

How to Photograph the Moon

FOCUSED CAMERA™

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How to Photograph the Moon

If you are new to photography, photographing the Moon or anything at night is going to be challenging. You will not only need the right equipment but also the right technique and enough skill in setting exposure to make adjustments on the fly (and in the dark).

Our nearest celestial neighbor is one of the most photographed objects. If you are interested in night photography, it is less complex than some other subjects. Therefore, photographing the Moon is a good subject for getting started.

In this guide, we will mainly discuss Moon photography with a DSLR or mirrorless camera. Since you can also get amazing photos of the Moon with a smartphone, we will also cover that, but with less detail.

Before you start Moon photography, there are a few things you need to learn about the Moon itself, such as how to know where it will be located on a particular day and the different phases of the Moon. Throughout the month, the Moon changes as can be seen in the images below. This sequence represents what is seen in the Northern Hemisphere. In the Southern Hemisphere, it appears reversed or upside-down in comparison (for example, during waxing crescent the crescent of light will be on the left instead of the right).



NASA's Scientific Visualization Studio

The complete cycle is approximately 29 days from new moon until the next new moon. Once you know this, you can figure out approximately when each phase will occur. If you look up and see a quarter moon lit up on the right side, it will be about 7-8 days until the full moon. If the Moon is full, it will be about 14-15 days until the new moon. Good news, you don't have to rely on your eyes and math to know what the current status of the moon cycle is or will be on a future date. Some apps and simulators will not only show you the phases but also the location of the Moon in the sky in your town on a certain day and even at a specific time! We'll discuss some of those in the section about planning your shots.

When planning to photograph the Moon, it can also be helpful to know about a few special types of lunar events. As the Moon orbits Earth, there are some points along the path that bring it closer to us. When this happens during a full moon it is called a Supermoon. The Supermoon can appear over 10% larger and up to 30% brighter.

When the Sun, Earth, and Moon are aligned and the Earth's shadow falls on the Moon, a lunar eclipse occurs. There are partial and full eclipses. A full eclipse is referred to as a "Blood Moon" because of its red hue. Full moons happen monthly and each month has a name, such as Wolf Moon (January) or Flower Moon (May). When two full moons occur in the same month, the second one is a Blue Moon.

In addition to knowing some basics about the Moon and its location in the sky, you have to consider what type of photo you want. Look at lots of different Moon photos and decide what type of composition you want to achieve. The type of lens and set-up is slightly different depending on your goals. Take a look at the photos below. Which of these types of compositions do you want to achieve?



They may all seem very similar, but they are different phases and different times of day. The one on the left is daytime, the middle is late evening when the sky is darkening, and the last one is a night. What they have in common is these are all considered close-up shots (zoomed in). A detail shot would be even closer and may only show a small part of the moon.

Now take a look at these photos. Which of these types of compositions do you want to achieve?



These are all wide-field (or wide-angle) shots and they all incorporate other details, or foreground, into the composition of the image. This type of photo will take more planning and may require more editing processes; however, they can be accomplished much more easily without special camera gear. These photos were all taken at different times of day or night and different phases of the Moon.

You might not know right away which type of photo you want to try. We're going to cover aspects of both wide and close-up, as well as different lighting conditions and the type of gear required. Once you've read through this guide, you will likely have a clearer idea of what you want to try first.

The first time I tried to photograph the Moon with my DSLR it was blurry and distorted. When I tried to take a photo with my smartphone, the Moon was a small, overly-white oval that was indistinguishable. No one looking at either of these photos would have said they were photos of the Moon. Many photographers have similar experiences on their first attempts.

A few of the challenges that must be overcome to get a good Moon photograph are low light conditions, camera shake, working in the dark, working with manual mode settings, and dealing with wind and weather. It gets even more difficult when you have light pollution issues or you are trying to incorporate a landscape or other subject into the composition with the moon. We're going to troubleshoot several of these.

The steps for a Moon photo are as follows:

1. Decide on composition: close-up versus wide-field
2. Determine which Moon phase you want to capture
3. Plan the shot – this includes your location (finding dark skies), location of the moon, other elements and composition, time and day, and the weather
4. Assess and prepare your camera gear
5. Know your camera settings and how to focus the camera
6. Take your photos
7. Special section on lunar eclipses
8. Editing and post-processing
9. Printing and sharing!

We're going to talk about each of these steps in some detail. These steps are the same no matter what camera you have (or even a smartphone); however, how easily they can be accomplished and technical aspects within the steps may differ.

Composition: Close-up vs. Wide-field

The main difference between close-up and wide-field is the size of the Moon in the frame. In a close-up shot, the Moon will fill most of the frame. The camera is zoomed in to get “closer” to the Moon and to show more detail. The composition is strictly the Moon surrounded by sky (mostly empty, but may include stars or a passing bird or plane). With a wide-field image, the Moon is smaller in the frame and other elements such as a landscape, trees, or people are included. The camera is zoomed out, so the Moon is “farther” away and shows less detail. In this type of shot, the moon may be a focal point, but the other elements are also important and must be planned.

