SPYROS HENIADIS

[SHP]

SELF HELP PHOTOGRAPHER


# MANUAL MODE 101


Hello! My name is Spyros Heniadis (Spear-ohs Hen-e-ah-dis). I'm a Wisconsin native with a Greek name and a mixed heritage. Half Greek, quarter German, a splash of Irish, a pinch of Bohemian. Salt and pepper to taste. My great passion in life is photography. I love nothing more than to create beautiful, portraits and to share what I've learned in my years of shooting with photographers like you.

I am very excited to help you learn how your camera works so that you can use it to take the kinds of photos that you want to take.

I remember when I got my first DSLR camera and how excited I was to take photos with it. *I also remember the feeling of disappointment when I saw that my photos still sucked.*

This was incredibly frustrating. Here I had just spent $1,000 on this amazing camera, and my photos were still terrible.

For that amount of money, you would think that the damn thing would take the photos by itself but, the truth is, the camera is just a tool. *As photographers, we need to know how to use that tool.*

This tool can be very confusing. When I got my first DSLR, I had no idea what all of the mysterious modes on the dial were or how each one would make my photos look. So I started shooting in auto which is how we all start out. However, the thing about shooting in auto is that it's sort of like driving a high-performance race car to the grocery store.

***You can drive a Ferrari to the grocery store, but that's not really how that car is intended to be used.***

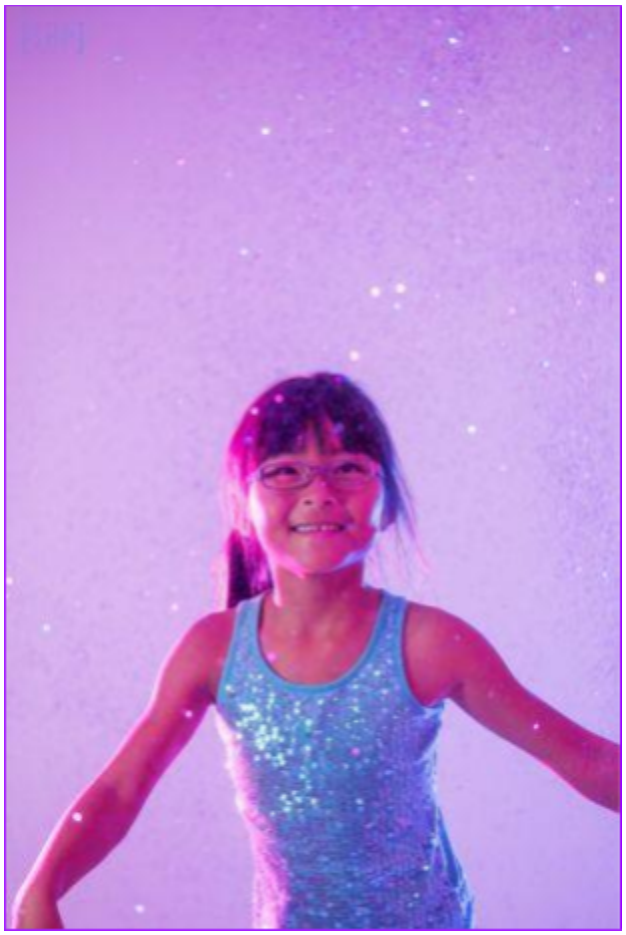
DSLRs, Mirrorless, and other advanced cameras are the same. You can shoot these cameras in auto mode, but it's not really intended to be used that way.

Clearly you've already realized that which is why this is so exciting. Once you understand how to use your camera, your photography will be changed forever. I am going to show you exactly how to do that.

In this ebook, I'm going to share with you how cameras work. Once you understand that, you will have the ability to pick up *any* camera and take amazing photos with it.

In order to understand how cameras work, we also have to understand the three pillars at the foundation of photography: Aperture, Shutter Speed, and ISO. We're going to look at each one of them separately to really understand them, and then we're going to see how all three of them work together.

Understanding these pillars is the first step down the road from not knowing anything about the camera or how to take fantastic photos with it, to being able to take photos like this:



And this:


And this:


***It is wonderful to create these photos. I love photography more than just about anything else in the world.***

***I know you will too.***

## HOW DO CAMERAS WORK?

When you take a photograph with your camera, a certain sequence of events occurs inside the camera. In order to understand what happens inside the camera, we first need to understand the basic parts that make up a camera.

These devices that we have are actually computers wrapped around a camera. This is awesome, because these computers offer us all sorts of features and functions that enhance our photography. But there is a very simple device underneath all of that computerization. That device is the actual camera. It is made up of four simple parts.

The first part is a box.

We need a closed box because inside that box is the second part which is called the image receptor.

In the case of our digital cameras, the image receptor is a light-sensitive microchip called an image sensor. We put the image sensor inside the box to protect it from light.

See, when we take a photograph, we're recording light. If we don't protect the sensor, it will be overwhelmed with all the light around us.

*The word photograph comes from the greek word Phos, which means light, and Graphé, which means drawing.*

Just look around for a moment. There is light everywhere.

It's coming from the screen of the device you're reading on, the sunlight streaming in through the windows, and the lights you have on in the room.

All of that light is too much light.

When we take a photo, we want the image sensor to record a specific amount of light. If the sensor isn't protected, it will record all of the light around us. Giving you a photo that is pure white/bright and looks like this:

The box keeps all of that light away from the image sensor.

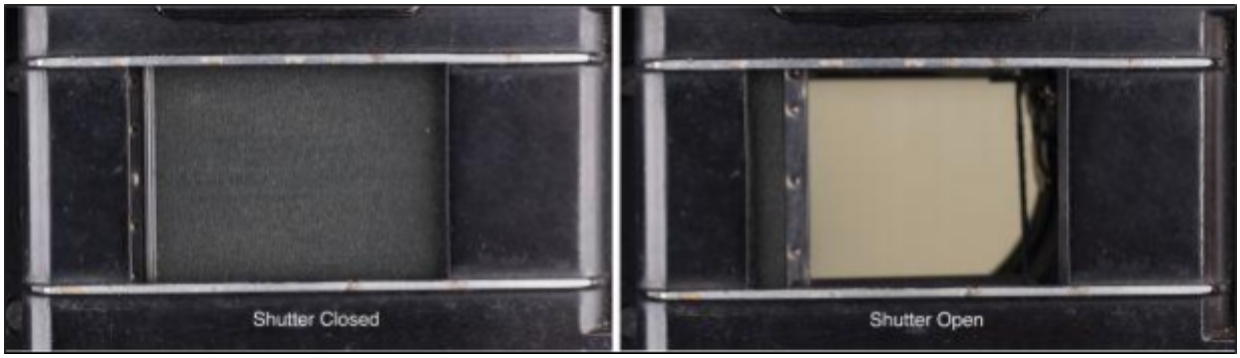
The next two pieces allow us to choose when and how much light is let into the box to be recorded for a photo.

One of those pieces is called the aperture. The aperture is a hole in the box that allows us to control how much light enters the box.

But with a hole in the box, we're back to capturing all that extra light because, once again, there's nothing to stop the light from getting into the box to the image sensor.

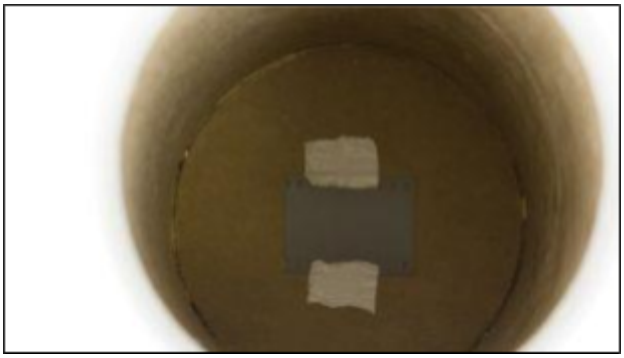
This is where the fourth piece comes in.

