PHOTOGRAPHY 101

POCKET GUIDE

EXPOSURE BASICS, CAMERA SETTINGS, LENS INFO, COMPOSITION TIPS, AND SHOOTING SCENARIOS

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TABLE OF CONTENTS

01 PRE-SHOOT CHECKLIST

Check these settings before you head out with your camera!

SETTING	MY PREFERRED SETTING
Exposure/Shooting Mode	.....
Metering Mode	.....
Exposure Compensation	.....
ISO Setting	.....
Focus Area	.....
Focus Mode	.....
Release/Drive Mode	.....
White Balance	.....
Highlight Warning (Blinkies): On/Off	.....
Noise Reduction	.....
File Format: JPEG, RAW, or RAW+JPEG	.....
Picture Control/Style/Film Simulation	.....
Color Space	.....
Image Stabilization/ Vibration Reduction: On/Off	.....
Battery Fully Charged and In Camera	.....
Memory Card(s) Formatted and In Camera	.....

02 EXPOSURE BASICS

The exposure is the overall amount of light that reaches your camera's sensor for the creation of a photograph. You want just the right amount of light to create a well-exposed image. Too bright? Your photo is overexposed. Too dark? Your photo is underexposed. These are the three settings that control the exposure:

Aperture: The size of the opening in the lens, which controls how much light enters the lens at once.

Shutter speed: Controls the amount of time that the sensor is exposed to light.

ISO: Controls how sensitive the sensor is to light.

In addition to these settings controlling how much light reaches your sensor, each setting also has a very important creative effect, which influences the look of the photo. This is particularly true of aperture and shutter speed.

When creating a photograph, you want to do two things: 1) get the right amount of light onto the camera's sensor to create a good exposure, and 2) achieve the creative look you want.

APERTURE AND DEPTH OF FIELD

The aperture—which is described in terms of f/stops: f/2.8, f/4, f/5.6, etc.—is the opening in the lens that lets light into the camera and onto your sensor. It seems counterintuitive, but:

- The smaller the f/number, the larger the opening. For example, f/2.8 is a wide opening that lets a lot of light into the camera.
- The larger the f/number, the smaller the opening. For example, f/22 is a narrow opening that lets very little light into the camera.

Creative effect: The aperture also controls the *depth of field* in an image, which determines how much of the image is in focus from the foreground to the background. The larger the aperture (such as f/2.8), the shallower the depth of field. Shallow depth of field is often used for portraits. The smaller the aperture (such as f/22), the deeper the depth of field. Deep depth of field is often used in landscape photography.

SHUTTER SPEED AND MOTION

The shutter speed is the amount of time that light reaches the sensor:

- Faster shutter speeds, such as 1/500" or 1/4000", allow less light to reach the sensor.
- Longer shutter speeds, such as 1/15" or 1 second, allow more light to reach the sensor. (Sometimes photographers will use very long shutter speeds of several minutes or even hours.)

Creative effect: Shutter speed controls how motion is shown in the image. The faster the shutter speed, the less time your subject has to move in your scene, and thus the greater the chance that the subject will be frozen in sharp focus. Alternatively, slow shutter speeds can show the motion of the subject as a blurred effect. For example, a fast shutter speed might be used to freeze water droplets, while a slow shutter speed could be used to blur the flowing water of a waterfall, creating a “silky waterfall” look.

ISO AND NOISE

The ISO setting determines how sensitive to light the sensor acts. The higher the ISO setting, the more sensitive the sensor is. At higher ISO settings, digital noise can be introduced into the image. Some photographers consider digital noise as a kind of "creative effect" akin to film's "grain," but for most photographers, this digital noise shows up as unwanted color dots that are best avoided.

Note: Noise can also be introduced during long exposures.

STOPS

In photography, light is measured and referred to in terms of "stops." A one-stop difference in exposure is equivalent to either doubling or halving the amount of light that reaches the sensor. All of the controls discussed here—aperture, shutter speed, and ISO—can be adjusted in increments of one stop (or even in 1/3-stop increments):

- Aperture: f/stop increments of one stop are f/2, f/2.8, f/4, f/5.6, f/8, f/11, f/16, etc.
- Shutter speed: The options for one-stop increments are 1", 1/2", 1/4", 1/8", 1/15", 1/30", 1/60", 1/125", etc.
- ISO: One-stop increments in ISO are 100, 200, 400, 800, 1600, 3200, etc.