Most cameras and phones are equipped with a standard and/or wide angle lens. Therefore, wide-field compositions have an advantage right off the bat, especially during the day. During daylight hours, the Moon and the rest of the surrounding foreground elements are equally bright. Therefore, you don't need to make any special adjustments with settings and you won't need to take multiple exposures. Because it is lighter outside during the day, the shutter speed on the camera is faster, which means you don't need a tripod to keep it steady. You don't need a zoom lens/function and should be able to use a standard auto mode with decent results.

A wide-field photo will look better if there is a foreground element, such as shooting through tree branches or flowers, or when there is a landscape element. It is easier to include a landscape element when the moon is closer to the horizon. When the moon is closer to the horizon, it will appear larger and a warmer color. This occurs because of atmospheric conditions and because foreground elements affect the perception of size.

Keep in mind, depending on the camera and the lens, the Moon may be very small in the frame. If you have an optical zoom (point-n-shoots, some phones) or a zoom lens (interchangeable lens cameras, some phones) you can zoom in to make the Moon bigger. This will change the composition of the photo, so you might have to adjust your position or framing too.

Once the sun starts to go down, Moon photography gets more difficult. The Moon is very bright compared to the rest of the sky or foreground. In a wide-field shot, achieving proper exposure of the Moon and other elements at the same time can be tricky. When you properly expose the Moon, the foreground elements will be too dark and possibly all black. When you expose for the foreground, the Moon will be a blown-out, over-exposed white blob. To solve this, most photographers take multiple exposures at different exposure values and then blend the photos with editing software. This means wide-field photography at night is vastly more complicated than it is during the day. You have to understand exposure, exposure bracketing, and editing techniques. We will talk about these more in the sections on settings and post-processing.

With a close-up composition, if all you want is the details of the moon and don't care about stars or other elements in the sky, then the process is relatively easy. You need a telephoto or zoom lens and you expose for the Moon. The sky will be black. Most

students want to start with close-up full moon photos; however, the full moon won't look as detailed as images of the Moon during other phases. If your goal is to capture the Moon with stars or the Milky Way, then it gets more challenging again. If you want an extreme close-up, you will need specialty lenses or even a telescope that attaches to the camera.

In all compositions, weather and planning for locations away from light pollution are important.

Once you've decided on what type of shot you want to try to achieve, the next step is to determine the moon phase you want in the composition.



Determining Moon Phase(s)

At different times in the Moon's cycles, the features of the moon may appear more or less prominent. The full moon is not the most ideal phase to photograph, despite its popularity. When the Moon is full (or almost full), the features will look flatter and less detailed due to the amount of sunlight hitting it. The features disappear because of a lack of shadows. The quarter phases or crescents will bring out more of the details of the Moon's topography. This is because the Sun's rays are casting shadows along the rims of craters. This allows us to see highlights and darker areas in contrast.

A good series of photos for practice would be to photograph the Moon every night for an entire month. Not only will you get to see the different phases, but you'll get practice with settings and tracking the moon over time. Once you have your full month of photos, you can sit down and compare them. You will notice a difference in surface details and hopefully you will also see a difference in quality. After all, practice makes better!

Once you know what phase of the Moon you want to photograph, the next step is planning!



Planning the Shot

Planning is essential, especially if you want to capture a specific event such as the moon rising over a certain mountain peak, a Supermoon, or even a lunar eclipse. Remember, for standard Moon photos, a close-up photo will take less planning than a wide-field because there are no other elements in the shot.

Let's start with the most obvious, planning a location. You will want a location that not only has any elements you want with the Moon, but also has a dark sky. Light pollution ruins many, many night photographs. Atmospheric haze and air pollution, smoke, moisture in the air, and heat can also ruin a shot, especially with close-ups. Anything that is between you and the Moon will degrade the quality of the shot.

When the Moon is directly overhead – at its zenith – there is less atmosphere between you and the Moon. This will make the photo clearer. This is known as better “seeing” conditions. When the Moon is near the horizon, there is more atmosphere. The area near the horizon may also have more light pollution and air pollution from cars and cities. These can all make an image look blurry or wavy. This applies to Moon photos at night and during the day. The app Astrophotic provides detailed forecasts for “seeing” conditions.

The app Dark Sky Finder or website Dark Site Finder can be very helpful for locating the best spots with lower amounts of light pollution for night photos. Less light pollution will also typically mean less haze from smog and air pollution.

After you have found areas that will have the compositional elements you need and the sky darkness required, you need to select the moon phase and together those will determine the day(s) and time(s) for your shoot.