The fourth piece is called the shutter. The shutter is like a curtain that you put in between the opening in the box and the image sensor. The curtain protects the image sensor from the light that's coming in through the aperture opening.



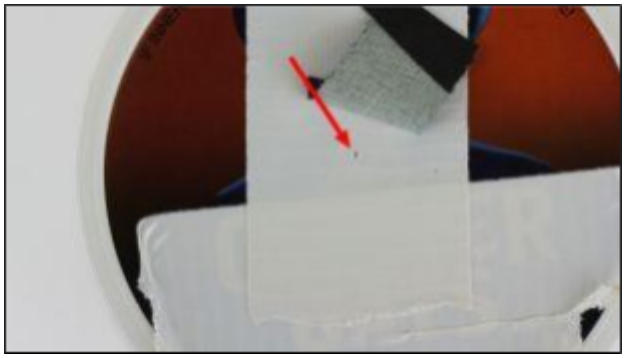

With those four pieces, you have a camera. *That's all you need to build a camera.* Everything else is extra.

In fact, this is a camera. Sure, it is a primitive camera, but it is still a camera.



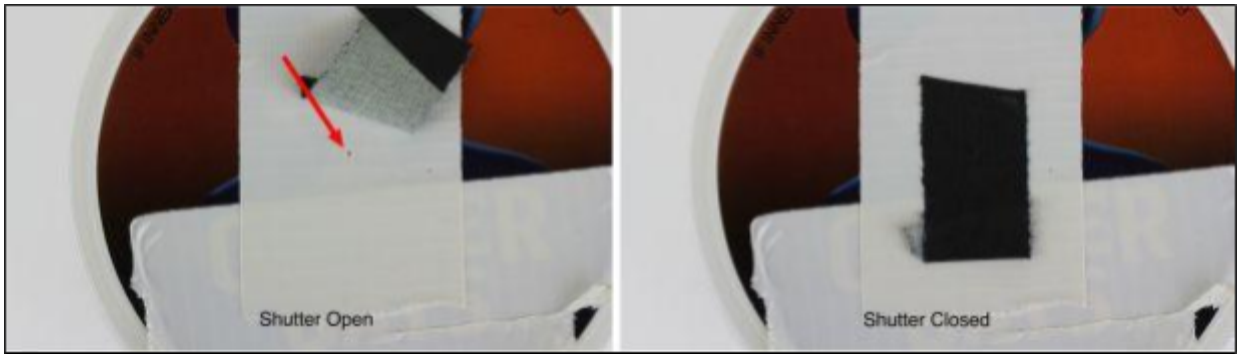
The oatmeal tin is the box. It's protecting the image receptor, a piece of film, that's inside the box.

The aperture opening is this pinhole you see right here.



The pinhole lets light into the tin to be recorded by the piece of film inside.

The piece of tape acts as the shutter. When the tape is removed, light is able to enter the camera through the pinhole. When the tape is replaced, no more light can get in and the photograph is done being recorded.



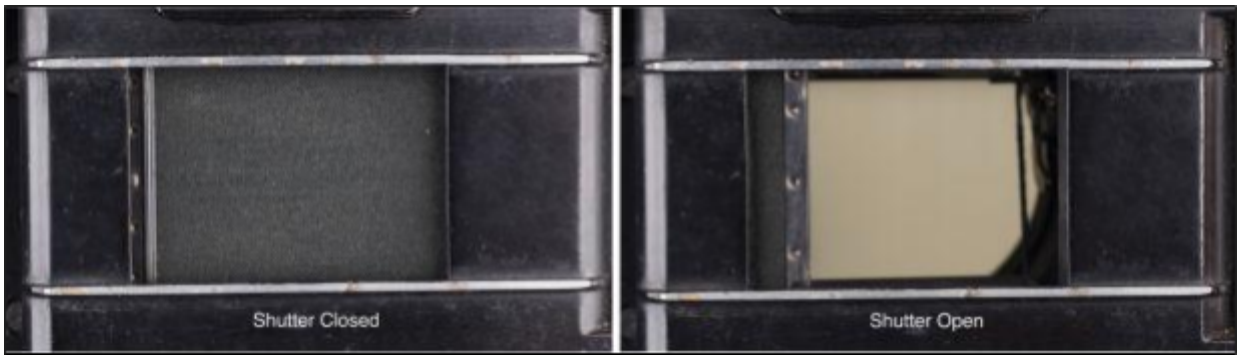

That is the exact sequence that takes place when you take a photo with your camera.

In the case of our cameras, the camera body is the box. On the front of the camera body is a great big opening, but that's not actually the aperture.

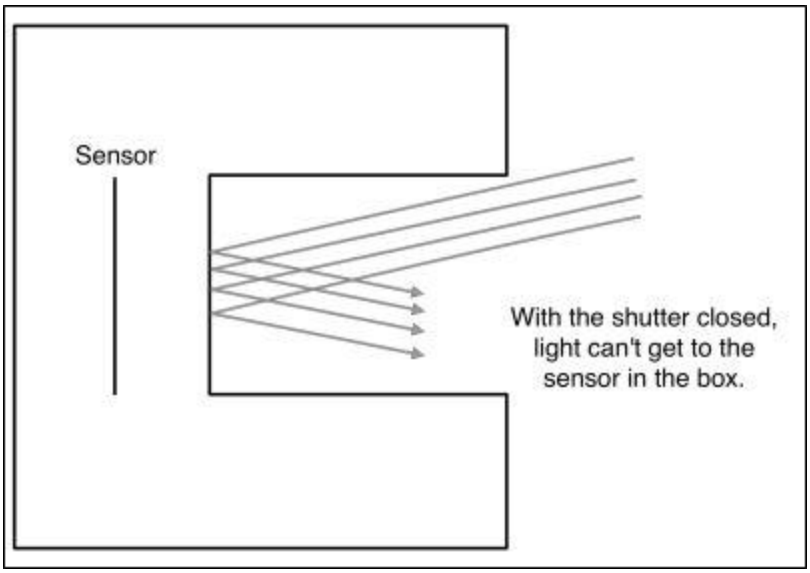


Instead, the aperture is in the lens.

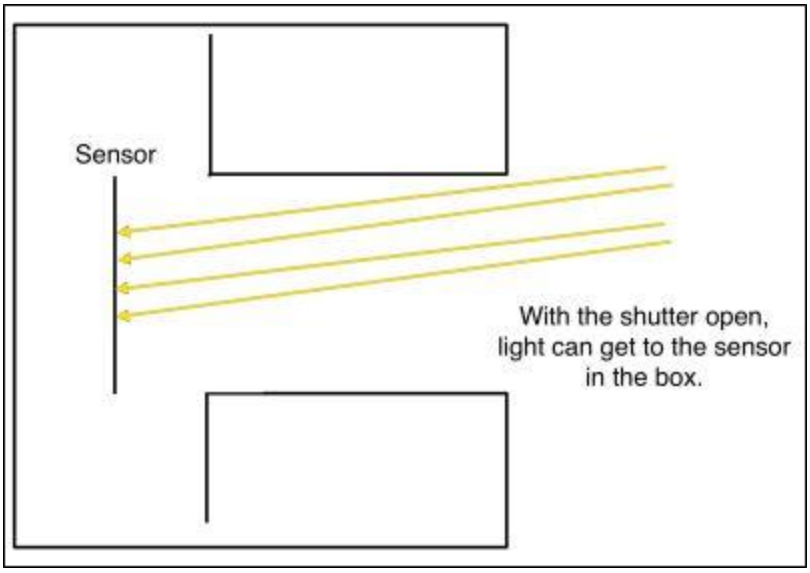
In this old film SLR, the shutter is a curtain that is in front of where the film would go. In a modern camera, the image sensor is where the film would be.



