





Lens Dust

No, that isn't smoke coming out of that chimney, that is either a little spec of dust or a little piece of hair on the lens or sensor. These little guys will start showing up the more you stop down your aperture, so remember to keep your lens and sensor clean.

There are two tools that I recommend getting that will help eliminate dust: Number 1 is the [Lenspen](#) (use this for your lens, NOT your sensor). There is a brush on one side, used to wipe dust away, and a soft smooth granite cleaning side on the other, perfect for removing smudges. It's very inexpensive and works great.



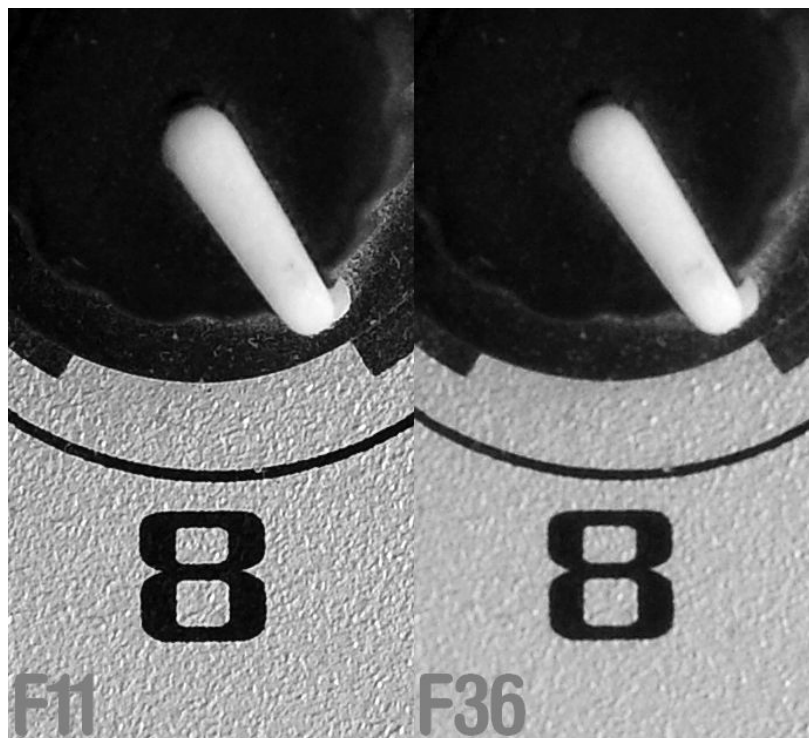
Another tool you can use is the [Giottos AA1900 Rocket Air Blaster](#). This is even better than the brush side of the Lenspen because you are not making any contact with the lens or filter, you simply blow away the dust, and then use the Lenspen to remove any remaining smudges. This tool was originally made for cleaning camera sensors, but I honestly do not recommend cleaning camera sensors by yourself because there are just too many things that can go wrong. If at all possible, go to a camera shop and get it professionally cleaned instead.

Lens Diffraction

Stopping all the way down to F36 isn't necessarily the sharpest spot on the lens. It will give you the most depth of field but that doesn't mean that it will be crystal clear tack-sharp with details-galore.

In order to test your lens for yourself, put your camera on a tripod and set it to Aperture Priority mode and then take a shot of the same scene with different F-Numbers, such as 2.8, 5.6, 8, 11, 16, and 36. Zoom in to 100% on your preview LCD screen and see which shot appears to be the sharpest. It varies from lens to lens, but I have found that F8 and F11 is the sweet-spot on most lenses.

Another additional technique you can use for getting the sharpest photo possible is to use a wireless remote for your camera in addition to using the "mirror lock up" mode or "exposure delay mode". Mid-range and High-end DSLR cameras should have this feature, Low-end DSLRs unfortunately do not. This was a big determining factor for me when I bought my [D300s](#). The D300s came with a mode that lifts up the mirror first, waits a second, and then takes the exposure after that one second. This helps eliminate all camera vibrations, thus giving you a tack-sharp image. A feature like this isn't really necessary when you are using a basic DSLR to learn about photography, but if you are an image-quality freak, you will want it.