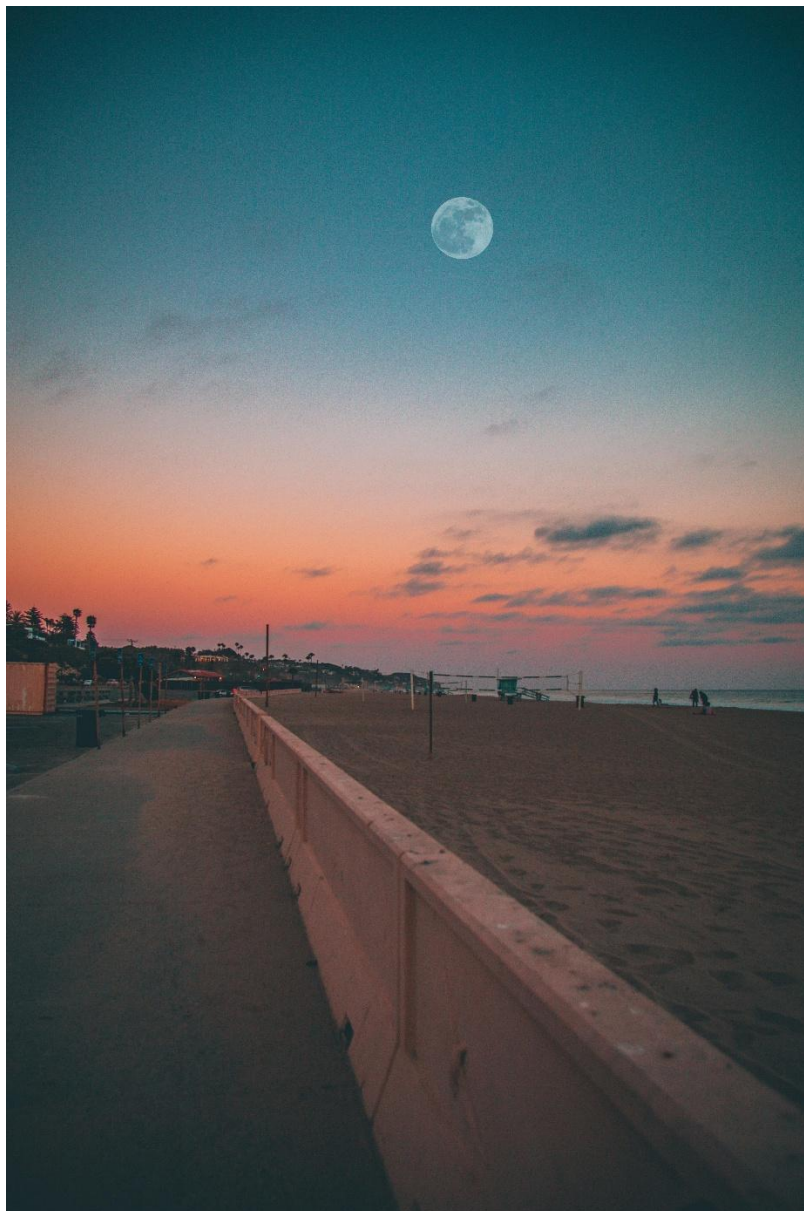
Here are some general guidelines:

- Twilight/Dawn – better times because the Moon is not much brighter than the sky
- Full Moon – a day or two before or after the actual full moon
- Full Moon at twilight – a few days before the actual full moon
- Full Moon at sunrise – a few days after the actual full moon
- Half Moon – almost anytime; blackness of night, twilight, or during the day
- Crescent Moon – a few days before or after the new moon
- Crescent Moon at twilight – a few days after the new moon
- Crescent Moon at sunrise – a few days before the new moon

The website TimeAndDate is a great resource for moon phases, as well as the times for moonrise and moonset; however, there are a few apps that also provide this information, as well as augmented reality features. These allow you to calculate the precise location, time, and look of the moon by creating an overlay on your landscape. For example, with the Photo Pills app you can stand at your location and set the day timer to the day and time you want or scrub through the days until you see the phase

you want. You can then view the look of your composition on your phone's camera. The app Photographer's Ephemeris is another useful planning app.

Now you've already done a lot of planning, but there is one more step – the weather. You don't want heat waves, dust, smoke, or moisture to ruin your well-planned shot. Obviously, you don't want to go out in rainy or misty weather or at times where there is heavy cloud cover. Heat waves from hot summer days and cities and factories will also destroy a shot. For these reasons, you will want to consult a weather channel, website, or app. The app mentioned previously – Astrophoric – can help with all of these. Many photographers also recommend astrophotography on colder nights. Cold air holds less moisture and haze, typically has less cloud cover, and is less turbulent than hot air. However, colder weather is harder on the photographer and drains camera batteries quickly!



Assess and Prepare Your Camera Gear

Now you are ready to figure out exactly what gear you have (or need) and test it out.

You may be limited to certain types of Moon photography depending on what type of camera gear you have.

If you are planning to photograph a special event like a lunar eclipse, you will need to practice regular Moon photography in advance and read other articles and tutorials in addition to this one.

A close-up shot using a 200mm or more lens can reveal many details like impact craters on the surface of the Moon. Most cell phones do not zoom much further than 100-200mm in optical zoom. Some offer a digital zoom, but image quality will suffer. Many point-and-shoot cameras and bridge cameras offer a zoom over 200mm. Some point-and-shoot cameras have zooms up to 2000mm! An interchangeable lens camera may have included a zoom in the 200mm range, or you can purchase a telephoto zoom lens. None of these phones or lenses will take a spectacular shot like a \$5,000 super-telephoto 600mm lens on a professional camera, but until you know you love Moon photography, stick with what you have.