In a resting state, when the camera is not being used, the image sensor is enclosed in the camera body and protected by the camera shutter. The aperture in the lens is open which lets light enter the camera, but that light can't strike the image sensor because of the shutter.




When you press the shutter button to take a photo, the shutter opens. The light that's already coming into the camera through the opening in the lens is now able to get to the sensor.



After a predetermined amount of time, the shutter closes, and you've finished recording the photograph.

When we take a photograph like this, we record a specific amount of light. This is called an exposure.

As photographers, we can control the exposure which allows us to control how the resulting photograph looks. We control the exposure with three of the four pieces of the camera: the image sensor, the aperture, and the shutter.

***Exposure: The total amount of light recorded by a camera for a single photograph***

The image sensor has a variable sensitivity to light which you can change via the ISO setting.

The aperture has a variable size which you can change with your Aperture setting.

The shutter can be opened for different lengths of time which you control with your Shutter Speed setting.

Understanding how ISO, Aperture, and Shutter Speed work, and how they work together is the foundation of photography. While there are loads of extra features and functions on your camera, everything else in photography is built on top of those three things. If you understand them and how they work, *you'll be able to use any camera to take any kind of photo that you want.*

# HOW ISO, APERTURE, AND SHUTTER SPEED WORK

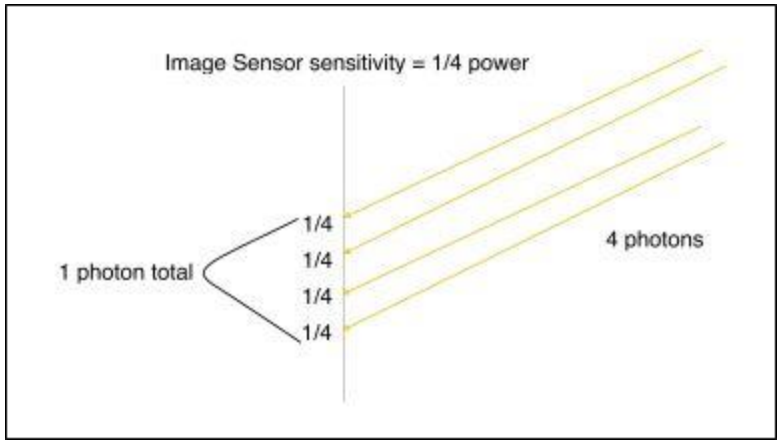
ISO, Aperture, and Shutter Speed give us control over the amount of light captured for a photo. What we're going to do now is take a look at them individually. Then we'll see how they work together.

## ISO

The ISO setting controls how much light the sensor is able to record.

For instance, let's say that 4 photons of light hit the camera's sensor.

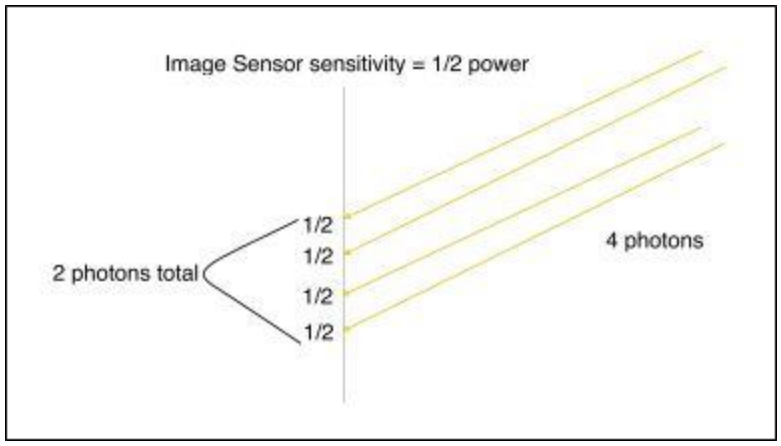
*(Just to clarify, these are made up numbers I'll be using to help you understand how everything works.)*




In this example, the ISO sensitivity is set so that each photon only registers at 1/4 power. If four photons strike the sensor and register at 1/4 power each, the total amount of light recorded by the sensor is just one photon.

**4 photons x 1/4 power = 1 photon**

If you change the ISO setting, it will increase the sensitivity of the sensor. Then, when those same four photons hit the sensor, they will register at 1/2 power instead of 1/4 power.




When the four photons hit the sensor, it will record a total of two photons, doubling the amount of light recorded for the exposure.

**4 photons x 1/2 power = 2 photons**

***What this means is that you can increase or decrease the amount of light that the camera records in a photo by changing the ISO setting.***

The important thing to understand is that, by changing the ISO, you can change the amount of light recorded for an exposure. When you increase the ISO setting, you increase the amount of light recorded. When you decrease the ISO setting, you decrease the amount of light recorded.

**Important tip on ISO: When you change the ISO setting, even though you change the amount of light recorded, you do not change the actual amount of light that strikes the sensor. That's something I cover in more depth in my Guide to Shooting In Manual Mode video course..**

On our cameras, the ISO setting tells us how sensitive the sensor is. Most cameras have an ISO setting that starts at 100. That is the the lowest ISO setting. At 100, the sensor is the least sensitive to light.


The maximum ISO setting depends on your camera. For instance, the maximum ISO for the camera in this example is 51,200. That is the camera's highest sensitivity level which allows it to record the most amount of light.

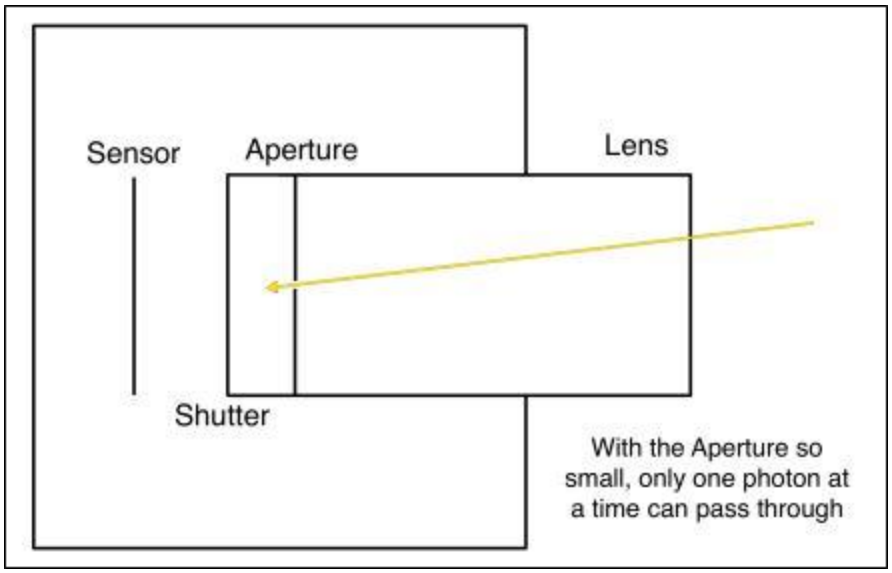

***When setting your ISO, the lower the ISO setting is, the less light you'll get in your photo. The higher the ISO setting, the more light you'll get.***

Before moving on to Aperture, you should take a look at the ISO setting on your camera and find your lowest and highest sensitivity levels.

