Shutterbug

photography training

Beginner Photography: Class 4

Qualities of a Lens

When considering the purchase of a new lens, there are ***two primary factors*** to keep in mind; the ***focal length*** and the ***maximum aperture***.

Lenses capable of achieving ***larger maximum apertures***, such as f/1.2 or f/2.8, are generally ***more expensive*** than lenses with smaller maximum apertures.

The ***front element*** in a ***wide maximum aperture*** lens is ***larger*** than a lens with a small maximum aperture. This larger size makes the lens ***heavier***, which can become an issue when ***carried for long periods of time***.

Just think, if just ***one big fast lens*** makes your kit ***too heavy***, what will a bag with ***several*** fast lenses feel like?

Fast and Slow

As it relates to ***maximum aperture***, lenses are divided into two camps, and are considered as being either ***fast*** or ***slow***.

Lenses capable of achieving ***large maximum apertures***, such as f/1.2 or f/2.8, are considered ***fast lenses***. They get their designation because they ***allow more light to enter the camera*** and permit ***faster shutter speeds in low-light*** conditions.

Conversely, lenses capable of achieving ***maximum apertures of f/4 or smaller***, are considered ***slow lenses***. They get their designation because they ***allow less light to enter the camera***, thus permitting ***slower shutter speeds*** in the same low-light conditions.

TIP: use the ISO to increase shutter speed with slow lenses in low light.

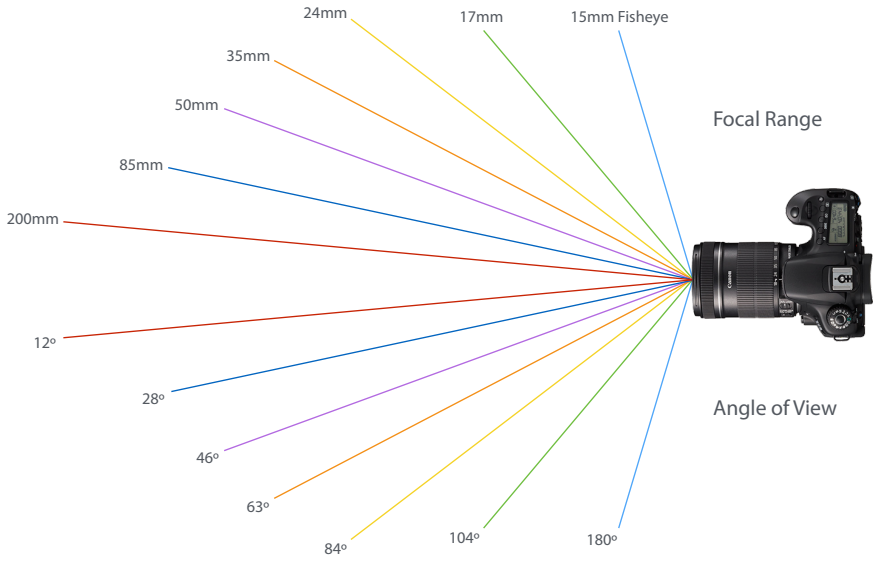
Focal Length

The ***focal length*** determines the ***angle of view*** the lens will capture. With regard to ***view angle***, lenses generally fall into one of ***three categories***, and sometimes expand into two, or even all three.

Wide-Angle: a wide-angle lens has a ***short focal length***, such as 17mm, 24mm, and 35mm. Wide-angle lenses are great for capturing ***large areas*** of a scene, and are ideal for ***landscapes*** and ***architecture***.

Normal: a normal lens has a ***medium focal length*** around 50mm, which is similar to ***human vision***. This focal length is suitable for ***everyday shooting***.

Telephoto: a telephoto lens has a ***longer focal length***, such as 85mm or greater, and allows you to capture photos from a ***distance***. Telephotos have a ***narrow angle of view*** and are used for ***sports, wildlife,*** and ***portraits***.



Focal Length

A lens has several ***numbers*** printed on the ***side of the lens***, and/or on the ***inside rim of the front element***. These numbers are known a ***'markings'*** and they tell you what the lens ***can*** and ***cannot*** do.

Measured in ***millimeters***, the first number in this group relates to the ***focal length*** of the lens, which controls how ***close*** or ***far away*** objects will ***appear*** in the frame (24-70mm, 50mm, 85mm, 70-200mm, etc.).

In essence, the ***larger the number***, the ***closer*** a subject will appear, and the ***smaller the number***, the ***farther away*** a subject will appear.

Certain focal lengths are ***more suited*** for a situation than others, and the ***kind of photo you want to capture*** will dictate the focal length you use.

Prime and Telephoto

Lenses are further categorized as either a ***prime*** or ***telephoto***, which is determined by how the lens allows you to work with the ***focal range***.

For instance, a lens with a ***single number***, such as 35mm, 50mm, or 85mm, is considered to be a ***prime*** or ***fixed lens***.

These lenses are ***restricted to one focal length*** and are ***not capable of zooming*** in and out. If you want to zoom in on, or away from your subject, you will have to ***zoom with your feet***.

A lens with a ***range of numbers*** displayed with a ***dash in between***, such as 18-55mm, 24-70mm, or 70-200mm, is considered a ***telephoto lens*** that is capable zooming, or achieving ***different focal lengths***.


AF
MF
50mm
CANON LENS EF 50mm 1:1.2 L USM
Focal Range


IMAGE STABILIZER
70
100
135
200
70-200mm
CANON ZOOM LENS EF 70-200mm
ULTRASONIC
Focal Range

Maximum Aperture (fixed)

To the ***right of the focal length*** is a number that represents the ***maximum aperture*** of the lens. This number is telling you what the ***largest aperture value*** of the lens is, not its ***aperture range***.

For example, a lens with markings displayed as ***70-200mm 1:2.8*** would indicate a telephoto lens with a ***focal length*** in the range of ***70-200mm***, and has a ***maximum aperture value of f/2.8***.

This lens has a ***single***, or ***fixed maximum aperture*** listed (f/2.8), which indicates that it is capable of ***holding*** this maximum aperture ***regardless of the focal range***.

TIP: these are considered ***pro lenses***, and come with a ***higher price tag***.

Maximum Aperture (variable)

However, not all zoom lenses feature a single maximum aperture, but instead, have an ***aperture range*** that is ***dependent on the focal length***. These lenses have what is known as a ***variable aperture***.

For example, a lens with markings displayed as ***18-200mm 1:3.5-5.6*** would indicate a telephoto lens with a ***focal length*** in the range of ***18-200mm***, and has a ***maximum aperture*** that will ***vary*** depending on which ***focal length*** is selected.

At the ***widest zoom*** (18mm), you are capable of achieving a ***maximum aperture of f/3.5***. However, as you ***zoom in on your subject***, the ***maximum aperture will decrease***. By the time you get to ***200mm***, you will only be able to open the aperture as wide as ***f/5.6***.

Variable Maximum Aperture

Wide-Angle

Wide-angle lenses can be used for a variety of situations, including ***weddings***, ***architectural***, and ***landscape*** photography. Their short focal lengths (35mm and under) permit a ***wider angle of view*** that captures ***larger areas of a scene***.

Just be aware that these ***wider angles of view*** will introduce ***distortion*** in your photo, such as causing ***horizons to bend*** and ***vertical objects to lean***. And, the wider the lens, the more ***pronounced*** the distortion will be.

There's even a super-wide-angle lens called a ***fisheye***, which is primarily used to ***exaggerate perspective***. You will see this lens used during ***wedding receptions*** where the entire dance floor is captured in one shot.

TIP: wide-angle lenses are ***not*** known for capturing ***pleasing portraits***.

ISO 1600
1/125 sec
f/8 @ 24mm

ISO 100
1/30 sec
f/8 @ 15mm (fish eye)

Normal

Lenses with a ***medium focal length*** around 50mm are referred to as ***normal***. Their focal length is similar to ***human vision*** and allow you to capture a more ***natural perspective*** of your subjects.

While this focal range can be found in many zooms, it is typically utilized on a ***prime lens***, which will give you access to ***wider maximum apertures***.

Many zooms have a maximum aperture of f/4, or even f/2.8, but shooting at the ***widest aperture setting*** of any lens will always introduce a form of ***distortion*** known as ***diffraction***.

For example, a photo taken at ***f/2.8*** on a ***prime lens*** with a maximum aperture of ***f/2 or wider***, will have ***better image quality*** than one taken at ***f/2.8*** on a ***zoom lens*** with a maximum aperture of ***f/2.8***.


ISO 400
1/125 sec
f/11 @ 50mm


ISO 3200
1/125 sec
f/1.8 @ 50mm

Telephoto

Telephoto lenses have a ***long focal length***, with the ***70-200mm*** variety being the most common. They have a ***narrow angle of view*** and produce better ***shallow depth of field*** than lenses with a shorter focal length.

Whether you can't get ***close*** to your subject, or simply don't want to, telephoto lenses allow you to ***capture photos from a distance***, which makes them ideal for ***sports*** or ***wildlife*** photography.

Compression, where the ***distance between objects*** in a scene appears to be ***compressed***, or closer together, is another ***benefit*** of using longer focal lengths. We will be covering that soon…

TIP: this lens also covers the ***85mm*** focal range (short-telephoto), which is considered by many to be the ***ideal focal length for portraits***.


ISO 500
1/640 sec
f/11 @ 185mm


ISO 1600
1/250 sec
f/2.8 @ 200mm

Macro Lenses

If you want to get ***really, really close to your subject***, you will achieve the best results from a ***dedicated macro lens***.

Some lenses have a ***macro setting*** that's designed to allow you to focus on subjects ***close to the camera***, but unfortunately, it's ***not going to come close*** to the power of a true macro lens.

There are ***close-up lenses*** (not a macro lens) that do a ***much better job*** at getting close to your subject than the macro setting does. They look more like ***screw-on filters*** and attach to your lens in a similar way.

However, if you're ***serious*** about this specialized kind of photography, you will want to ***invest*** in a ***dedicated macro lens***. These lenses are ***fixed in focal length*** and come in ***several options***, with the most ***common*** focal length being ***100mm*** (great for ***portraits***, too).


ISO 100
1/15 sec
f/2.8 @ 100mm


ISO 100
1/80 sec
f/2.8 @ 100mm

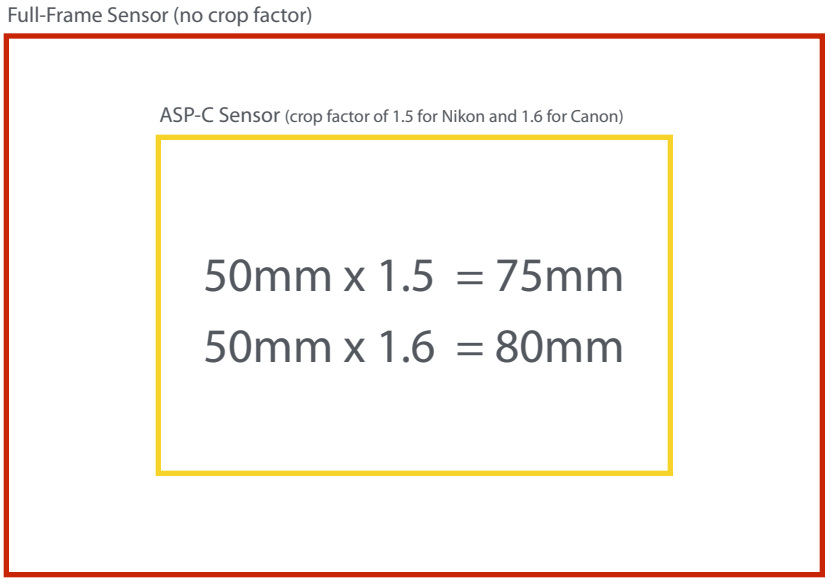
Digital Image Sensors

When an image is captured using a film camera, the image is recorded directly onto the film… your DSLR uses an ***image sensor*** instead.

Image sensors come in ***different sizes*** and are described as either ***full-frame*** or ***cropped*** (ASP-C). Full-frame sensors are ***equal to the size*** of a typical ***35mm film negative***, whereas cropped sensors are ***smaller***.

ASP-C sensors use a ***crop factor*** (magnification) to ***mimic the size of a full-frame sensor***, which can have an effect on a lens' ***focal length***.

For example, if you put an ***50mm lens*** on a camera with a ***full-frame sensor***, it will give you a ***true 50mm angle of view***. However, if you put the ***same 50mm lens*** on a camera with a ***cropped sensor***, it will give you an ***angle of view closer to 75mm (Nikon) or 80mm (Canon)***.



Multiply the lens **focal length** by the **crop factor** to get the **equivalent** focal length.

Crop Factor Pros and Cons

There isn't much difference in quality between the two sizes, but a notable benefit of a ***cropped sensor*** is being able to achieve ***greater close up shots***. For example, because of the crop factor, a ***200mm telephoto lens*** will behave more like a ***300mm telephoto lens***.

Conversely, the crop factor ***works against you*** when shooting with a ***wide-angle lens***. Because of the magnification involved, you will ***lose some of the view angle*** on a cropped sensor.

If you want to use a ***24mm lens*** to capture a ***landscape***, it will provide an ***angle of view*** closer to ***35mm*** when placed on a ***cropped sensor*** camera.

So, if you really want a ***24mm(ish) angle of view***, you would need to use a lens with a ***shorter focal length***, such as 15mm or 17mm.

Image Stabilization

Image Stabilization is a handy feature that helps 'settle' your camera and permits the use of shutter speeds ***2-4 stops slower***, which is useful for taking ***hand-held shots in low-light conditions***.

If you are taking images at high shutter speeds like ***1/500th*** of a second, you essentially have ***no real use for image stabilization***… the fast shutter speed ***cancels out any camera shake***.

Image stabilization is useful in hand-held situations where you ***don't have enough light to get shutter speed you need***.

- **Canon**: IS (Image Stabilization)
- **Nikon**: VR (Vibration Reduction)
- **Sigma**: OS (Optical Stabilization)
- **Tamron**: VC (Vibration Compensation)

Do You Need Stabilization?

While image stabilization is great, ***nobody really needs it***. Sure, it's a nice feature to have when shooting hand-held in low-light conditions, but it's becoming ***less of an issue*** as each new camera that comes out is getting ***better at handling higher ISO levels***.

Most beginner ***kit lenses*** come with ***image stabilization***, which is helpful because they have ***limited maximum apertures***, such as f/3.5 or f/4.

The ***best image stabilizer is your tripod***, which will come in handy when you are shooting formal portraits where everyone is behaving themselves.

However, children rarely give us that luxury, and essentially makes using a ***tripod impractical***… and this is where ***stabilization*** and/or having a camera capable of handling ***high ISO settings*** fits in nicely.

Lens Compression

Lens compression is a phenomenon that affects the ***visual appearance*** between the ***background*** and the ***subject*** when captured at ***various focal lengths*** and ***distances***.

For instance, the spatial distance between the ***subject*** and ***background*** will appear to be ***farther*** with ***shorter focal lengths***.

Conversely, the spatial distance between the ***subject*** and ***background***, while keeping the ***subject the same size***, will appear to be ***closer***, or ***compressed***, with ***longer focal lengths***.

This ***optical illusion*** happens because the ***narrow angle of view*** created by a telephoto lens makes ***near*** and ***far*** objects ***appear closer together*** than they actually are.


70mm at f/8


135mm at f/8


200mm at f/8


Riddell
12
Patriots
12

Compression with Portraits

Lens compression is also important when it comes to taking ***natural looking portraits***… not natural facial expressions, but ***physical features***.

It is always preferred to capture portraits with as little ***facial distortion*** as possible, which is why lenses with a ***longer focal length*** in the range of ***85mm*** to ***135mm*** are most often used.

Wide-angle lenses ranging from ***14mm*** to ***35mm*** are generally ***not used for portraits*** because they can ***distort***, or bloat, people's faces.

A ***50mm***, or normal lens, can be used for ***full length*** or even ***waist up portraits***, and is often used for ***reportage*** photography. An ***85mm*** lens is good for ***bust shots***, while a ***135mm*** lens is considered the ideal length for ***tight shots showing just the face***.

Tips from the Field

Use your lens hood: the main purpose of a lens hood is to ***block any light falling onto your lens*** and reduce any unsightly ***lens flares***. But it has another advantage (besides making your lens look bigger), and that is to ***protect your front element*** from damage.

Changing lenses: if possible, ***avoid changing lenses*** in ***open areas*** with ***high wind***, such as the beach or a baseball field.

When you remove the lens from the camera body, you are left with a ***big opening*** that is capable of ***collecting unwanted debris***. This debris, also known as ***sensor dust***, is somehow magically attracted to your sensor.

TIP: if your sensor becomes 'dirty,' don't try to clean it yourself. Instead, take it to ***Camtronics Camera Repair*** in Grandview.

Shopping for Glass

Getting a ***new lens*** basically comes down to the ***kind of photos*** you are ***interested*** in capturing. Are you interested in landscapes, lifestyle family, sports, macro, portraits? (relates to ***focal length***)

The ***conditions*** you will be shooting in will help narrow your options even further. Will you be shooting in places with an ***abundance of light***, or will you be in places with ***low-light levels***? (relates to ***maximum aperture***)

Remember, the ***more gear*** you have the ***heavier your camera bag*** will get. This is an important consideration, especially if you're ***traveling***. A good all-purpose lens, such as an ***18-200mm***, is a great option for travelers.

If you're ***unsure of which lens*** (or camera) you want, you can always ***rent gear*** you're thinking of buying before making an investment.

Assignments

Take a good look at your lens, or lenses, and be sure you ***understand*** what you're working with. Do you have a ***zoom lens***, ***wide-angle***, a ***prime***? What is your ***maximum aperture*** and ***focal length***?

If you have a zoom lens, practice ***image compression*** by taking photos at ***various focal lengths*** to see how that affects your images.

Remember, each time you ***increase the focal length*** (70mm to 135mm), you will need to ***increase the distance*** between you and the subject to keep it/them the ***same size*** in the frame.

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