There are attachments for cellphones that can provide more zoom, but many are poor quality. You are better off to take a photo at the maximum optical zoom for your phone and then crop and upscale the photo in editing to give the final image the close-up look. If you have an interchangeable lens camera, there are some less expensive telephoto zoom lenses, like the Tamron 18-400mm, but an all-around zoom may not have the best image quality (I have this lens and love it, but it would not be a first choice for astrophotography). Another option is a 1.4x or 2x teleconverter. This is attached to the lens and magnifies the view by that amount. In other words, adding a 1.4x to a 200mm lens makes it 280mm, or adding a 2x will make it 400mm. This option is much less expensive than a new lens. The disadvantage of the added reach of a teleconverter is that they let in less light and can reduce sharpness.

If you have a camera with a smaller sensor, known as a crop sensor or APS-C, the crop factor of the camera will be helpful for close-up Moon photos. For example, the Canon Rebel series cameras have a crop factor of 1.6x, which means a 200mm lens will effectively work like a 320mm. Keep in mind that the reverse is true for APS-C cameras and wide-field photography. An 18mm focal length will create images that effectively look like the view of a 28-30mm on a full frame camera. If you are unfamiliar with the concepts of crop factor or lens focal lengths, you should read our Lens Guide before making any lens purchase decisions.

For a wide-field photo of the Moon, most cell phones have a wide-angle option that will work, as will bridge cameras and point-and-shoot cameras. Interchangeable lens cameras can use a kit lens (usually something like an 18-55mm, although usually not the best image quality), a prime lens like a 50mm, or other options in that range. These

lenses will give you a wider field of view that allows you to include the Moon in a landscape or with other foreground elements. The 50mm will provide an image that looks similar to what we see with our eyes.

You do not need any tracking systems to capture the Moon. However, you will get much better photos if you have and use a tripod. A tripod is one of those items that you can invest in for the long term. You can use it for a variety of other photography genres; therefore, we suggest purchasing a strong, sturdy tripod. A heavy tripod will help keep the camera stable as well, but consider how far you might be carrying it and your gear. The tripod is essential for close-up photography because longer lenses and focal lengths need to be steadied. Camera shake can be a big problem! Even the slightest movements can blur the image. You also want a tripod that is easy to adjust. As you take your photos, the Moon will be moving across the sky and it moves more quickly than it might seem. The tripod will help steady your shots for wide-field photos as well, but you can have some success without one.

Using a remote camera trigger or release is also helpful. If you don't have one, then you will want to use the short timer on your camera instead. These will reduce camera shake. If your camera has a mirror lock up function (DSLRs), then use that feature too.

As you get better and have more practice, you may also want a graduated neutral density (ND) filter for an interchangeable lens camera for wide-field photos. When attached to a lens, the filter blocks light from ½ of the scene. You can attach it so that the upper half blocks the light of the Moon (which is a lot brighter than it seems) and allows all the light from the lower half with the landscape in. This balances the exposure so that multiple exposures are not needed (more on this in the settings section).



So to review, use the gear you have. This may mean making adjustments to your compositions until you know you love night photography and have the budget to invest in different gear. If all you have is a cellphone, then use it to take wide-field photos during the day when no fancy gear or tripod is needed. If you have a great telephoto lens and tripod already, then zoom in and go for some close-ups! You will need to practice several times and test out your gear. Don't get discouraged if your first attempts aren't successful. You'll get there!

Now we are ready to talk about camera functions and settings you will need.

Camera Functions and Settings

In this section we will cover basic starting points for different types of photographs and different types of camera gear. There are no settings that will work 100% of the time. An understanding of your camera functions will be required. If your camera has a manual, you may need it or you can find a copy online. For some cameras, you will also need to know how to balance exposure. If you are unfamiliar with the basics of exposure, there are guides and videos on our website available for free.

Let's start with using a phone.

Phone photography of the Moon is possible, but there are limitations. Most smartphones don't allow you to have precise control over settings of exposure and as already discussed may not have enough zoom for close-ups. Android phones tend to have more exposure controls than the iPhone. There are also apps that allow you to have more precise control and those might be worth investigating if you don't get good results with the camera app that came with the phone.

If your cellphone is an older model with only one lens/camera on the back, then you will be limited to wide-field photography. Take shots during the day. At night your photos will result in overexposed white Moon blobs. Older phones, in most cases, won't allow you to make the adjustments needed to bring down the exposure of the Moon. If you have an Android phone, you may be able to make adjustments more easily than iPhones, but it is still better to try daytime and wide-field.