## APERTURE

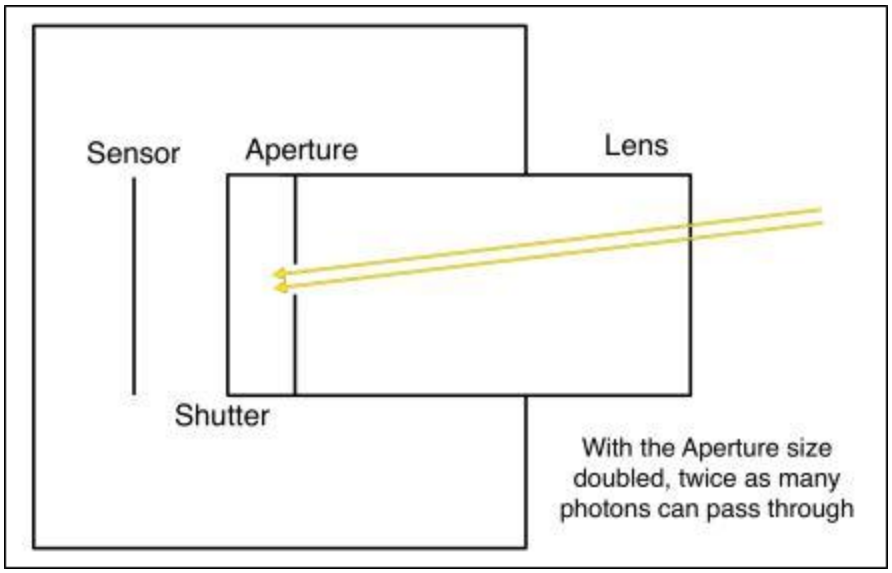
The size of the opening in the lens is the Aperture setting. This setting changes how much light gets to the sensor by varying the size of the opening in the lens.


For example, let's say that the opening is just large enough for one photon to pass through.




If the light is only coming in one photon at a time, that's a tiny amount of light being allowed into the camera to be recorded for your photo.

To increase the amount of light that's able to physically pass through the lens, you can increase the size of the aperture.




You change the size of the aperture by changing the Aperture setting. So, if the Aperture setting is changed to double the size of the opening, then two photons of light can pass through at a time, doubling the amount of light that is able to enter the camera for your photo.

***Just as with the ISO, you can increase or decrease the amount of light recorded in your photo by changing the Aperture setting.***

And, just as with the ISO, the Aperture setting tells you whether the aperture opening is small, letting in a little bit of light, or large, letting in a lot of light.

**On the rear screen of the camera, the Aperture setting is often shown with an "f" in front of the number, as in "f3.5". In the viewfinder or on the top LCD (if you have one), it is typically shown without the "f", as in "3.5".**

However, this doesn't vary from camera to camera, because the Aperture settings available for you to use depend entirely on the lens you are using.

For example, most DSLR cameras come optional with an 18-55mm zoom lens. On those lenses, the LARGEST Aperture setting is f3.5.


**Counterintuitively, the smallest Aperture setting (f3.5 in this example) lets in the MOST light possible.**

On the 18-55mm zoom lens, the SMALLEST Aperture setting is typically f22 which lets in the least amount of light.


***With your Aperture setting, the numbers are backwards. When you set your Aperture to a smaller number, the aperture opening is larger, letting in more light. When you set it to a larger number, the aperture opening is smaller, letting in less light.***

**I know these Aperture numbers are confusing. I explain why they are backwards and much more in my Guide to Shooting In Manual Mode Video Course.**

Before moving on to Shutter Speed, take a moment to find the largest and smallest Aperture settings for your lens.

## SHUTTER SPEED

The third piece is how long the shutter is open. This is the Shutter Speed setting. This setting changes the amount of time the shutter is opened when recording a photo.

It's only when the shutter is open that light is actually able to strike the sensor and be recorded for a photograph. The longer the shutter is open, the more light is able to strike the sensor to be recorded for a photo.

For example, let's say the shutter opens for one second. During the one second that the shutter is open, four photons are able to pass through the aperture and strike the camera sensor.

If only four photons are able to strike the sensor, then you can only record four photons for your photo. *(In this example, we're ignoring the ISO setting.)*

To increase the amount of light for the exposure, you can leave that shutter open longer. If we leave the shutter open for twice as long - two seconds - then eight photons will now make it through the aperture to the camera sensor.

By keeping the shutter open for a longer period of time, more light can get to the sensor to be recorded for the photograph.

***Just as when you change the ISO or Aperture setting, you can increase or decrease the amount of light recorded for a photo by changing the Shutter Speed setting***

Just as with ISO and Aperture, the Shutter Speed setting tells you how much or how little light you are getting. With Shutter Speed, the setting is actually the amount of time the shutter will be open, measured in seconds.

On most DSLRs and Mirrorless cameras, the longest shutter speed is 30 seconds. This is the setting that lets in the most amount of light. On your camera, that's shown like this: **30"**.


**The " mark in *30"* is the international standard notation for seconds.**

The shortest Shutter Speed will vary from camera to camera. For example, the shortest Shutter Speed on the camera in this example is 1/8000 of a second which lets in the least amount of light.

This is shown just as it's written, but sometimes it is shown just as a number instead of a fraction. So 1/8000 might be displayed like this: **8000**


***If you remember from math in school, the top number in the fraction is the Numerator, and the bottom number in the fraction is the Denominator. Typically, the full fraction is shown on the back of the camera, while only the Denominator is shown in the viewfinder and on the top LCD screen (if you have one).***

Now take a moment to find your longest and shortest Shutter Speeds. While you're finding your longest Shutter Speed, you might run into a Shutter Speed setting called "**BULB**". If you do, ignore it for now. It's definitely something you'll want to learn about, but it's not important right now.

## HOW ISO, APERTURE, AND SHUTTER SPEED WORK TOGETHER

As you recall, when we take a photo we record a specific amount of light which is called an exposure. This is critical because we determine exactly how much light we're going to record by adjusting the ISO, Aperture, and Shutter Speed.

For example, let's say we want an exposure of 2 photons. *(Again, we're using made up numbers to illustrate the concepts.)*

The ISO is set to 100 which is typically the lowest sensitivity level on a camera. At ISO 100, let's say that each photon registers at ¼ power.

The Aperture is set to f22 which we'll say lets in one photon at a time.

Finally, the Shutter Speed is set to two seconds, and we'll say one photon will hit the sensor every quarter second (four photons per second).

So these are the current settings:

| | | | | |
|---|---|---|---|---|
| **ISO: 100 (1/4 power per photon)** | + | **Aperture: f22 (one photon at a time)** | + | **Shutter Speed: 2″ (four photons per second)** |

With our settings set, when we press the shutter button to take the photo, the aperture let's one photon through at a time. Over the two seconds the shutter is opened, eight photons will pass through the lens and strike the camera sensor. With the ISO at 100, the photons register at 1/4 power. The amount of light recorded will be 2 photons, capturing exactly the quantity of light that we wanted.

| | | | | | | |
|---|---|---|---|---|---|---|
| **ISO: 100 (1/4 power per photon)** | + | **Aperture: f22 (one photon at a time)** | + | **Shutter Speed: 2″ (four photons per second)** | = | **2 Photons** |

**8 photons x ¼ power = 2 photons**

Now, let's make a change.

We still want to record two photons. The ISO is still set to 100, and the Aperture Setting is still f22, but now the Shutter Speed is set to one second.