As an example, if a photo is overexposed (too much light), you might “stop down” the exposure by one stop by making any one of the following adjustments:

- Aperture: Change from f/2.8 to f/4—letting in half as much light at once.
- Shutter speed: Change from 1/30" to 1/60"—cutting in half the amount of time that light reaches the sensor.
- ISO: Change from 800 to 400—making the sensor half as sensitive to light.

Overexposed by one stop

Exposure corrected by changing aperture from f/2.8 to f/4

03 SETTING UP YOUR CAMERA

EXPOSURE/SHOOTING MODES

The exposure/shooting mode that you choose tells the camera how to help you create the exposure. There are four main exposure/shooting modes to choose from:

Program Auto: The camera determines the exposure by setting the shutter speed and the aperture. The photographer has little control over exposure.

Aperture Priority: *This is the most popular shooting mode, and the most commonly used for most situations.* The photographer sets the aperture, and the camera sets the shutter speed. Best when you want to control the depth of field to either have the subject pop off a blurred background (example: using f/2.8 for a shallow depth of field) or when you need to make sure that all the elements in the image are in focus (example: using f/22 for a deep depth of field).

Shutter Speed Priority: The photographer sets the shutter speed, and the camera picks the aperture. This is best used when you want to make sure that you are controlling how motion is conveyed in the photograph—that it is either frozen

(with a fast shutter speed) or creatively blurred (with a slower shutter speed).

Manual: The photographer picks the shutter speed and the aperture, and the camera doesn't make any decisions. Manual mode is best used when shooting in tricky light where the reading from the camera's built-in light meter might not work to your benefit.

Note: Some cameras have additional modes (such as Scene modes or other Auto modes), but these four modes are the main exposure/shooting modes that all the other modes are based on.

METERING MODES

In order to determine what the camera thinks is the right exposure, it uses a built-in light meter to analyze and measure the light in the scene. This measuring process is called metering, and the metering modes in your camera measure light in different ways. The camera uses this information to determine what it thinks are the proper exposure settings for your photo. These are the three main metering modes:

Evaluative/Matrix: The camera examines the whole scene to determine the exposure. *This is the best setting for most*

photography and is the recommended metering mode for most situations.

Spot: The camera looks at just a small spart of the scene and ignores the rest. This is best when you have large areas around your subject that are either very dark or very bright (such as an actor on a stage), and you do not want the camera to factor these areas into the exposure.

Center-Weighted: The camera analyzes and gives priority to the central, main part of the scene in order to measure the light, and it ignores the outer edges of the scene.

EXPOSURE COMPENSATION

When you are shooting in Program Auto, Aperture Priority, or Shutter Speed Priority mode, the camera is determining at least one of the exposure settings, and sometimes the overall exposure will not be the result you want—the image will be too dark or too bright. The exposure compensation feature allows you to adjust the exposure settings to make the photo lighter (+ [plus] compensation) or darker (– [minus] compensation).

This is a very powerful feature. Most photographers use exposure compensation in coordination with shooting in Aperture Priority or Shutter Speed Priority mode. Most cameras allow exposure compensation settings of up to three or more stops,

in 1/3-stop or one-stop increments. Some cameras allow up to five or more stops of exposure compensation.

Note: When shooting in Manual mode, exposure compensation is unavailable—to make the overall exposure brighter or darker, you simply change the aperture, shutter speed, or ISO yourself.

FOCUS AREA & FOCUS MODES

The focus area refers to what portion of the scene you tell the camera to use to determine focus. Cameras use focus points, either individually or grouped in varying sizes, to allow you to pick the critical area in the image to focus on.

The focus mode is the method that the camera uses to achieve focus. The main focus modes are:

Single Shot Auto Focus: *The most commonly used mode for most situations.* The camera focuses until the focus is achieved, then the focus is locked and doesn't change again until you either take the photo or remove pressure from the shutter release button. Best used for stationary subjects.

Continuous Auto Focus: The camera keeps focusing right up to the point when the photo is taken. Best used for moving subjects. (This mode is also sometimes called "Servo" mode.)

Manual Focus: You rotate the lens barrel's focus ring to focus the lens. Best used when the autofocus modes are not focusing on the exact area you want them to.

RELEASE/DRIVE MODES

The release/drive mode determines how the camera captures photographs when you press the shutter release button:

Single Release: *The most commonly used method for most situations.* The camera takes a single image every time the shutter release button is pressed all the way down.

Continuous Release: The camera keeps taking photos as long as the shutter button is pressed all the way down (and there is enough memory in the buffer and on the memory card).

Self-Timer: The camera takes a photo after a predetermined amount of time passes after the shutter release is pressed all the way down. Many cameras offer a 2-second and 10-second self-timer.

Bulb: The shutter will stay open as long as the shutter release is pressed down. On some cameras, you can press the shutter release once to start the exposure and a second time to end it. You can also often control the shutter release with a cable release or via WiFi and an app.

WHITE BALANCE

White balance (WB) helps render colors accurately by using the correct profile for the light in your scene. Select the white balance based on the type of lighting illuminating the scene, and the colors will be more accurate and truer to life. The **Auto WB** setting is the best place to start. If you are shooting under mixed lighting, use the Custom WB setting on your camera for the best results.

HIGHLIGHT WARNING ("BLINKIES")

When reviewing an image on the LCD, areas that are pure white—so bright that they are "blown out" and hold no detail—can be shown to blink, letting the photographer know instantly that these areas have no image data in them other than pure white. If you want to bring back detail in that area, you can use the exposure compensation feature to dial down the exposure.

NOISE REDUCTION

Digital noise can be introduced when you use a very high ISO or leave the shutter open for a very long time. Use **High ISO Noise Reduction** and **Long Exposure Noise Reduction** to minimize the noise in your images, but know that the noise

reduction features can lead to some loss of sharpness in the image and can take longer for each photo to be processed by the camera.

RAW FILE FORMATS AND FILE SIZES

File formats

Cameras allow you to save the image file as either a RAW file or a JPEG file (some cameras allow you to save both at the same time).

RAW file: This file contains all the image data from the sensor. The RAW file will need to be processed before it can be used. If you want to edit the image later, this file will contain all the possible data, making it a better choice. Shooting in RAW requires post-processing, but it gives you the most amount of information and control over your image.

JPEG file: A JPEG can be used immediately but not all the image data is saved, so editing it later could be problematic. It is also a smaller file than the RAW so more images can be saved to a memory card. A JPEG file often looks better than a RAW file right out of the camera because the camera has processed the image; however, you lose a lot of information and control.

In short, if you want a better image right out of the camera, shoot in JPEG. If you want ultimate control of the image for post-processing later, shoot in RAW.

File sizes

Options include Small, Medium, and Large, along with a Normal or Fine compression option for each. Normal is good quality, while Fine is a higher quality.

PICTURE CONTROLS/STYLES/FILM SIMULATIONS

These settings (the name of which varies depending on the camera brand) offer different "looks" that the camera will apply to the image, from simulating classic film looks to options such as Portrait, Landscape, and Black and White/Monochrome, which optimize the image for typical colors, desired sharpness, contrast levels, etc., in different situations.

COLOR SPACES

There are two color space options to choose from:

sRGB is best when the photo is going to be used directly from the camera.

AdobeRGB is best when the image will be edited later.

Note: RAW files can have their color space changed later during processing.

IMAGE STABILIZATION/VIBRATION REDUCTION

On either your camera or your lens (or both), you may have the option to turn on the image stabilization feature. Turn this feature on when hand-holding your camera to help ensure a sharp image, especially when shooting at slower shutter speeds (such as 1/30" or slower).

Note: When shooting on a tripod, turn off the image stabilization feature, as it may actually cause motion blur as the feature “seeks” movement to stabilize.

RESET CAMERA

When all else fails and you can’t figure out how to reset or change a certain feature, reset the camera to its default factory settings and start fresh.

04 LENSES AND FOCAL LENGTH

In addition to your choices of aperture and/or shutter speed, the other factor that has a massive influence on the look of your photo is your choice of lens—more specifically, your choice of focal length.

FOCAL LENGTHS

The focal length of a lens is described in millimeters (mm) and measures the distance from the optical center of the lens to the camera's sensor. The focal length determines the angle of view of the lens. The smaller the number, the wider the angle of view.

Ultra Wide Angle: Lenses with a focal length of 24mm or less.

Wide Angle: Lenses with a focal length of 24mm to 35mm.

Standard: Lenses with a focal length of 35mm to 70mm.

Telephoto: Lenses with a focal length between 70mm and 300mm.

Super Telephoto: Lenses with a focal length of more than 300mm.

24mm

40mm

75mm

120mm

200mm

300mm

Prime lenses have a single, nonadjustable focal length (such as a 50mm lens) while **zoom lenses** cover a range of focal lengths (such as a 70–200mm lens).

Your choice of lens depends on the subject matter and how you want to capture it. This is not a hard and fast rule by any means, but landscape photography is often captured with ultra wide angle and wide angle lenses, while portraits are often captured with standard and telephoto lenses. Your choice of focal length can have a dramatic effect on how the subject is rendered in a photo. See "Lens Compression and Distortion" on page 22.