If your phone is newer and has dual cameras or more, then there should be a zoom function (5x, 10x) that will allow you to take close-ups in addition to the wide-field shots. The zoom on a phone is not actually a telephoto lens, so don't expect the image quality or the level of zoom to equal that of a professional camera and lens. In many cases, the lens on the phone will offer lower resolution with the zoom camera lens. For example, on the iPhone 15 Pro Max, the standard camera is 48MP, but the telephoto lens is only 12MP.

Stick to optical zoom even if there is an option for digital zoom. Digital zoom crops a part of the image and then interprets what it thinks should be there and adds pixels to fill the gaps, resulting in loss of sharpness.

Start by zooming in on the Moon. It will be very bright and look undefined.

On most phone cameras you will touch the screen to focus on the Moon and a yellow box with a slider will appear. Slide down. This will reduce the brightness of the Moon. As the brightness decreases, the Moon's features should start to appear. Take the photo.

On an Android phone, your camera app may have exposure controls. Set the aperture to open/wide. Reduce the ISO to the lowest value. Check shutter speed. It should be

1/60 second or faster. Take the photo. If it is too bright, choose a faster shutter speed or close the aperture a little.

Depending on level of zoom on your phone, your photo may look like some of the images in this article. However, if the image quality is poor or your phone won't allow you the flexibility to adjust exposure, then stick to daytime moon photos with other elements in the composition until you can invest in other equipment.

Point-and-shoot cameras, bridge cameras, and interchangeable lens cameras will all have one or more controls for exposure. Familiarize yourself with image formats, manual camera mode, ISO (and Auto ISO), aperture, shutter speed, exposure bracketing, auto and manual focus, focus points, image stabilization controls (in camera or lens, or both), mirror lock up (only on some cameras), metering modes, and electronic front curtain shutter or exposure delay (only on some cameras).

If your camera will let you shoot in RAW file format, then select that option. This format stores all the camera data so that you have greater flexibility in editing later, including fixing white balance.

If your camera has a mirror lock up, exposure delay, or electronic front curtain shutter, then enable these functions to reduce camera shake.

If your camera has a remote trigger or a delay timer, set those up. These will also reduce camera shake.

If your camera and/or lens has image stabilization, turn it off if you are using a tripod. Leave it on when you are hand-held. It might seem counter-intuitive to ever turn it off, but the image stabilizer uses tiny motors or gyros to stabilize your handheld shots. When you are on a tripod, you don't need that function and the movement of the motor or gyro can actually cause camera shake.

Set your camera to manual mode. In manual mode, you will be fully responsible for setting exposure. The camera will not make any selections for you. Be sure to turn Auto ISO off.

The starting rule for Moon photos is "Looney 11." While it may work right off the bat, it is just a starting point and more often than not, it will need adjustments. The rule is as follows:

- Use manual mode

- Set the aperture to f/11 (Looney 11)

- Set the shutter speed and ISO at matching values.

- Example: aperture f/11, ISO 100, shutter speed 1/100



If it is too bright, adjust to a faster shutter speed such as 1/200 or 1/250. If it is too dark, increase the ISO to 200 or 400 or open the aperture to f/8 or f/5.6. Don't slow the shutter speed too much, especially with telephoto lenses, or the image will show the movement of the Moon. A shutter speed of 1/00 – 1/125 is the slowest I would recommend before you can get motion blur. The Moon moves faster than it seems – 2,288 miles per hour!

These settings are just a starting point. In actual practice, an aperture of f/8 or even f/5.6 may work better, especially if you are using a teleconverter. This lets in more light so you can then use a faster shutter speed. In some circumstances, you may have to adjust ISO higher, especially with the crescent moon or special circumstances like a lunar eclipse where there is less light. The key is to understand a bit about exposure and each of the factors so you can balance them appropriately.

Generally speaking, these are some basic rules:

- Don't use extremes of aperture

- Lower ISO is better, but use high ISO if needed to get faster shutter speed

- Shutter speed should be no slower than 1/125, or follow the 500 rule below

The Moon and stars are in constant motion. The 500 rule is a quick math calculation you can use to determine the slowest shutter speed before you start to have light trails

and motion blur. If you want the stars to be points of light, divide the focal length of the lens into 500. For a crop sensor camera, calculate with the crop factor first. If you have a 50mm lens, then divide 500 by 50 and you get 10 seconds. After 10 seconds of exposure time (shutter speed) you will see blur and light trails. The time gets shorter when you are using a telephoto lens. If you have a 500mm lens, then the equation is 500 divided by 500, which is 1 second. You can have a 1 second exposure time before you have blur and light trails. If the 500mm lens is on a crop sensor camera, then we have to multiply by the crop factor first. On Canon that is $1.6 \times 500 = 800$, then we divide into 500. So 500 divided by 800 is .625 of a second, just a little more than a half-second.

Because the sunlight reflecting off the moon is not even, you may end up with areas that are overexposed even if the overall exposure is fairly good. In this case, you can take an exposure bracket of 3 images. These can later be merged in editing. If merging photos is too complicated or you don't have post-processing software, then slightly underexposing is often a better option than overexposing when you can only take one shot.

Set up your metering mode and focus point(s). You will want your metering mode set to spot metering. This means the camera reads the light and provides information about exposure using one point. As a beginner, it is best to set that point in the center.

If you will be trying to use autofocus, do the same for focus points. Set the focus mode to point and place the point in the center. When taking your photos, put the center point over the Moon. Once you have practice, you can move the point(s) to different places if you want to try different compositions. In most cases, manual focus will be better than auto focus. Focus points will not matter in manual focus because you are setting the focus.

Try focusing on the Moon with autofocus. If that works, then turn autofocus off and put a piece of tape on the focus ring to keep it locked. You don't want to accidentally move it and you don't want the camera trying to re-establish focus every time you take a shot. When you focus on the Moon, this should place the focus at "infinity" and there are usually infinity markings on the lens. It is not recommended that you turn the lens all the way to infinity without confirming that it is properly focused at that point. Some lenses have a little bit of play at that point and infinity may be out of focus.

You can also view the Moon on your LCD (on some cameras this is the only option and some have to have Live View turned on) and use the magnify button to maximize the view and then try autofocus. You can make further tiny adjustments in manual focus (be sure to turn autofocus off if you decide to use manual focus) if needed. If autofocus will not work on the center of the Moon, try putting the focus point on the edge of the Moon or along the transition line where the area of the Moon goes from light to shadow. If autofocus will not work at all, turn it off and manually focus.

If the LCD is showing the Moon as overexposed, it may have trouble focusing. Set your exposure and darken the image by choosing a faster shutter speed. Some cameras have a function that increases exposure automatically. If your camera has that exposure boost mode or exposure simulation, be sure to turn it off in the camera's menus.

Once focus is set with any of these methods, be sure autofocus is off and secure the focus ring so it won't move. Autofocus is turned off in different ways with different cameras – some have a switch on the camera, some have a switch on the lens, and some have settings in a camera menu.

Take a test shot and review the image. Zoom in with the magnify button. Check the Moon is sharp and adjust the shutter speed faster if needed. Be sure to use the camera self-timer or your remote trigger.

Review your histogram to make sure you don't have any clipping in the highlights from overexposure. If your camera has overexposure warnings, or highlight alerts with "blinks" or color overlays, be sure to have those turned on. Adjust exposure as needed.

Now you should be ready to take some photos!



Take Your Photos!

All the technical details may seem overwhelming. Do your best and know that there are many different possible combinations that might work. Therefore it is important to adjust and make changes to settings as you go.

A good time to photograph the Moon with a landscape is right before sunrise or right after sunset. At these times of day it is possible to get good and proper exposure of both the Moon and the landscape at the same time. Set the exposure for the landscape. At sunset, as it gets darker and darker, you have to continue to increase your exposure. At some point the Moon will become overexposed. If you have a graduated ND filter you can take additional shots during this time (place the ND part over the sky to darken the Moon).

Another option for photos of the Moon within a landscape is to take a series of shots that are then blended later in editing. You can use exposure bracketing, but this may not provide enough range. A better option may be to take photos before sunset with the landscape properly exposed and the moon overexposed, and then after sunset take photos of the Moon properly exposed and the landscape underexposed. These are then combined in a program like Photoshop or Lightroom.

For close-ups, apertures between $f/5$ – $f/11$ and shutter speeds of $1/125$ to $1/500$ should result in a clear image. Of course, there are exceptions such as Supermoons when the Moon is brighter, or a lunar eclipse where the Moon is darker. These both require adjustments in exposure values. Using a teleconverter will require changes to settings to increase exposure (teleconverters let in less light). Phases of the Moon that are darker, like the crescent, will require adjustments to increase exposure.



Don't be afraid to take lots of photos! The great thing about digital is there is not really a "waste" to using the product like there was back in the days of film. If you only had 24 exposures on a roll you might have to be conservative. Today we use memory cards that can hold hundreds of images, so take plenty! Just be sure to analyze them and do some editing practice with them so you learn from work you did.

In the next section, we will briefly discuss some of the challenges and steps for photographing a lunar eclipse. Then we will finish up with some post-processing and editing tips.

Lunar Eclipse Photography

To photograph a lunar eclipse you will need all the knowledge and skill you have accumulated through practicing standard Moon photography. A lunar eclipse will require constant adjustments to settings throughout the entire event.

You will need to have a solid grasp of camera settings and exposure. The type of equipment you use is more important. You don't need any additional gear, but some pieces of equipment can make the process easier and your images better. I suggest you wait to invest in these until you know you love the genre.

1. An intervalometer (or camera with one built in) – Set intervals to take time lapse photos or a series of images a few seconds apart while also preventing camera shake
2. A quality telephoto lens and/or a teleconverter – Get closer shots and better image quality than basic lenses
3. An equatorial tracker – Tracks the Moon (or other celestial bodies like the Milky Way) without having to reposition the camera and allows you to use longer shutter speeds and keep ISO low
4. A better camera – A camera that can handle high ISO levels so you can use faster shutter speeds and still have enough light

If you are going to buy gear and have to choose between a better lens, a better camera, or a tracker, I would recommend the tracker. It gives you the same benefits for your exposures and eliminates having to recompose your shots all the time. An eclipse is 4 hours longer (give or take); that's a lot of moving the camera around. A tracker is usually less expensive too!

