Digital Photography SUPERGUIDE

GET THE MOST OUT OF YOUR DIGITAL CAMERA AND SMARTPHONE
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Foreword

There’s an old saying in the photography community: “The best camera is the one you have with you.” In the years since we released the fourth edition of our Digital Photography Superguide, smartphones have increasingly become that ubiquitous camera. Indeed, most of today’s smartphone cameras have specs you might have found in a point-and-shoot a few years ago. But whether the camera in your hand is a smartphone or a $1000 DSLR, the focus of this book remains the same: to help you get the most out of your camera.

We firmly believe that to use your equipment properly, you must understand how it works. The vocabulary surrounding photography might sometimes be confounding enough to make any budding shutterbug want to switch to Auto mode. That’s why this new edition of the superguide boasts more how-tos and image comparisons, as well as a glossary explaining even the most arcane terms.

Have you just gotten a DSLR and don’t know where to start? Rest easy. We break down the manual-photography process step by step, with full-color diagrams illustrating aperture, shutter speed, and focus. If you’re more interested in the mobile arena, check out our extensive chapter on taking and editing photographs using the three most popular operating systems for mobile photography: iOS, Android, and Windows Phone 8.

The only surefire way to become a better photographer is experience. Luckily, digital photography allows you to make as many mistakes, cost-free, as your memory card can hold. And as you combine technical knowledge and compositional awareness with lots of practice, you’ll be able to capture moments of brilliance. We hope this book will help you along that journey.

—Lauren Crabbe
San Francisco, February 2013
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Choose a Camera

TIME TO BUY Ready to take the plunge on your first camera? Here’s all you need to know.

Maybe you’re buying your first digital camera. Maybe you’re looking to upgrade to a newer, lighter, or more capable one. But with so many different kinds of cameras at so many different prices, it’s hard to figure out which one you want. You might be tempted to base a buying decision on looks and price alone, but it’s the camera’s features and capabilities that determine whether you have a gadget you love—or one that collects dust on a shelf.

Never fear: TechHive’s experts are here. In this chapter, we’ll go over types of cameras and show you what to look for when comparing them. And to help you make your final decision, we’ll explain which features are essential—and which ones don’t live up to the hype.
Camera Basics

A LOOK INSIDE These are the components of a digital single-lens reflex (DSLR) camera.

When a photographer happens across a scene she decides is worth capturing, she picks up her camera and snaps a photo. Pressing that shutter button exposes the camera's sensor to the light reflecting off objects in the scene. The resulting image looks the way it does based on three major factors—how much light the lens allows through (aperture), how long the sensor is exposed to the light (shutter speed), and how sensitive the sensor is (ISO). Other factors include lens shape and length, color balance, and the amount of natural and artificial light available.

A DSLR camera (pictured above) uses a mirror to reflect the scene in front of your camera up to your device's optical viewfinder. This allows you to see exactly what your lens sees and adjust settings accordingly. The mirror covers the digital sensor while you're framing your picture; when you're ready to capture your scene, pressing the shutter release button simultaneously opens the shutter and hides the mirror, letting the sensor record the scene. The distinct click you hear when snapping a picture with a DSLR comes from the mirror flipping away to reveal the sensor.
Non-DSLRs—like smartphones and compact interchangeable-lens cameras (CILCs)—do not have a mirror system. Instead, the lens goes directly to the sensor, which sends a live preview of the scene to the digital display screen; when you press the digital or physical shutter button, the sensor records the image.

**Common Digital Photography Terms**

When you’re looking for a camera, you may run into strange phrases like “megapixel count” and “pocket mega-zoom.” Here’s a quick rundown of some common terminology found in digital photography (see “Camera Settings” in the “Take Photos” chapter for more definitions).

**APERTURE** The *aperture* is the opening in the lens that allows light to reach the sensor. When the opening is large, it lets in more light (think of how your pupils get bigger in dark places). The larger the opening, the smaller the depth of field becomes.

**BURST RATE** Some cameras use *burst mode* to capture motion or reduce camera shake. In this mode, the camera takes a series of photos in quick succession with the aim of capturing one that is clear. *Burst rate* refers to the number of photos and frequency of capture within one such photo shot. Some cameras save photos at a lower resolution with burst mode than with normal capture.

**COMPACT INTERCHANGEABLE-LENS CAMERA (CILC)** This type of camera can accommodate different lenses instead of just using a single built-in lens, but lacks the mirror and viewfinder of a DSLR.