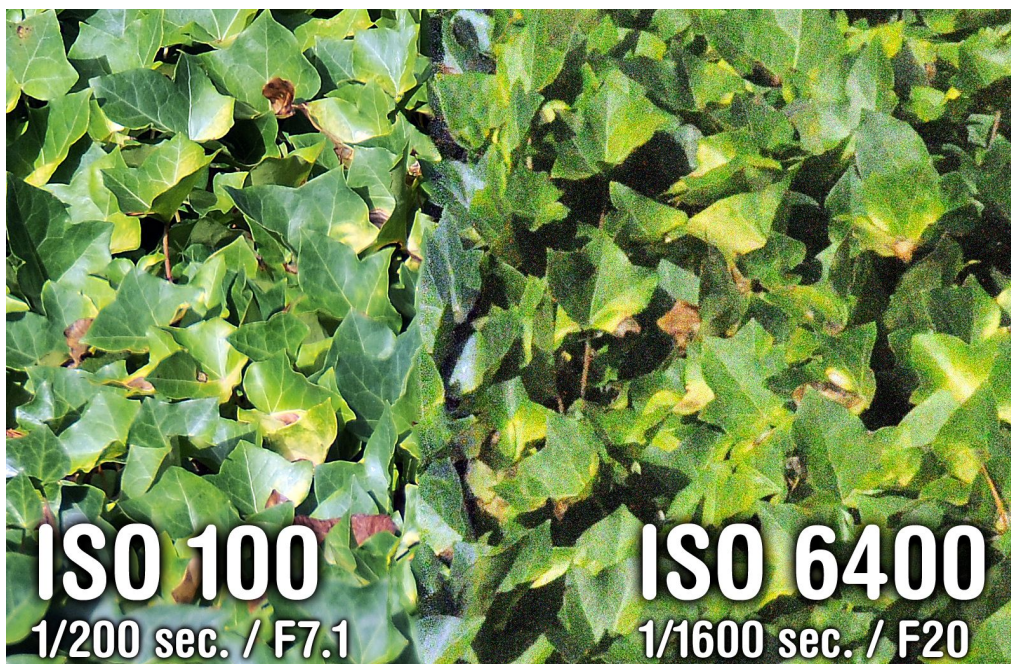
3. ISO

The ISO (also known as 'ASA' or simply '[film speed](#)') determines how sensitive your sensor is to light. The higher the ISO number, the brighter your image will be. The lower the ISO number, the darker your image will be.

Now I know you are thinking “Great! I'll just use the highest ISO possible to make my image as bright as I can, then I'll just stop down my F stop to make up for the difference!” Well, sadly but surely there is a side effect that comes along with ISO, and that is called [noise](#).

Noise is basically color grain that destroys the fine detail and color in your photographs. Always try to use the lowest ISO number you can, especially when doing long exposure work. I usually keep my ISO in the 100-400 range, with 100 being the goal.

The only situation where you will need to use higher ISO numbers is when you are in a dark environment and have no tripod available. Without using a high ISO number, your camera will try opening up the aperture all the way to let as much light in as it can, and then set the shutter speed for several seconds to let in even more light. Because we humans can't hold a camera perfectly in place for several seconds, our image would be very blurry. So, in order to get around that, we would *have* to use higher ISO numbers in order to compensate for the long shutter speed. If we had a tripod however, this would not be an issue. If you want professional quality photos that were taken in dark environments, you will have to use a tripod and a low ISO.



To wrap it all up, shutter speed, aperture, and ISO all work together. All of them have the same effect (making the photo brighter or darker) but they also all have a special side effect (**motion blur** is a side-effect of increasing exposure time, **depth of field** is the side-effect of adjusting aperture, and **noise** is a side effect of raising the ISO).

When you are photographing different subjects in different lighting conditions, you will find yourself changing each variable according to the conditions. For example, if I am deep in the woods photographing a person, I would want to first start off with Aperture Priority Mode with a wide aperture like F1.8 or F2.8 to let in lots of light into my camera, because I know that when it is dark my camera will want to increase the shutter speed length, and I don't want that to happen because my pictures will look all blurry from camera shake.