First thing you have to decide is whether you want to photograph the entire eclipse in stages so you have the whole sequence, or just the time during totality. The entire sequence will take several hours. It can be great practice and can result in some wonderful images.



Preparation for a lunar eclipse is essential. Use an app or website like those already discussed to find out exactly where the Moon will be located and to get a good idea of the track it will follow across the sky that night. Keep an eye on the weather. It might be a good idea to have more than one location scoped out in advance.

While an aperture of f/11 can work for regular Moon photos, with an eclipse you will be working with a lot less light. Set the aperture at f/8 or f/6.3. Start with an ISO of 100 or 200 and a shutter speed of 1/250th of a second. The darker half of the Moon will not be visible or only slightly visible. You have to balance the exposure so that the bright parts of the Moon do not get overexposed or you will lose all detail in the image.

As the eclipse continues, the aperture can be opened wider to f/5.6 or f/4 if your lens allows an aperture this wide. Many long telephoto zoom lenses have a variable aperture and when extended the maximum may be f/5.6 or narrower. The alternative is to increase the ISO. You don't want to adjust the shutter speed slower unless you absolutely have to, because as already explained, this may result in blurring.

Unlike wide-field photos of the Moon where you can create a bracket, blending multiple exposures of an eclipse will likely look very fake. Your best option is to expose for the bright areas during the beginning and end phases of the eclipse, then expose for the shadows while the Moon is nearly at or in totality.

If your camera has Auto ISO, you can turn this function on. The camera will select the ISO it needs. This means you can focus entirely on aperture and shutter speed and tracking the Moon.

In my experience, my first shots at the start of the eclipse were f/8, ISO 100, 1/250th of a second. In the shot on the right, when the eclipse was partial, they were f/6.3, ISO 400, and 1/250th. This is a change of almost 3 stops of light. One stop is half the light of the previous one. Think of it this way, if at the start of a photoshoot I had 100 lightbulbs, by this time in the process I would only have about 12-15 lightbulbs.



When the eclipse reached totality, my settings were f/6.3, ISO 6400 and a shutter speed of .6 seconds. This is another 5 stops of light. In lightbulbs, I would only have 1/2 of a lightbulb – in other words, a very dim light. You will be working in almost complete darkness. You will need to be comfortable with your camera and how to adjust settings without light!

As you track the Moon, it can be helpful to frame the moon in the left side/corner of the frame and let it move across to the right. As it gets to the far side, reposition with the Moon on the left again. As it crosses the sky it will also move slightly diagonally. An app like Stellarium can help you visualize this movement from your location.



Most of the other tips provided in previous sections still apply such as using the LCD to zoom in to check focus, using manual focus, etc.

Lunar eclipse photos will be very difficult and will likely not come out well with only a smartphone. Some smartphones have long exposure options, but with this you are almost certainly going to see motion blur. Use a tripod and if your phone's camera or camera app has exposure controls, be sure to use them. Bridge cameras and point-and-shoot cameras may work to photograph a lunar eclipse. You will need to be able to have some control over the exposure functions for it to work.

One final suggestion, if you want your image to show stars with the Moon, then shoot the stars separately and combine that image with one of the Moon. You can even use a wider-angle lens for longer shutter speeds to get brighter stars.

Now onto editing and post-processing!

Post-Processing & Editing Techniques

If you've taken the time to plan out a shot, you should take the time to post-process. Moon photos can look flat and not very dynamic, especially if you shoot in RAW format. RAW format images are supposed to be edited. There are several changes to an image that can help your Moon photo look sharp and bring out its features (example below is unedited on the left and some editing completed on the right).

In Lightroom, go way down near the bottom to Lens Corrections and remove chromatic aberration and enable lens corrections. Then you can start with editing. Select a camera profile and then adjust white balance. If the Moon is too blue, move the temperature slider to the right. If the Moon is too yellow/orange, move the slider to the left. Next move onto highlights, shadows, and contrast. Increase contrast, but don't overdo it. Same for bringing down highlights and lifting shadows – too much adjustment will make the image look flat. If you need to increase contrast even further, you can increase whites and decrease blacks. Add anywhere between +5 to +10 on Texture, Clarity and Dehaze. Drop down to the details menu and add some sharpening. You can use the masking (ALT) to apply the sharpening only to the edges. You can make adjustments to radius, detail, and amount until you are satisfied. Remove noise using Denoise if needed.

In Photoshop, you can open the image in the Camera RAW filter and complete these same steps. If you have a program like Topaz Labs' DeNoise you can use that to remove noise from images with high ISO. In some cases, programs like these can work more effectively on an image than Lightroom or Photoshop.