**DEPTH OF FIELD** Your image’s *depth of field* refers to the thickness of the plane of focus. When the aperture measurement (called an *f-stop*) is small, the depth of field is also small and the plane of focus is thin. When the depth of field is large, the plane of focus is thicker and you can keep more of the subject in focus.

**DIGITAL SINGLE-LENS REFLEX (DSLR)** This type of camera has an optical viewfinder and mirror system that allows you to look directly into the lens when framing your shot. DSLRs are often the biggest of the digital cameras, as they have a somewhat complex mirror setup that requires a bigger body than most. DSLRs also allow you to swap lenses.

**DIGITAL ZOOM** Digital zoom uses software to essentially crop the photo and zoom in on details. This approach results in lower-resolution images than those taken with an optical zoom.

**FIXED-LENS CAMERA** These cameras are often compact and come with a built-in lens. They do not allow for interchangeable lenses.

**FOCAL LENGTH** Often defined in millimeters, the focal length of a lens signifies how far it can zoom.

**F-STOP** While the aperture is the physical opening in the lens, the *f-stop* is the measurement we use to control it.
BY THE NUMBERS These illustrations show two aperture sizes. The smaller the f-number, the larger the aperture, which means more light and less depth of field.

The \( f \) in f-stop stands for fraction—the basic representation of the aperture measurement formula. To calculate your f-stop, take the focal length of your lens and divide by the opening of the aperture (entrance pupil). Say your 35mm lens has a diameter of 12.5mm—the f-stop would be \( f/2.8 \).

To set the diameter, we use a camera’s aperture priority mode or manual mode. (If your camera does not offer either of these modes, you may not be able to adjust your aperture.) Both modes allow you to change your camera’s f-stop, which in turn widens or closes the entrance pupil.

The smaller your f-stop, the wider the entrance pupil becomes. As the diameter increases, the camera sensor gets more light, and your depth of field (how much of the image is in focus) becomes shallower. Shoot with a large f-stop, and your camera’s entrance pupil becomes very small, increasing the depth of field.

**HD VIDEO** Any device that captures video at 720p (1280 by 720 pixels) is considered high definition. Most HDTVs are 720p or 1080p (1920 by 1080 pixels). The quality of HD video capture relies heavily on the camera’s sensor size.

**IMAGE STABILIZATION** This feature reduces the visual effects of handheld camera shake. Lens and sensor hardware can provide image stabilization, or you can apply it digitally by changing a camera’s capture settings.

**MANUAL CONTROLS** Many simple cameras allow you to shoot in automatic or scene modes, which means that the camera’s software analyzes the current picture conditions and adjusts your settings accordingly. Manual controls allow you to manually adjust any of these settings, including aperture, shutter speed, white balance, and focus.
MEGAPIXEL Used to describe the overall size of an image, the megapixel number of a photo refers to the area of pixels in a digital photo. For example, the Nikon D600 can capture images at 6016 by 4016 pixels, making the area of the photo 24,160,256 pixels—or roughly 24 megapixels.

MEGAZOOM These cameras don't have interchangeable lenses, but do offer large optical zoom and some manual controls. Pocket megazooms are compact versions that—you guessed it—fit in a pocket.

NOISE Basically the digital equivalent of film grain, noise results when you have the ISO—which measures your sensor's light sensitivity—set very high in a low-light setting. ISO isn't the only cause of noise, though. Sensor size plays a huge role in noise levels—the larger the sensor, the less noise it will produce.

OPTICAL ZOOM This type of zoom uses the hardware of the lens to get a closer view.

PLANE OF FOCUS Your camera's sensor is mounted to something called a film plane, positioned at a fixed angle. This angle is your camera's plane of focus. You use your lens and camera settings to dictate how much of the image you want your sensor to see. Certain settings allow the entire picture to be in focus, while others let you focus on a specific object in the scene.

SENSOR The sensor in your digital camera converts light to digital signals to create your final image. The larger the sensor, the better the resulting image quality.

SHUTTER SPEED The shutter speed is the length of time that the shutter remains open to expose the sensor to light.

WHITE BALANCE While you're taking your photo, white balance measures the color temperature of the whitest point in your photos and adjusts your image to make it look true to life.

ZOOM The zoom describes the range of the lens from its widest to its tightest view of a scene.
APERTURES IN ACTION  The large aperture (top) has a narrow depth of focus and lets in more light; the smaller aperture (bottom) has a wide depth of focus and lets in less light.
Choose a Type of Camera

The first step in narrowing the field of contenders is to decide which type of camera best suits you. Most digital cameras offer a trade-off between size, flexibility, and image quality; by determining early on what your priorities are, you can quickly home in on the right type of camera for your needs.