So our settings look like this:

| | | | | |
|---|---|---|---|---|
| **ISO: 100 (1/4 power per photon)** | + | **Aperture: f22 (one photon at a time)** | + | **Shutter Speed: 1" (four photons per second)** |

When we press the shutter button, the shutter opens for one second.

During that one second, only four photons will hit the sensor because the aperture is still only letting in one photon of light at a time, and the ISO setting is still only registering the photons at 1/4 power. That means that we've recorded just one photon of light.

If we want two photons for the exposure, this is not enough light.

| | | | | | | |
|---|---|---|---|---|---|---|
| **ISO: 100 (1/4 power per photon)** | + | **Aperture: f22 (one photon at a time)** | + | **Shutter Speed: 1" (four photons per second)** | = | **1 Photons** |

**4 photons x ¼ power = 1 photon**

By changing the Shutter Speed, we restricted the amount of time that light was allowed to get to the sensor which decreased the total amount of light recorded to one photon.

If we want to maintain an exposure of two photons, we will have to change either the ISO setting or the Aperture setting to increase the amount of light that's recorded during the one second Shutter Speed.

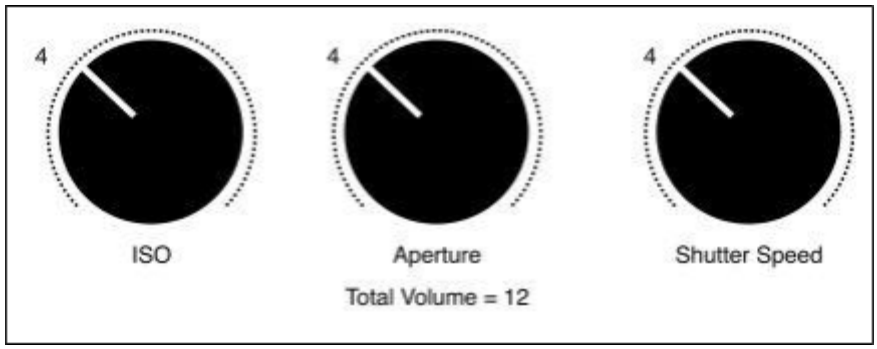
To compensate for the change in Shutter Speed, we can open up the aperture to allow two photons pass through at a time (f16). That doubles the amount of photons that can reach the sensor during that one-second Shutter Speed. With the ISO setting registering them at ¼ power, that brings our total exposure back to two photons which is right where we want it.

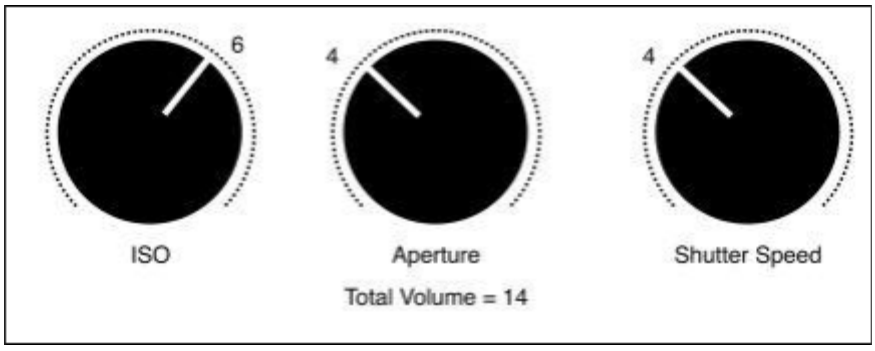
| ISO: 100 (1/4 power per photon) | + | Aperture: f16 (two photons at a time) | + | Shutter Speed: 1″ (four photons per second) | = | 2 Photons |
|---|---|---|---|---|---|---|

***If you want to keep the amount of light recorded for your photo the same, when you change any one of your three settings (ISO, Aperture, or Shutter Speed) you have to change one (or both) of the other settings to compensate for the change in the first setting.***

When taking a photo, we want to capture a specific amount of light, and we have THREE different controls that can alter the amount of light you can capture.

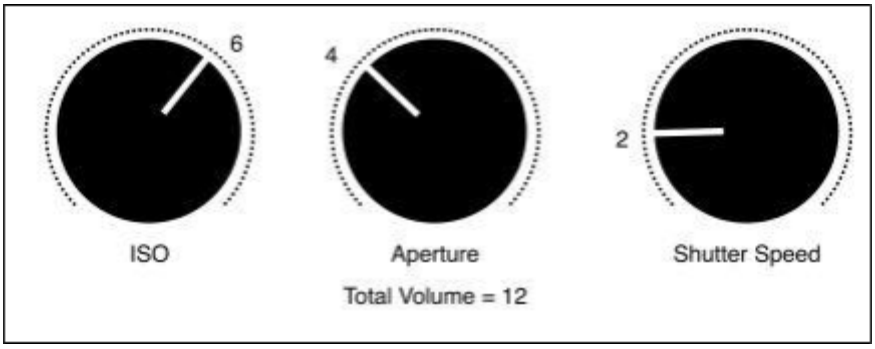
It's kind of like having three volume controls on your stereo. If you want the volume set at 12, you can set all three volume controls at 4 which will give you a total volume of 12.

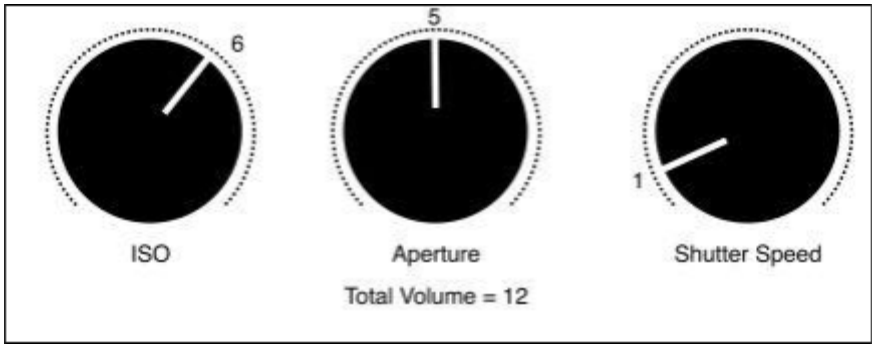



If you want the volume set at 12, you can't change volume one to 6 and leave volumes two and three set to 4, because then the total volume will be 14.

In order to keep the volume at 12 with volume one set to 6, you could keep the the second volume at 4 and set the third at 2, resulting in a total volume of 12.




You could also have volume one set to 6, volume two set to 5, and volume three set to 1 (or in any other combination that adds up to 12).

***ISO, Aperture, and Shutter Speed are the three volume knobs for our cameras and, as mentioned earlier, they create the foundation for all photography.***

## TAKING CONTROL OF YOUR CAMERA

Up until this point, when shooting in Auto mode, the camera has been setting the ISO, Aperture, and Shutter Speed settings for you. In order to control those settings, we need to switch out of Auto mode and into Manual mode.


There's a whole lot more to ISO, Aperture and Shutter speed, and you can learn more about how they work and how they affect your photos in my Guide to Shooting in Manual Mode Video Course.

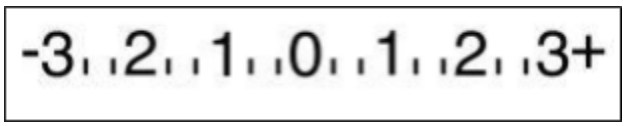
In Manual mode, we are in total control of the camera and have total control over ISO, Aperture, and Shutter Speed.

***Now we can set the settings however we want in order to take a photo but, in order to set our settings, we need to know how much light we want to capture for the photo.***

Fortunately, we don't have to guess at the amount of light we want to capture, because the camera tells us how much light we need with the **exposure indicator**.

We know that an exposure is the specific amount of light that we capture when we take a photograph.

The exposure indicator tells us what that amount is. It looks like this:

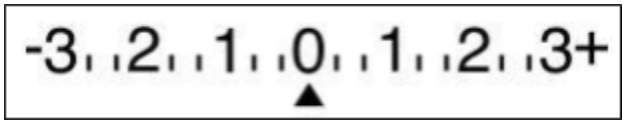



As you can see, there is a 0 in the middle of the indicator with positive and negative values on either side.

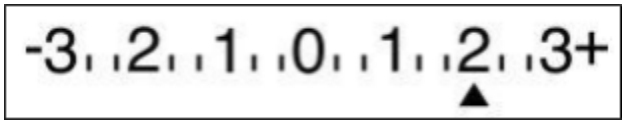
For the most part, your indicator will look something like that. However, some older Nikon cameras have it reversed so that the positive values are on the left instead of the right. it looks like this:


Regardless of the direction, here's how it works.

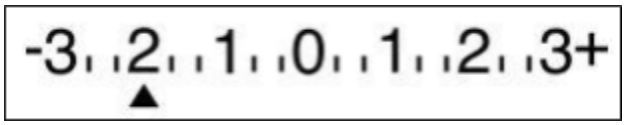
The camera calculates the amount of light that will be captured based on the current ISO, Aperture, and Shutter Speed settings. When the exposure indicator is pointing at 0, that tells you that with the current ISO, Aperture, and Shutter Speed settings, the camera will capture what it thinks is the correct amount of light for the subject you are about to photograph.




If the indicator is pointing at a positive value, such as +2, the camera thinks that the current settings will capture too much light which will result in a photo that is too bright.



If the indicator is pointing at a negative value, such as -2, the camera thinks that the current settings will capture too little light which will result in a photo that is too dark.




I keep saying, "the camera thinks", because what the camera thinks is the correct amount light doesn't always give you the results that you actually want.

**You can learn about why the camera gets it wrong and how to adjust for that in my my Guide to Shooting in Manual Mode Video Course.**

For now, because we're just getting started shooting in Manual mode, we're just going to work at getting the exposure indicator to read 0.

You can find the exposure indicator in one of three possible places.

Pretty much every DSLR shows the exposure indicator on the back screen of the camera.


If you have a top LCD SCREEN, you may see the indicator there.


Finally, on all DSLRs, Mirrorless, and advanced point and shoots with viewfinders, you can see the exposure indicator in the viewfinder, typically at the bottom in the info display.


Take a moment and make sure you can find your exposure indicator.

Now what we're going to do is go through the process of setting the settings so that the exposure indicator reads 0, and then take some photos.

***WARNING: These photos are going to suck. That's fine. Right now, we're just figuring out how this all works. Also, your final settings will be different from the example settings given in this exercise.***

Let's get started.

Grab your camera, take off the lens cap, turn it on, and make sure that it's in Manual mode.

First we're going to set the ISO. To get started, I'd like you to set your ISO setting to 400 *(I'm switching cameras here so you can work along with me).*


Remember, ISO is one of our three volume controls for light. At ISO 400, we're at a sort of medium low volume for ISO.

After setting the ISO to 400, we're going to change the Aperture.

Set your Aperture to the lowest number but, before you set your Aperture, make sure your lens is zoomed to the widest angle, and press your shutter button halfway down to make sure the camera is awake.

The lowest Aperture number available to you will vary depending on the lens you are using. If you're using a kit lens that came with your camera, it will probably be something like f3.5.

**Why do you need the lens zoomed to the widest angle? Where your lens is zoomed affects the Aperture setting that you can select. This is fully explained in my Guide to Shooting in Manual Mode Video Course**

With the ISO and the Aperture set, all that's left is the Shutter Speed but, before we set the Shutter Speed, we need to check the exposure indicator.

The Shutter Speed is our last volume control. When we set the Shutter Speed, we want the exposure indicator to end up on the 0. We need to see what the exposure indicator is reading, because that will tell us what we need to do with the Shutter Speed.

***And here I want to make a very important point. When you check your exposure indicator, you must be pointing the camera at the subject you are about to photograph.***

This is because the camera calculates the amount of light based on whatever it sees through the lens. If you point the camera at the floor when you check the exposure indicator, you'll get a reading for what the exposure would be if you took a photo of the floor. This will be a completely different reading from the subject you actually intend to photograph. *(Unless you intend to photograph the floor!)*

So point the camera at whatever you want to take a photo of, and then press the shutter button halfway down to wake up the camera.

Your exposure indicator should look something like this:


Your exposure indicator will likely show something different.

It may be on the “+” side or, if you’re lucky with your settings and subject, it could actually be at “0”.

In this example, the exposure indicator looks like it’s -3 which tells us that the camera wants more light, but this is actually telling us something different. Because this is a picture, what you can’t see is that the exposure indicator is blinking.
What that blinking means is that the exposure indicator can't display the actual exposure reading. (On some cameras, the little pointer will turn into an arrow, and on most cameras it will blink to indicate that it can’t give you a precise reading. On this camera the pointer doesn’t change, but it does blink.)

When you see this it means that, at the current settings, the exposure is beyond what can be displayed on the exposure indicator. In other words, the reading is something like -6, -10, or -50, depending on the situation.

Every camera’s exposure indicator has a display limit. On the camera in this example, the limit is +3 and -3. Your camera will have its own limit. Regardless of the limit, when you are beyond the limits of the exposure indicator, your camera will give you an indication of that.

Right now, the important thing to recognize is that the exposure indicator is giving a negative reading in this example. This means that, at the current Shutter Speed, the camera will not get enough light for the photo, and the photo will be too dark.

That means we need to turn up the volume on the Shutter Speed setting to get more light for the photo.

In this example, the Shutter Speed is currently set to 1/4000 which means that for this camera, the Shutter Speed volume control is turned all the way down, letting in the least amount of light.

What you are seeing on your camera will be different, but here's what's important to understand.

***If the exposure indicator is showing a negative value, the camera needs more light. If the exposure indicator is showing a positive value, the camera needs less light.***

Either way, unless your exposure indicator is at 0, you will need to change the Shutter Speed to let in more (or less) light.

Before you start changing it, press the shutter button halfway down to wake up the camera. If you don't do that, you won't see anything happening on the exposure indicator when you start changing the Shutter Speed.

***Even with the camera awake, you won't see any changes on the exposure indicator right away if your exposure indicator is off the charts when you start changing the Shutter Speed.***

This happens because your exposure is so far off the charts that a big change in the Shutter Speed is required before it will start to show up on the exposure indicator.

For example, if I'm at -20 and I change the Shutter Speed to 1/1600, that's a pretty big change from 1/4000, but I might still be at -10. The exposure indicator only goes to -3, so it's going to keep showing that it's off the charts (and will also keep blinking). I've made a change, just not enough of a change.



So don't freak out if you don't see anything happening right away. As long as you pressed the shutter button halfway to wake up the camera, all you need to do is keep changing your Shutter Speed until you start to see your exposure indicator moving.

If you haven't done it already, half press your shutter button to wake up the camera, point it at the subject you want to photograph, and then change your Shutter Speed until your exposure indicator reads 0.

In this example, I started at 1/4000. I had to go to 1/60 to get to a zero exposure.


One thing you may notice as you get near 0 is that the exposure indicator keeps jumping around instead of staying exactly on 0.