CONSTANT APERTURE LENSES AND VARIABLE APERTURE LENSES

Constant aperture lenses have the same maximum aperture no matter what focal length is used. A constant aperture lens may be described as "70–200mm f/2.8," for example.

Variable aperture lenses are zoom lenses that have a different maximum aperture depending on the focal length being used. These lenses are described by showing the focal length range, followed by the maximum aperture range, such as "55–250mm f/4–5.6." As the lens zooms in, the maximum aperture gets smaller automatically, which will change the depth of field and the exposure.

LENS COMPRESSION AND DISTORTION

Just as the tools of exposure (aperture, shutter speed, and ISO) have both a technical purpose and creative effect, the focal length behaves similarly. Your choice of lens and focal length can greatly impact not just how the subject looks, but how the subject is shown in relationship to the background and foreground.

24mm (wide angle)

200mm (telephoto)

A wide angle lens includes more of the scene, and it also "spreads out" the elements in the scene to make them look further apart. It also has the effect of distorting subjects that

are very close to the camera. Wide angle lenses are typically good for landscape photography but are often not a great choice for portrait photography.

A telephoto lens, on the other hand, compresses the scene and makes it seem like the background is much closer to the subject. This quality of “compression” is also considered very flattering for portrait photography.

You can use longer focal lengths (85mm or more) to isolate your subject from their surroundings and, especially when combined with a shallow depth of field (via a large aperture such as f/2.8), the background will blur and your subject will stand out.

FOCAL LENGTH, CAMERA SHAKE, AND SHUTTER SPEED

The longer the focal length, the faster the shutter speed should be to avoid camera shake that can blur your image, making it appear soft or out of focus. The guideline to use is that your shutter speed should be equal to 1/focal length. For example, using a 200mm lens requires a minimum shutter speed of 1/200".

Note: If you’re hand-holding your camera, remember to turn on the Image Stabilization/Vibration Reduction feature, if possible.

05 ADVANCED SHOOTING TECHNIQUES

AUTO ISO

Auto ISO allows the camera to automatically adjust the ISO between a set of predetermined values (such as ISO 100–6400) to help you achieve the proper exposure. You also set a minimum shutter speed for the camera to use. When shooting in Aperture Priority mode, this allows you to select the aperture you want, and then the camera will select the shutter speed *and* adjust the ISO so that the exposure is correct and your shutter speed doesn't drop so low that you have a blurry picture.

BACK BUTTON FOCUS

The default is to have the camera begin focusing when the shutter release button is pressed halfway down. This ties the focusing operation to taking the picture. But on many cameras, you can separate these functions by assigning focus operation to a different button—such as one of the back buttons on the camera. This allows you to start and stop focusing separately from taking the photo. Back button focus is often used by sports photographers who need to stop and start focusing as players and officials run through their frame, but many photographers prefer this setup for all of their photography.

FOCUS AND COMPOSITION

There are two main methods you can use to achieve sharp focus when using autofocus with one single focus point:

Focus and recompose: *The most common method.* When shooting most stationary subjects with Single Shot autofocus, you can place the single focus point over the subject, achieve focus (by either pressing and holding the shutter button halfway down or using the back button focus method), and then recompose your image and take the shot.

Move the focus point: Many cameras now have a very large number of focus points that cover the majority of the frame, which allows you to compose the scene first, then move the focus point so it is directly over the most critical area in the image (such as the eye of a portrait subject), and then take the shot.

EXPOSURE BRACKETING/HDR PHOTOGRAPHY

Bracketing is a technique where you take a series of images with a set exposure difference (such as one or two stops) between each photo. This allows you to capture all the available photographic data in a scene—including details in both highlights and shadows—and then combine them (sometimes

in the camera, but mostly in software such as Adobe Lightroom) to create a high-dynamic range (HDR) image.

USING THE HISTOGRAM

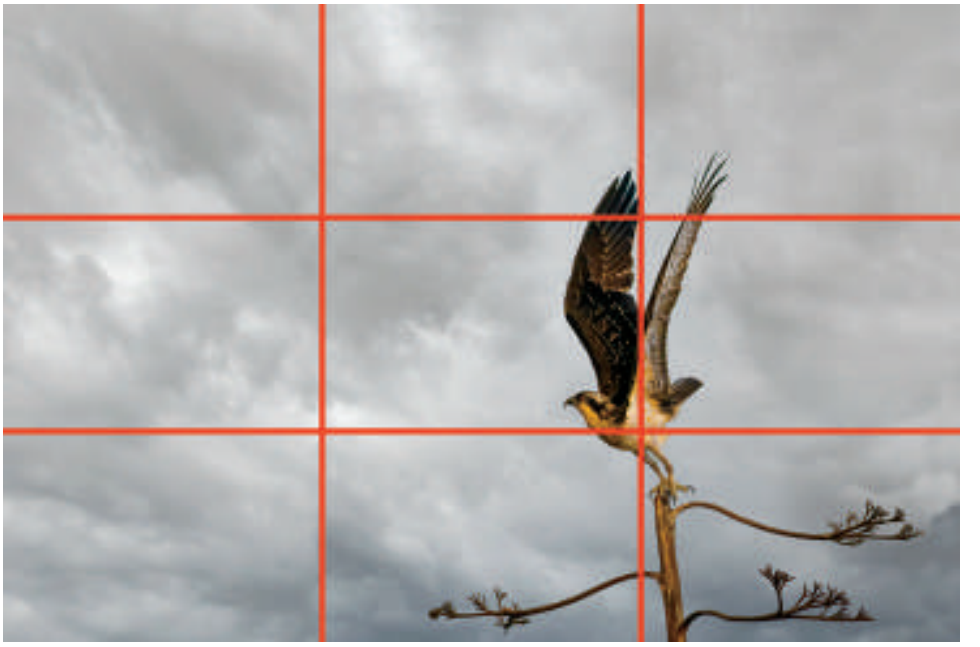
A histogram is a graphical representation showing the distribution of tones in your image. The left side of the histogram represents the shadows and dark areas, while the right side represents the highlights and bright areas. Any data that is pure black (on the left of the graph) or pure white (on the right of the graph) is usually unwanted. You can use the histogram as a guide to help you gauge your exposure.

Some photographers also use the histogram when shooting to employ a technique called "expose to the right" (ETTR)—where you expose your image to push the peaks in the histogram as close to the right edge as possible without actually hitting the right edge. Then you can adjust the exposure later with post-processing software to adjust the bright areas. This helps you create a robust RAW file and achieve the widest dynamic range in the image.

06 COMPOSITION TIPS

RULE OF THIRDS

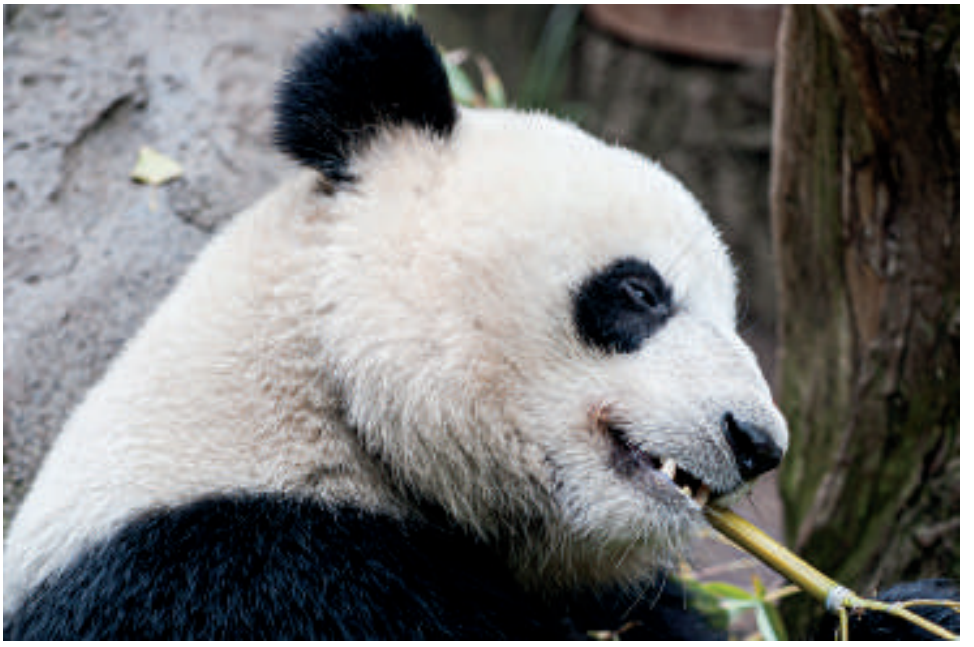
Divide the scene with two equally spaced vertical lines and two equally spaced horizontal lines, then place the subject where the lines intersect. Many cameras allow you to superimpose a rule-of-thirds grid in your viewfinder or LCD screen. For landscape photography, try placing the horizon line at the top or bottom third of the frame (one of the “rule of thirds” horizontal lines). For portrait photography, try aligning the eyes with the top third of the frame.