So, the first thing I would do is change the mode to Aperture Priority and use f2.8 to let in more light. If the shutter speed ends up being anything faster than 1/60th of a second, then I know I'm okay. If it is *slower* than 1/60th of a second, I'll need to increase my ISO to raise the brightness. This will in turn shorten my shutter-speed, and I will be able to take sharper pictures, even though there will be some extra noise added to the image. You will always find yourself adjusting the aperture, shutter-speed, and ISO for each different situation you are in.

If you need more help in this area, – the most fundamental concept you must know how to use when using a camera – Google search the term “[exposure triangle](#)”.

There is also [this site](#) that explains how all of the variables work together to create “stops”. This page is extremely useful.

4. White Balance

White balance is basically color correction right in your camera. If the light you are photographing has more cold/blue tones, you will want to raise the white balance to a warmer/redder color temperature to even out the tones.

Look in your camera's manual to figure out how to change the white balance preset and set your own custom white balance. The process for setting the white balance is different for every camera so I cannot explain how to do it in this ebook. Use Google or your camera's manual instead. Of course, if you don't want to mess around with it, just leave it on Automatic.

The photographs on the right were taken on a sunny day. The rocks were only *slightly* shaded by a tree.

These basic white balance presets should be on your DSLR and are probably ordered in the exact same way:

- Incandescent/Tungsten (2500-3000K)
- Fluorescent (~4000-5000K)
- Daylight (~5200)
- Flash (~5400K)
- Cloudy (~6500-8000K)
- Shade (~8000-10000K)
- Custom / Saved Preset / Set Color Temperature

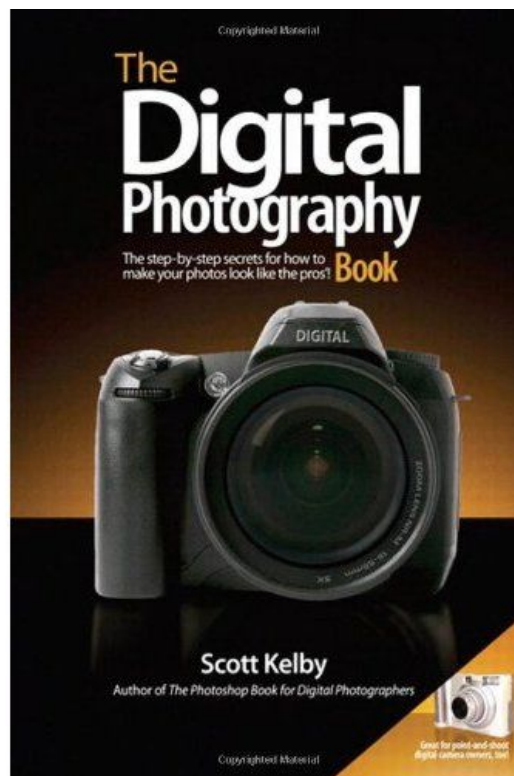
In order to make a 100% custom white-balance correction, you will need to get an 18% gray card. These cards are color calibrated for cameras and are meant for the sole purpose of getting an accurate white balance metering. If you don't have a gray card, just take a closeup picture of a white sheet of paper so it fills the frame using manual focus. You will have to do this each time you move into a new environment with different lighting conditions. Check your camera's manual to learn how to take a custom white-balance metering. The process is a little different for each DSLR out there.



Further Reading

If you are just getting into photography as a hobby or perhaps would like to be a pro in the future, there is one book in particular that I have read and found useful when I was first starting out. The format of the book is very easy to read (there is literally **one** photography tip per page, with only a title, image, and paragraph describing the tip). I will be creating a product in the future that is more systematic and structured going over the essentials of photography, but for now this is a very good book to get.

Click the image below to check it out:



[The Digital Photography Book](#)

by Scott Kelby

There are three additional volumes also available:

