

Shutterbug

photography training

Beginner Photography: Class 2

The Exposure Triangle

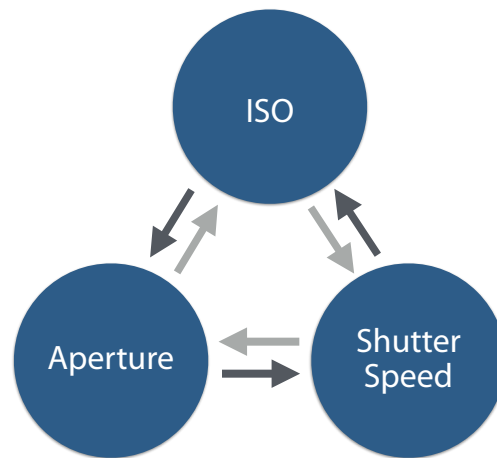
Every photo you take is the result of a combination of **three functions** known as **ISO**, **aperture**, and **shutter speed**. These three functions are commonly referred to as the **exposure triangle**.

Each of these functions **manage how light enters the camera**, but it's their **collective settings** that determine how the final image will look.

The collective settings of these three functions will **vary from scene to scene**, depending on the kind of photo you want to create and the available light.

We're going to **look at each of these functions in-depth** so you will have a better idea of how they work, and how to best use them to capture the kind images you want.

The Exposure Triangle



ISO

The ISO controls how *sensitive your camera's digital sensor is to light*. It is considered the digital equivalent to *film speed*.

ISO capabilities *vary from camera to camera*, ranging from low settings of 100/200, to higher settings of 3200 or 6400. All cameras handle *low ISOs in a similar way*, but differences become apparent the higher you get.

The only reason you increase the ISO is to introduce *more light* into the camera so you can achieve a *'fast enough' shutter speed*.

The *lower the ISO*, the *less sensitive*, or light absorbing, the sensor is, whereas the *higher the ISO*, the *more sensitive* it is. So in practice, as your *light increases*, the *lower* the ISO you will *want*, and as the *light decreases*, the *higher* ISO you will *need*.

Digital Noise

Digital noise is usually introduced during *low-light conditions*, such as at night or dark interior scenes. *Slow shutter speeds* and *high ISO* settings are also contributing factors.

'Noise' looks *similar* to the grain found in photos captured on film, but it can start to look like *colored speckles* when the ISO gets too high. It's a problem that tends to get worse as light levels decrease.

Acceptable noise is subjective, and the amount of noise that would be considered acceptable for one photographer might be considered unacceptable for another. It comes down to *personal preference*.

TIP: take photos at various ISO settings (start at 800 and go up from there) to see what your acceptable level of digital noise is.

ISO & Digital Noise

When *shooting outdoors in bright light*, you can keep your *ISO settings fairly low* (100-200). Because with so much available light from the sun, you don't need a high ISO to get a good exposure.

However, move *indoors* and things change. Since the interior light levels will be *considerably lower*, the same ISO that would work in the previous bright condition, would fall short in this environment.

One of the easiest ways to *compensate for low-light* is by *increasing the ISO*. Just remember that the *more you increase the sensitivity* of the ISO, the *more digital noise* you will experience.

There's a difference between a want and a need when it comes to using a low or high ISO; it's a *trade-off between image quality and shutter speed*.

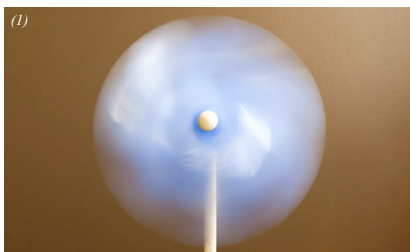
Shutter Speed

Shutter speed is responsible for controlling *time and motion*, and determines *how long light is allowed to enter the camera*.

If the shutter speed is *fast* enough, it can *freeze action* completely. If the shutter speed is *slow*, it will *capture motion*, rendering moving objects blurry along their direction of travel.

Shutter speed is measured in *fractions of a second*, and even *full seconds*, and are displayed as 1/15, 1/30, 1/60, 1/125, 1/250, and so on. *The higher the denominator, the faster the shutter speed*.

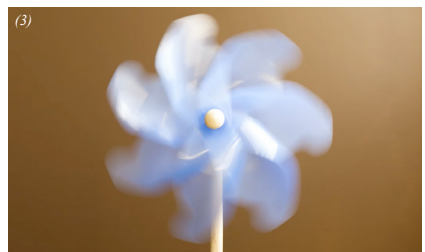
Conversely, full second shutter speeds are followed by a *quote symbol (")* and will display as 2", 4", and 8", and so on, up to the camera's *maximum programmed exposure time of 30 seconds*.



1/15 sec



1/30 sec



1/60 sec



1/125 sec



1/250 sec



1/1000 sec

Shutter Speed

Like many things in photography, the '*correct*' *shutter speed* needed for a particular situation is a *variable*, and depends on the *desired outcome*.

Shutter speed is controlled either by using *Shutter Priority*, a mode where *you set the shutter speed* and the camera selects the aperture, or by using *Manual*, a mode where you set *both* the shutter speed and aperture.

A *fast shutter speed* means the shutter opens and closes quickly. The faster the shutter speed, the *less light* that is allowed to enter the camera. This is used for shooting sports or any object you want to *freeze in time*.

A *slow shutter speed* means the shutter opens and closes slowly. The slower the shutter speed, the *more light* that is allowed to enter the camera. This is used for low-light, or when you want to *capture motion*.





Shutter Speed Scale

1/8000 1/4000 1/2000 1/1000 1/500 1/250 1/125 1/60 1/30 1/15 1/8 1/4 1/2 1 2 4 8 15 30

Shutter is open less ← → Shutter is open more

Less light enters camera ← → More light enters camera

Freezes motion ← → Slows motion

Less digital noise ← → More digital noise

Recommended Speeds

1/2000 - 1/4000 sec: freezing really fast subjects

1/500 - 1/1250 sec: amateur and professional sports

1/125 - 1/250 sec: normal photos and children

1/60 sec: **minimum for sharp hand held shots**

1/30 sec: panning for action and sports

1/15 sec: blur subjects in motion

1/8 sec: blur fast moving water

1/4 sec: panning for people walking

1/2 sec: blur slow moving water

1 sec or slower: long exposures

Aperture

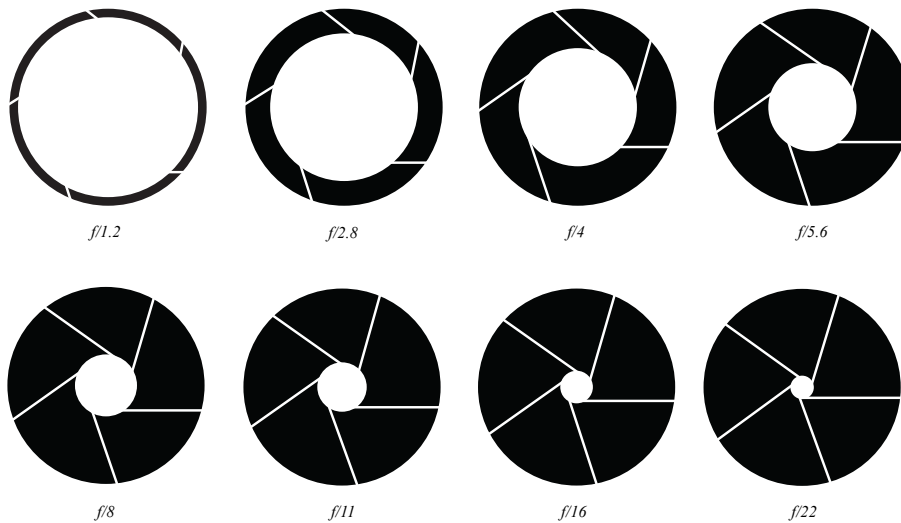
The aperture is an *opening in the lens* that controls the *amount of light that reaches the camera's sensor*. It also affects how much of the image is in sharp or soft focus, which is known as *depth of field*.

You control the aperture either by using *Aperture Priority*, a mode where *you set the aperture* and the camera selects the shutter speed, or by using *Manual*, a mode where *you set both* the aperture and shutter speed.

The *size of the aperture* is described by a number known as the *aperture value*, and is expressed as an *F-stop* (focal ratio), such as F2.8 or f/2.8, F5.6 or f/5.6. **Note**, you may or may not see the F or f/ on your display.

Keep in mind that the *smaller the f/stop number* the *larger the lens opening*, and the *larger the f/stop number* the *smaller the lens opening*.

Aperture Values (f/stops)



Depth of Field

Controlling time and motion is the main benefit of adjusting the shutter speed, and ***depth of field is the main benefit of adjusting the aperture***. It's what helps you ***tell the kind of story*** you want to with your photos.

Because the ***relationship between the aperture value (f/stop) and iris opening can seem backwards***, depth of field is probably one of the ***most confusing concepts*** of photography.

Knowing the ***intention behind your photo*** will go a long way in helping ***decide which aperture value*** to select.

Portraits: wide aperture values, such as $f/2.8$ to $f/3.5$

Groups: middle aperture values, such as $f/5.6$ to $f/8$

Landscapes: small aperture values, such as $f/11$ to $f/16$



Deep Depth of Field @ f/11



Shallow Depth of Field @ f/1.2

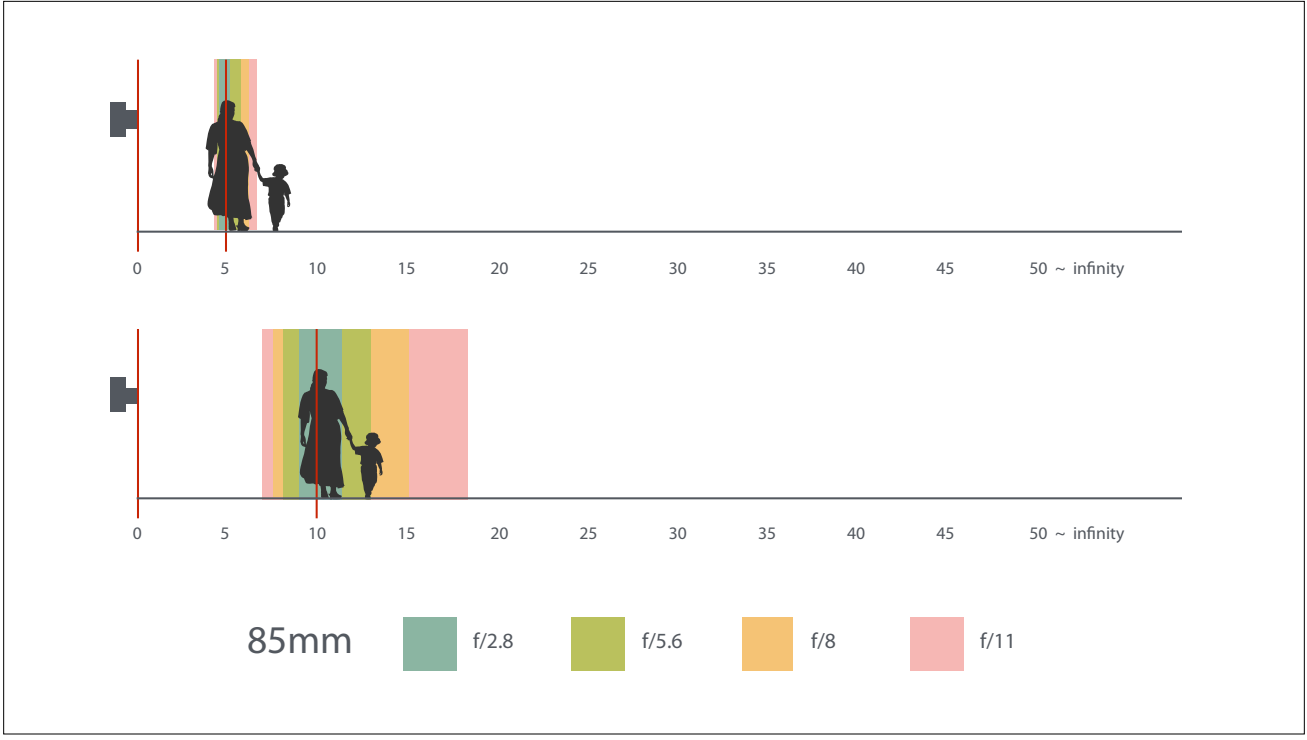
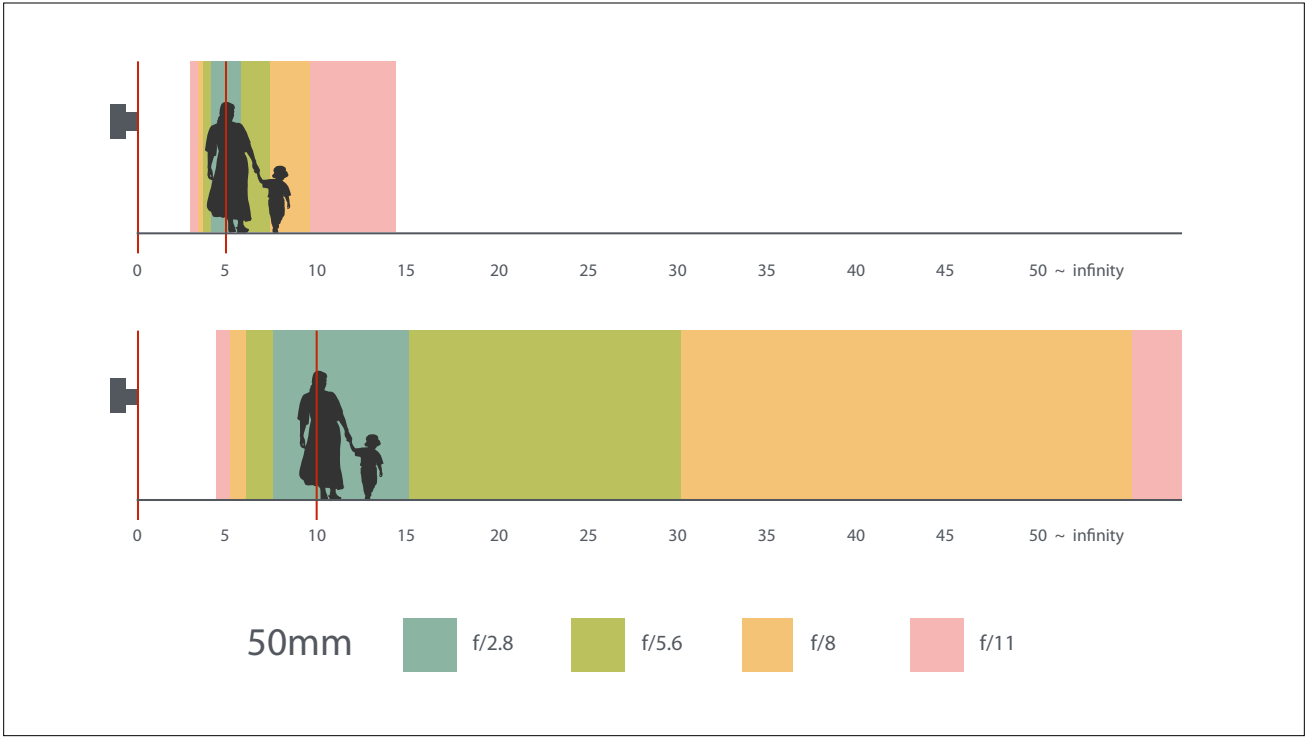
Creating Shallow DOF

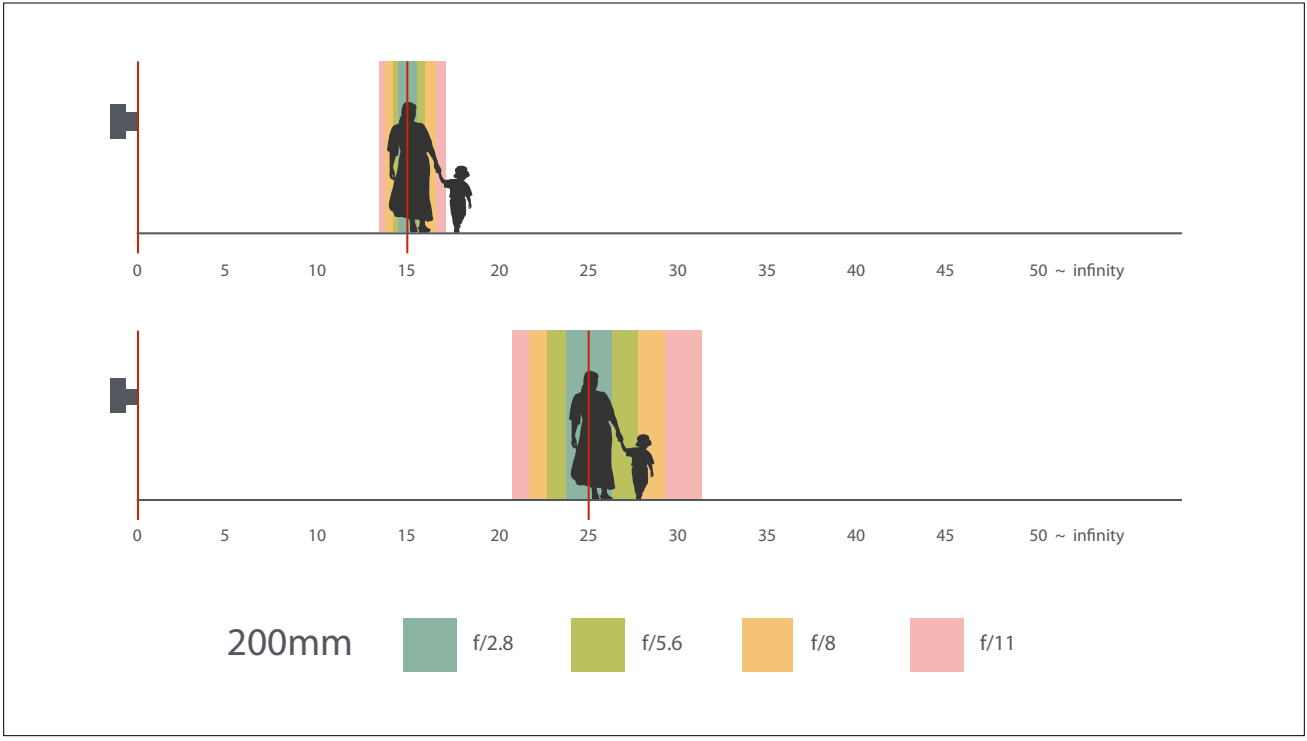
Wide apertures, such as f/1.8 and f/2.8, usually allow you to easily create a shallow DOF, but that's *not enough to guarantee* a blurry background. When it comes to depth of field, *distance matters*.

Minimum focusing distance: the minimum focusing distance of a lens is the closest distance your lens can focus on an object. Shooting as close to your subject as possible will help create shallow depth of field.

Separate subject and background: the farther away your subject is from the background, the more the background will be rendered out of focus.

Longer focal lengths: long focal lengths (85mm or longer) create shallower depths of field more effectively than wide angle lenses. Even with a small aperture of f/5.6, you can still blur out the background.







ISO 400
1/500 sec
f/1.8 @ 85mm



ISO 100
1/4 sec
f/11 @ 21mm



Exposure Triangle Recap

The function of the **ISO** is to introduce *more light* into the camera so you can achieve a *'fast enough' shutter speed*. Higher ISOs are more likely to contain more *digital noise* than lower ISOs.

Shutter speed is responsible for controlling *time and motion*, and determines *how long light is allowed to enter the camera*. This function is responsible for either freezing or showing motion.

Aperture controls the *volume of light that reaches the camera's sensor*. The main purpose of the aperture is to control how much of the image (front to back) is in sharp or soft focus, which is known as *depth of field*.

Each of these functions *manage how light enters the camera*, but it's their *collective settings* that determine the final exposure.