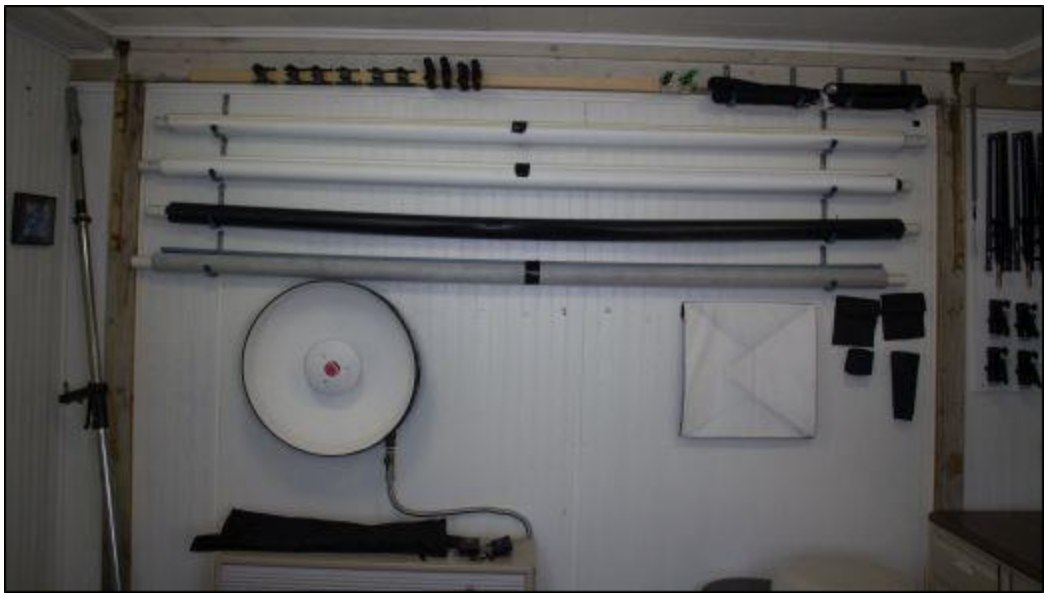
This is normal. When it's active, the camera is constantly evaluating the exposure and giving you a new reading of the scene. When you're hand holding the camera, the tiny movements from you changing the settings or just holding the camera will cause the camera to re-calculate the exposure with those movements.

Don't keep trying to get it to 0, because every change will just cause it to bounce around more as the camera moves.

***As long as it's stays near 0, go ahead and take your shot.***

Now you should have taken a photo, and it's entirely possible that the photo is all blurry.

If it’s blurry, that's fine. Remember, we knew we'd be taking crappy photos for this exercise.



Here’s the photo that I took for the example.

Now you’re going to take another photo, but you’re going to change a setting first.

I want you to change the Aperture by three clicks of the control dial.

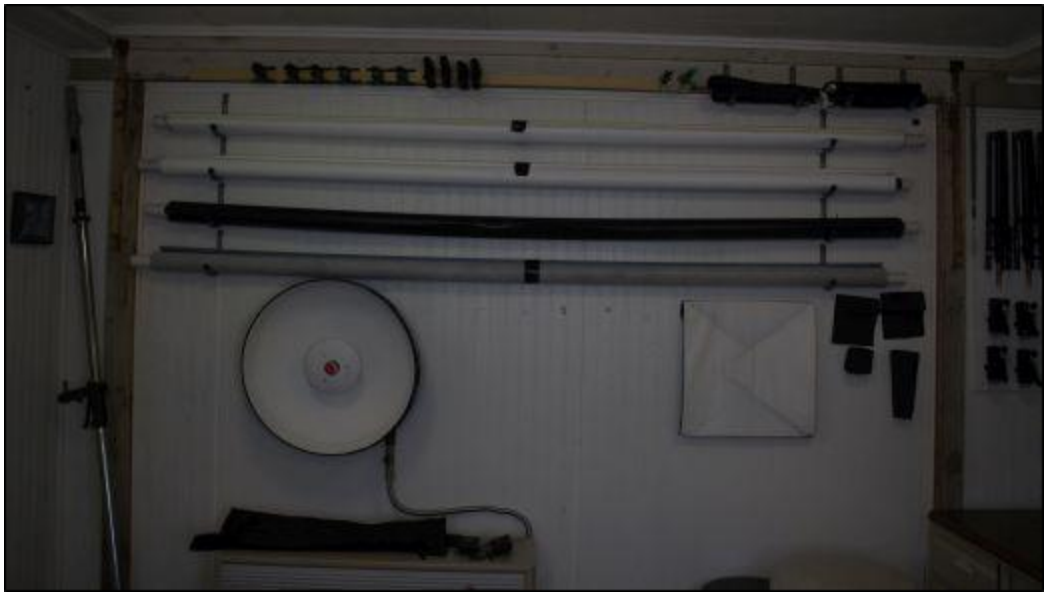
We’re going to turn down the aperture volume a little bit. Remember, the larger the Aperture number gets the smaller the Aperture opening is, and the less light you get, so this change will make the aperture number larger.


In the example, the camera was at f3.5. After changing the Aperture by three clicks, it goes from 3.5 to 4 to 4.5 and finally to 5 *(I accidentally went one click too far to 5.6!)*

If you were at f3.5, you should end at f5. If your lowest Aperture setting was different, just change it by three clicks. Remember to half press the shutter button first to wake up the camera.
Now point your camera at the same subject you photographed before, and look at your exposure indicator. It should be reading around -1.


It may not be exactly -1, but it should be close to it. This is because we changed one of our volume controls. As a result, we changed how much light would be captured which resulted in a new exposure reading.

Go ahead and take the photo. It should be noticeably darker than the first photo.



Notice how much darker this is compared to the first.

Now I want you to change another setting.

Change your ISO setting from from 400 to 1600.

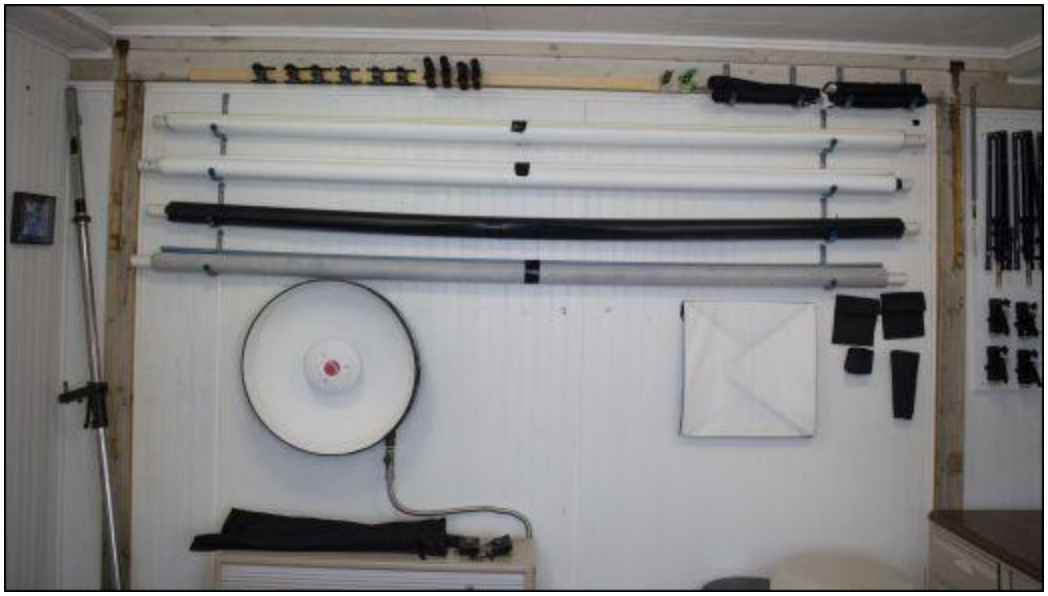
On some cameras, it will takes 6 clicks of the dial (or presses of the button) to go from 400 to 1600. On other cameras, it will only be two.