If you are choosing to make a composite photo, be careful they don't come out looking artificial. For example, if you copy and paste a huge Moon onto a landscape, it will not look realistic (example below). The hardest part of making a composite or blended image is making sure the "seam" where the images are blended transitions properly. This means knowing how to use the correct tools – like masking in Photoshop, or HDR merging in Lightroom. There are many online tutorials and YouTube videos that can teach you how to make composites. I recommend The Photoshop Training Channel, PLEARN, and Photoshop Café as good places to start learning editing techniques and all about the tools available. Once a year there is a free online conference for Adobe products called AdobeMAX and twice a year private conferences called the Photoshop Summit and Lightroom Summit are held online. Lightroom and Photoshop are the industry standards; however, other editing software programs are available, and they should have similar tools. The basic techniques and editing steps will be almost the same.



Printing and Sharing!

This is the exciting part! Too many people take photos and they only “live” in on their computer, they never get printed or shared. If you have taken a photo of the Moon and you are proud of it – regardless of how crisp or good or bad the composition is – be sure to print a copy. Put your achievement up on the fridge or on your desk shelf so you can see it from time to time. Post it on social media and show it off to your friends.

If you have a spectacular shot, be sure to print it with a reputable and professional print lab. They cost more, but the resulting print will be far better looking than the corner pharmacy or office supply store printer.



When you have discovered you love astrophotography, join an online group on social media where you can share and learn from others. Share your photos and listen to the suggestions for improvement.

You can also find astrophotography and astronomy groups that meet up at night for star watching and other celestial events.

The Takeaway...

Photographing the Moon can be both a rewarding and educational experience. While it may seem challenging at first, mastering the right techniques, understanding exposure, and familiarizing yourself with your equipment will allow you to capture stunning lunar images. As with any type of photography, practice and patience are key—each attempt will bring you closer to achieving the perfect shot.

By starting with the Moon, you are building essential skills that can be applied to other forms of night photography. Whether you are using a DSLR, mirrorless camera, or even a smartphone, the knowledge you’ve gained in this guide will help you refine your approach and continue growing as a photographer.

So, get out there, experiment, and enjoy the process of capturing our closest celestial neighbor in all its beauty.

A quick “starting point” cheat sheet is found on the next page. You can print this to keep in your camera bag. Now go take some photos!

Basic Cheat Sheet - Photograph the Moon

Use a Camera with a Long Zoom Lens for Close-ups

A camera with a zoom/long focal length lens, 200mm or more

Will work best with an interchangeable lens camera

Use a Wide-Angle Lens for the Moon with Landscape

A camera with a short focal length lens, 18-55mm

Will work with most cameras including smartphones

Compose the image to include other elements such as a landscape, trees, or foreground elements

Set Your Camera to Manual mode

Set ISO to 100

In lower light or special conditions, this will need to be set higher, 200, 400+

Set Aperture to f/11 (based on Looney 11 Rule)

In lower light or special conditions, this will need to be set wider, f/8, f/5.6

Set Shutter Speed to 1/100th (or a speed based on the 500 Rule)

Divide the focal length of the lens into 500 for maximum time

Set Lens to Manual Focus and Focus Manually

Attempt autofocus or use LCD/Live View and magnify to focus manually

Once focused, disable autofocus

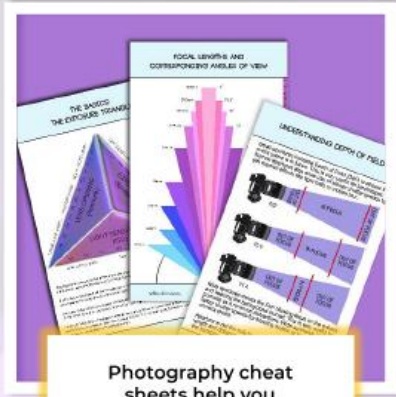
Take test shots and make adjustments as needed



Mega Pixel our Superhero Mascot!

You finished this guide! You're awesome!

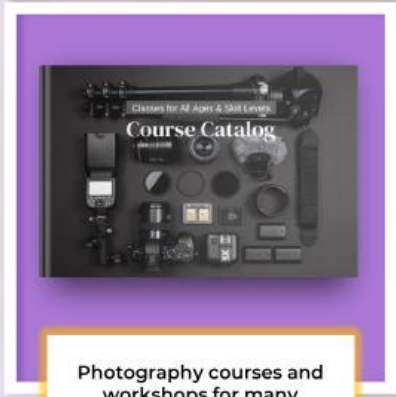
You know what else is awesome? These additional photography resources to help you along your photography journey!



Photography cheat sheets help you understand the basics



Guides and tutorials covering many popular photography topics



Photography courses and workshops for many genres and all skill levels



Want even more? Follow us on Twitter and YouTube @focusedcamera and subscribe to our Newsletter!

FREE E-BOOK



Learn Photography!
www.focusedcamera.net

Our nearest celestial neighbor is a common photography subject. Learn the basics of photographing the Moon with this guide covering the gear you need, camera settings to get started, and an introduction to Moon phases and how to track them to plan your shots. As an introduction to nightscapes and astrophotography, this guide includes a summary cheat sheet and tips for post-processing as well.