The Importance of Light

More often than not, the primary reason why some images (pardon the pun) outshine others is because of light. It's the one factor above all others that can ***make or break an image***.

It's a common misconception that the best photos are those taken in the most light, however, it's the ***quality of light*** rather than the ***quantity of light*** that counts most.

Light quality can take on many forms, and is usually divided into two fundamental types: ***hard*** and ***soft***. Both types have their ***own unique characteristics*** that affect the mood of a scene differently.

TIP: one form of lighting isn't necessarily better than the other... the choice of which one to use comes down to your ***intention***.

Hard Light

Hard light is considered ***high-contrast light***. This type of light is ***strong and direct***, casting deep shadows with defined edges. Direct, overhead sun is notorious for creating hard light.

Shadows create ***depth and dimension***, however, there are certain subjects that look better with this type of light than others. ***Portraits*** captured in ***hard light during midday*** are always ***unflattering***.

Hard lighting occurs when you have a relatively ***concentrated light source***, such as open sun, bare light bulbs, or (gasp!) flash.

While you should avoid taking photos of people using hard light, ***architectural subjects*** benefit from the depth and dimension created by strong shadows.

Soft Light

Soft light describes the type of light that you find in the *shade*, or on a *cloudy day* where *shadows have soft edges*. This type of lighting is also known as *diffused light*.

Soft light is great for taking *photos of people*, especially portraits. If you're outside on a bright sunny day, find some *open shade*, such as under a tree or overhang, and take photos of them there.

The *softer the light source*, the *less defined the shadows* will appear. Shadow edges will take on a *blurry form*, where light and dark areas of the subject will start to gently blend together.

Keep in mind that soft light has *very little contrast*, which can make images appear to *look flat and have less dimension*.







ISO 100
1/20 sec
f/16 @ 35mm



ISO 100
1/15 sec
f/16 @ 24mm

Observe the Light

Amount: how much light do you have to work in? The amount of available light determines your ISO needs; *a lot of light will permit a low ISO*, while *low-light requires a high ISO*.

Quality: quality light is referring to whether the available light is *soft* (creating soft shadows), or *hard* (creating hard shadows.) This is important when it comes to portraits because *soft light is more flattering on peoples' faces* than hard light.

Direction: the 'direction' of light refers to not only *which direction the light is coming from*, but also the *location of your subject in relation to that light*. Are your subjects lit from the front or the side, or are they backlit with light coming in from behind them?

Observe the Light

Angle: this relates to the *direction of light*... are you working in bright midday sun with lots of harsh shadows, or morning/late afternoon when the sun is low to the horizon creating soft, diffused light?

Color Temperature: color temperature is the *natural color a light source has* and *white balance* is how the color white appears, causing whites to have either a blue or gold color cast.

Note: we'll cover white balance next week.

Conclusion: it all comes down to what kind of light you're working with and the outcome you want to achieve. There are *many variables to consider* when creating an image, and the more familiar you are with them, the better your results.

White Balance

Color temperature is the *natural color a light source has*, and white balance controls how the *color white appears* in your image. The color temperature of light can have a noticeable effect on the appearance of your images, causing whites to have either a *blue or gold color cast*.

Your camera has *several white balance settings* to help deal with the various light conditions, such as daylight, cloudy, open shade, etc. The idea is to use a particular setting in its *respective lighting*. 📖

It also has an *automatic setting* that does a good job at getting the color balance right, which is called *Auto White Balance, or AWB*. But, with anything automatic, it can get the color balance wrong.

TIP: RAW allows you to adjust WB in post without any loss of quality.



Auto (AWB)



Daylight



Shade



Cloudy



Tungsten



Fluorescent

Assignments

1. Look for examples where a *deep or shallow depth of field* is used in movies, TV shows, and magazines. Notice how depth of field influences where you look first.
2. Look for examples where a *fast or slow shutter speed* is used in photo books, magazines, and on billboards. Notice whether the subject is *frozen in time*, or if *motion was recorded*.
3. Start *observing light more closely* and imagine what kind of impact it will have on your images. Is the light hard or soft? What direction is it coming from? Is the temperature cool or warm?
4. Test out the different *white balance* settings to see how they affect your images.