Note: Of course, all rules are meant to be broken! Sometimes a great photograph will show the subject in the middle of the frame (often called "bull's eye" framing). The rule of thirds is not so much a "rule" as a guide. Just remember: *you* decide where the subject goes in your frame.

FILL THE FRAME

Get in close and make the subject a significant part of the whole frame.



NEGATIVE SPACE

While you should “fill the frame” (see previous page) so it’s clear what your subject is, you can also balance that by leaving some room for the subject to “breathe” in your photo. A practical example: If your subject is moving or looking in a certain direction, leave space in front of them in your composition.

LEADING LINES

Look for lines that naturally occur in the scene, and then use them to direct the viewer's eye to the subject. Leading lines can be actual lines (such as a road) or an implied line (such as a row of trees).

PATTERNS AND REPETITION

Patterns draw the eye in a photograph, and repetition of the item, shape, or color can create a pleasing symmetry. You can also deliberately interrupt that pattern to create even more impact.

FRAME WITHIN A FRAME

Use a visual element in your scene, such as a window, door, or archway to frame your subject. Make sure that the framing device is clear of distractions and doesn't have any elements that could lead the eye out of the frame.

POINT OF VIEW

The placement of the camera in relation to the subject can drastically change the way the photo is viewed. Go low or high to change the relationship of the subject to the background. Try different shooting positions! Don't just shoot everything at your own eye level.

COLOR

Use color to grab the viewer's attention. You can also look for situations with complementary colors—such as yellow and blue, or red and green. Ask yourself if the color itself is the subject of the image. For example, in the photo below, would the blue wall and yellow window box have the same impact if they were not this colorful?

BLACK AND WHITE

When your subject matter is heavily textured or your scene contains strong graphical elements, try black and white for a powerful impression. Sometimes a photo can become stronger by removing the color.

WATCH THE BACKGROUND

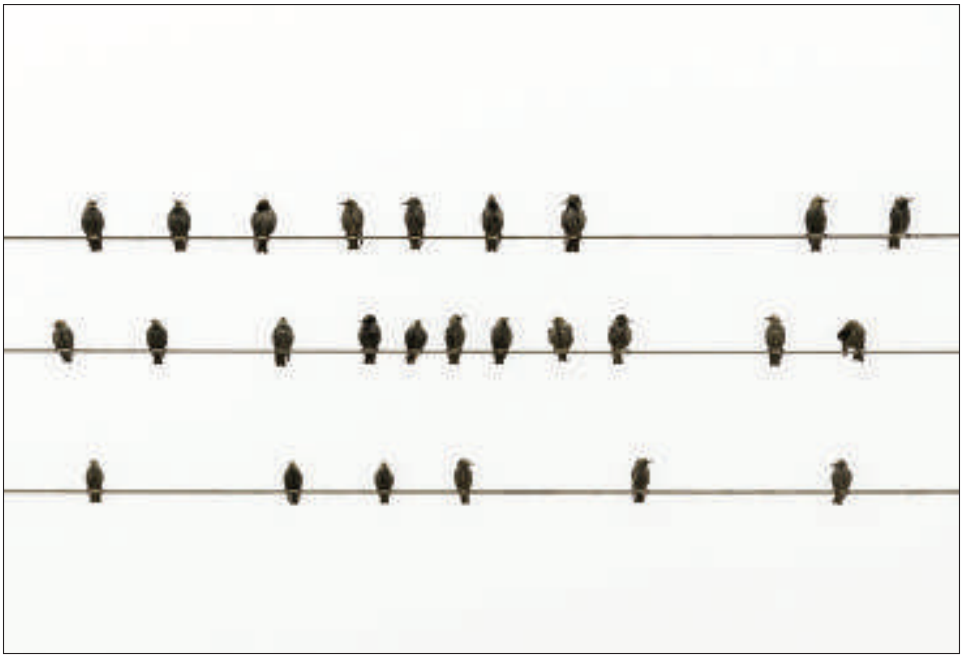
Avoid items in the background that could detract from or interact negatively with the subject. The classic example is a distracting element in the background (such as a tree limb) emerging from a portrait subject's head.

Bad background

Clean background

SIMPLIFY

The strongest compositions are often simple. Look for different ways to compose your image using all the tools at your disposal, including your point of view, choice of focal length, depth of field, and shutter speed.



FIND GREAT LIGHT

This may sound obvious, but great light makes a big difference in your photos. Pay attention to the light. When the light is wonderful, you have automatically improved your chances of getting a great shot.

07 TYPICAL SHOOTING SCENARIOS

SHOOTING SCENARIO
PORTRAIT

KEY PRINCIPLES

- The key to a portrait like this is shallow depth of field. So, shoot in **APERTURE PRIORITY** mode and start with the lowest aperture your lens offers (such as **f/2.8 or f/4**).
- Remember to **focus on the eyes**.
- If the image is too dark or too light, use **EXPOSURE COMPENSATION** to adjust the brightness level.

- If the image is blurry from a slow shutter speed, **raise the ISO** to increase your sensor's sensitivity to light, thus allowing for a faster shutter speed.
- Remember to use a **focal length of 50mm or greater** so that you don't distort your subject's face.

SHOOTING SCENARIO
GROUP PORTRAIT

KEY PRINCIPLES

- In order to get everyone in focus, you need a deep depth of field. So, shoot in **APERTURE PRIORITY** mode and set the aperture between **f/8–f/16**.
- **Focus on the person in the middle of the group.** If possible, check focus by zooming in on the LCD monitor to view at 100% and check faces in the front and back rows. If anyone is out of focus, use a smaller aperture for deeper depth of field.
- Use **EVALUATIVE/MATRIX** metering to account for the light in the entire scene.
- **Arrange the group so they can all see you** (and you can see them).
- Use **EXPOSURE COMPENSATION** if the image is too bright or too dark.
- If image is blurry, **raise the ISO** to allow the camera to use a faster shutter speed.

SHOOTING SCENARIO

LANDSCAPE

KEY PRINCIPLES

- Shoot in **APERTURE PRIORITY** mode to control depth of field and start with **f/16** to ensure deep depth of field.
- **Use a tripod** to eliminate camera movement. Whenever your camera is on a tripod, also make sure that the lens or camera's **IMAGE STABILIZATION/VIBRATION REDUCTION** is turned OFF unless there is a specific tripod mode.
- Use **EVALUATIVE/MATRIX** metering mode and **SINGLE SHOT AUTO FOCUS** mode.
- **Set the ISO to a low setting (100–200)** to avoid any digital noise.

- Shoot in **RAW** so that you have the most available information when editing later.
- Consider **BRACKETING** your exposures.

SHOOTING SCENARIO
FREEZE ACTION

KEY PRINCIPLES

- Use **SHUTTER SPEED PRIORITY** mode and set the shutter speed to a value that will freeze the action. The appropriate shutter speed depends on your subject and its movement, but could be anywhere between **1/500"–1/4000"**.

- Use **CONTINUOUS AUTO FOCUS** mode so that the camera keeps focusing as the subject moves.
- If the image is dark or blurry, **raise the ISO or try AUTO ISO** to automatically have the camera adjust the ISO as needed.

SHOOTING SCENARIO
SHOWING MOTION—PANNING

KEY PRINCIPLES

- Shoot in **SHUTTER SPEED PRIORITY** mode and use a slow-enough shutter speed to allow for the subject to move during the exposure.
- **Follow the subject** across the frame as you shoot.

- If your camera has a **LIVE VIEW** mode, try using it so you can see the subject during the exposure
- Use **CONTINUOUS AUTO FOCUS** mode, and keep the focus point on the subject as the subject and camera both move.

SHOOTING SCENARIO
LOW-LIGHT SITUATIONS

KEY PRINCIPLES

- Shoot in **APERTURE PRIORITY** mode and use a wide aperture such as **f/2.8 or f/4**.
- Use **SPOT** metering and meter on the subject's face.

- Use **CONTINUOUS AUTO FOCUS** and a **single autofocus point**.
- **Set the ISO to 1600 or higher**, depending on the amount of available light.
- If the image is blurry, **increase the ISO** to allow for a faster shutter speed.

SHOOTING SCENARIO
LONG EXPOSURE

KEY PRINCIPLES

- Use your camera's **BULB** setting to allow for long exposures.