Either way, set your ISO to 1600. Then point the camera at your subject again and check your exposure indicator. You may need to press the shutter button halfway to wake up the camera.

Now it should be reading around +1.

Again, we changed a volume control. We changed the amount of light that would be captured which resulted in a new exposure reading.

If you haven't taken the photo yet, go ahead and take it. It should be noticeably brighter than both of the previous photos.



Notice that this photo is brighter than both of the first two photos.

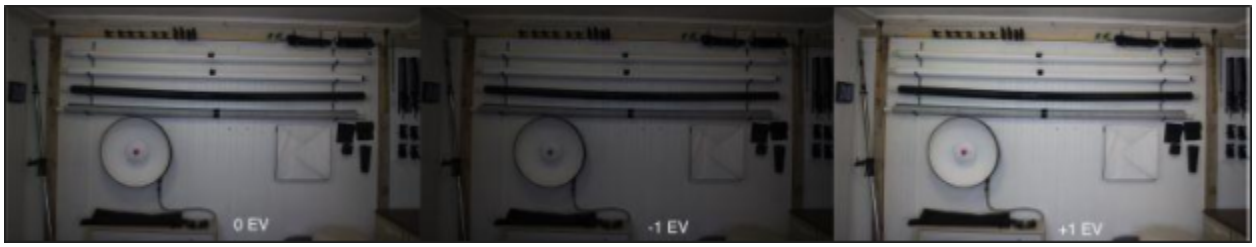
Now it's time to change the settings one more time to get back to 0.

Point your camera at the subject, press the shutter button halfway down to wake up the camera, and then change your Shutter Speed to give you a 0 reading on the exposure indicator.

You have just used one of your volume controls, Shutter Speed, to compensate for the other changes made to bring your exposure back to 0.

Let's take a moment to compare those photos. The first photo was taken with the exposure indicator reading 0. This is called an **exposure value** of 0 (0 EV).

***Exposure Value:*** **The number shown on a camera's exposure indicator showing if the image is under exposed, over exposed, or properly exposed according to the camera's calculations.**




The second photo was taken with an exposure value of -1 (-1 EV). This photo is darker than the first. If we were to actually measure how much darker, we would discover that it is twice as dark as the first photo.

The third photo was taken with an exposure value of +1 (+1 EV). This photo is brighter than the first. If we measured it, we would discover that it is twice as bright as the first photo. (It's four times as bright as the -1 EV photo).

This is valuable information, because now we have a unit of measurement to work with. The way the camera calculates how much light you need for an exposure value of 0 is kind of arbitrary. With the exposure indicator, we can see when we're at 0, but we never actually know how much light we're recording.

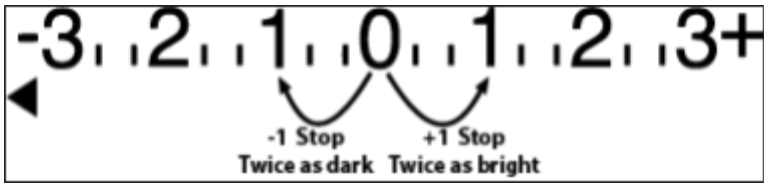
The good thing is that we don't really need to know how much light we're recording.

What we do need to know is how much the amount of light changes when we change our settings.

We know that going one step up the exposure indicator makes the image twice as bright, and going one step down the exposure indicator makes the image twice as dark. That change of twice as bright or twice as dark is called a **Stop**.

***A Stop is how we measure the change in the amount of light captured when we change our settings. A one stop change makes the image either twice as bright or twice as dark.***

Our exposure indicator measures light in stops.




When you are out shooting photos, you can use this knowledge to decide how and when you'll change your settings based on how you want the photo to look.

Let me show you an example. Let's say that you're taking a photo of a scene.

You set your settings to get a 0 EV, and the photo looks like this:

Photo with 0 EV

And, when you look at the photo, you think, *“Well, the camera thinks this is correct, but I think it’s too dark. I’d like this to be about twice as bright.”*

You know that, in order to make the photo twice as bright, you need to increase the amount of light captured for the photo by one stop.

Since you started with an exposure value of 0 (0 EV), you know that you need to change at least one of your settings (ISO, Aperture, or Shutter Speed) to give you an exposure value of +1 (+1 EV).

Photo with +1 EV

If that still wasn't bright enough, you could make it twice as bright again by changing at least one of your settings (ISO, Aperture, or Shutter Speed) to give you an exposure value of +2 (+2 EV).

Photo with +2 EV

***An important thing to understand is that there is no right answer for how bright or dark any given photo should be. As the photographer, that is entirely up to you to decide based on what you want your final photo to look like. Now you have the power and the knowledge to make that choice.***

## CONCLUSION

What you have learned here is the foundation of all photography.

No matter how expensive or complex a camera is, at its core it is just a box with an image sensor inside it, an opening in that box, and a curtain in front of the sensor.

Knowing how those pieces work individually and how they work together gives you the power to pick up any camera and take the photos that you want to take with it.

In this manual, we covered how cameras work and learned the four fundamental parts that make up every camera.

We learned that the three most important functions of a camera are the ISO, Aperture, and Shutter Speed settings, and we learned how those settings work to control the amount of light that is let into the camera.

We learned that the exposure indicator tells us how much light the camera wants us to capture for the subject/scene being photographed (0 EV) and that the exposure indicator measures the light in Stops.

We also learned that a Stop measures the change in light being recorded for a photo; and that increasing the amount of light by one stop makes the image twice as bright while decreasing the light by one stop makes the image twice as dark.

***This is the foundation of photography, and this is how you shoot in Manual mode.***

There is obviously much more to photography than this, and the first question that you're probably asking yourself is, *"How do I decide what ISO, Aperture, and Shutter Speed to use when taking a photo?"*

This is an excellent and important question, because ISO, Aperture, and Shutter Speed not only control how much light you record for a photo, but ***they also control how the photo looks.***

The ISO controls how much noise is in the photo. The Aperture helps control Depth of Field. The Shutter Speed controls how motion appears in the photo. Understanding noise, depth of field, and motion in your photos is critical to answering the question of how you decide what settings to use when you take a photo, and I cover all of that in my **Guide to Shooting in Manual Mode** video course

I am excited that you chose to start your photography journey with me, and I am really looking forward to seeing what you can do with your camera. As a way to say, “Thank you” for purchasing this book, I’d like to offer you the chance to get **The Guide to Shooting in Manual Mode Video Course** at a discount. With the coupon code **IAMSHOOTING**, you can save $15.

The Guide expands upon what we’ve covered in this book, and much more, including:

- How cameras work, including more in depth explanations of ISO, Aperture, and Shutter Speed
- Exactly how to change your ISO, Aperture, and Shutter Speed settings
- An in depth look at exactly how changing ISO, Aperture, and Shutter Speed will change your photos
- Exactly how to get Shallow Depth of Field when you want it
- The secret to my I Am Shooting method, which will help you choose the right settings for the photo you want to take every single time
- How to take sharp photos and avoid those crappy blurry photos we never want to take
- and much more...

# GET OUT THERE AND TAKE SOME DAMN PHOTOS!