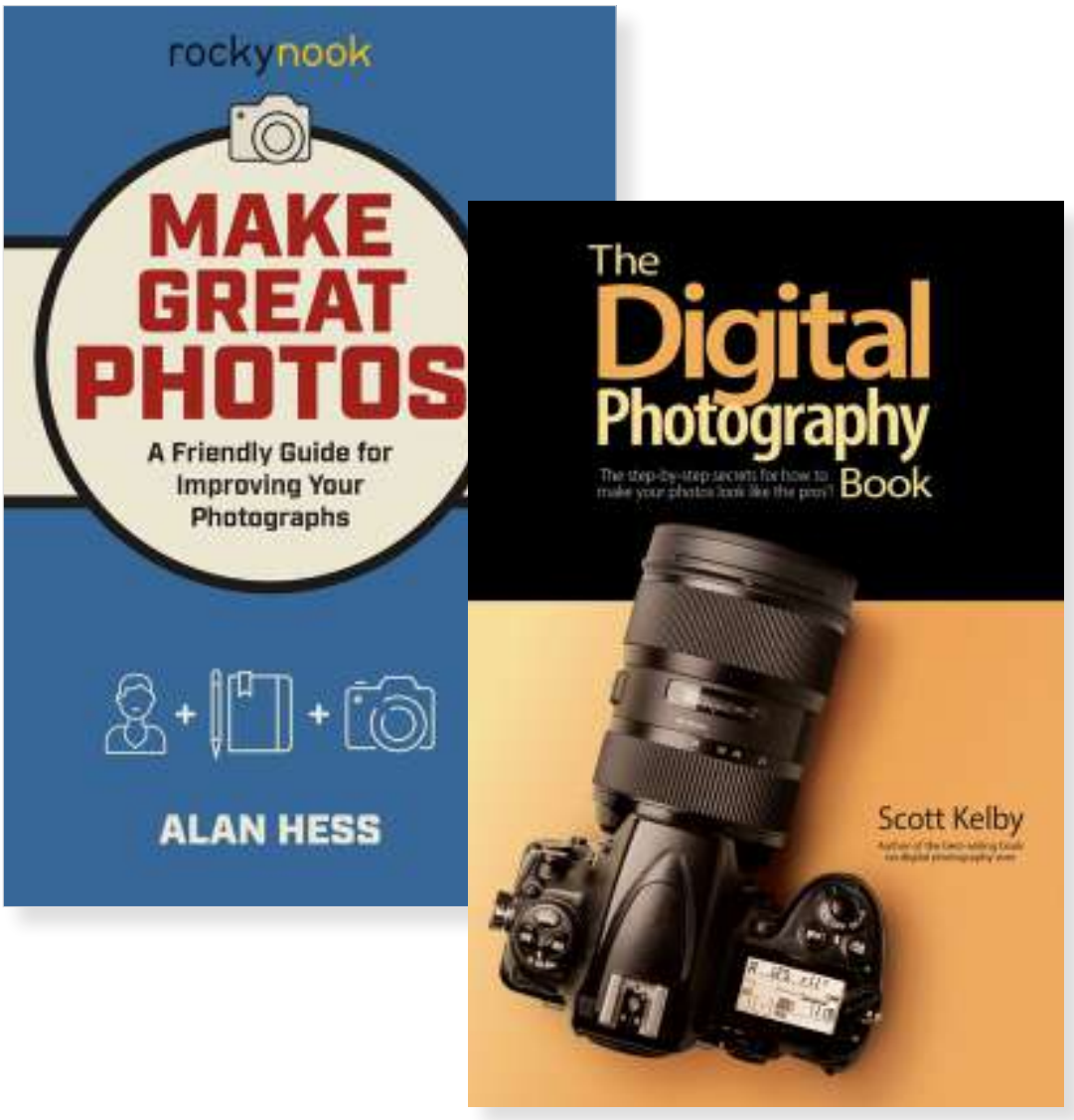
- **Use a tripod** to keep the camera stable. Turn off any **IMAGE STABILIZATION/VIBRATION REDUCTION** feature on your camera or lens.
- Use the **SINGLE SHOT AUTO FOCUS** mode, or try manual focus if the camera is having a hard time locking on focus.
- **Use a low ISO (100–400)** and shoot **RAW** to ensure a high-quality file.
- Consider using a **remote release** (either a cable, a wireless trigger, or an app) to fire the camera without touching it.

SHOOTING SCENARIO
MACRO/CLOSE-UP

KEY PRINCIPLES

- Shoot in **APERTURE PRIORITY** mode and use a small aperture to ensure you achieve enough depth of field. When the camera is so close to the subject, the depth of field can be extremely shallow, so a small aperture helps here (this image was shot at f/13).
- Use **EVALUATIVE/MATRIX** metering to analyze the light in the entire frame.
- **Use a tripod** to keep the camera steady. Turn off any **IMAGE STABILIZATION/VIBRATION REDUCTION** feature on your camera or lens.
- Try **manual focus** and zoom in to confirm that your focus is tack-sharp.
- Try using a dedicated **macro lens or close-up filters** to make sure you can achieve sharp focus when you are so close to the subject.

WANT TO LEARN MORE ABOUT PHOTOGRAPHY?



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