Camera Phone

It doesn’t get any simpler than a camera phone. Smartphones—such as the 8-megapixel iPhone 5, 8.7-megapixel Nokia Lumia 920, or 8-megapixel Samsung Galaxy S3—tend to have the latest and greatest small-form fixed lenses and sensors, but the next new thing can quickly leave them in the dust. Many smartphones can also shoot 1080p HD video.
CHAPTER 1  Choose a Camera

**TIP: SENSOR SHOCK**

Some phones have a huge megapixel count. The Nokia 808 PureView has a 41-megapixel sensor (resulting in a 38-megapixel image). This allows you to perform extreme digital zooming without compromising file size, but when viewed at 100 percent, the image quality is no better than that of its 8.7-megapixel counterpart, the Nokia Lumia 920.

Smartphones have several advantages over traditional cameras: You can edit any image you've taken almost instantly using fun and creative apps, share photos with friends over messaging software and social networks, and capture footage in places where lugging around a traditional camera may not always be possible. Additionally, your phone is always in your pocket, so you always have a camera handy when unexpected photo ops come up. Finally, the simplicity of most camera apps on smartphones makes them the ultimate entry-level camera.

**PROS** Always with you; access to in-camera editing apps; built-in Wi-Fi and cell networks allow instant uploading and sharing of images; incredibly easy to use; megapixel quality matches that of low-end point-and-shoot cameras.

**CONS** Lack of control over camera settings; no optical zoom options; poor stabilization; the improved camera features in newer smartphones will quickly outdate those of older models.
CHAPTER 1  Choose a Camera

Advanced Point-and-Shoot

For years, the point-and-shoot camera was a staple of basic digital photography. As smartphones have increasingly edged in on this territory, the concept of a basic point-and-shoot has largely died out, giving way to more-advanced versions with manual controls and extra features. Most advanced point-and-shoots have controls for setting your aperture, shutter, and ISO, letting you fine-tune your image in a much more controlled way than you can with a smartphone camera app.

Although advanced point-and-shoots don't offer the zoom range of a pocket megazoom, they often yield better image quality, and you won't get the distortion you sometimes see with a high-zoom lens. These cameras also often have wider apertures, allowing you to capture a greater depth of field and shoot at higher shutter speeds than with a pocket megazoom.

**PROS** Better image quality than that of most fixed-lens cameras; provide manual control of shutter speed and aperture settings; good learning tool for novice shooters.

**CONS** Smaller optical zoom range than pocket megazooms.
CHAPTER 1  Choose a Camera

SHOULD I GET A BASIC POINT-AND-SHOOT?

With the quality of camera phones rapidly increasing to match that of point-and-shoots, there is no reason to carry a basic compact camera. Most smartphones have at least 8-megapixel sensors and offer an abundance of apps to help you capture and edit your shot. If you prefer carrying a point-and-shoot over relying on a smartphone, look for more-advanced models that offer features such as optical zoom and capture assistance.

Megazoom Point-and-Shoot

These cameras are called megazooms because they offer a whopping 40X to 60X optical zoom lens, serving up impressive wide-angle shots and telephoto-like reach. As you can't change the lens on a megazoom, it doesn't give you as much flexibility as a DSLR or CILC, but it's the most versatile type of single-lens camera on the market.

Most megazooms offer manual controls for aperture and shutter, as well as good image-stabilization software to help you steady those full-zoom shots. These are great cameras for landscape photography, as they can capture both wide-angle vistas and faraway details; sports photography, as they allow you to sit in the crowd and still get tight shots of in-game action; and wildlife photography—because you really shouldn't get too close to that bear.
Although a megazoom camera is smaller than a DSLR, it's about the same size as a CILC, meaning you can't slip it into your pocket. You'll probably need a satchel or camera bag to tote it along with you.

**PROS** A very high optical zoom range; manual controls; excellent image stabilization; better lenses than in standard point-and-shoot cameras.

**CONS** Bulkier than a point-and-shoot camera; slightly expensive; fixed lens; not much smaller than an interchangeable-lens camera.
Pocket Megazoom Point-and-Shoot

If the versatile zoom lens of a megazoom camera attracts you, but you want something a bit more portable, a pocket megazoom is your best option. These compact cameras offer optical zoom ranges from 10X to 20X; though they’re definitely more compact than a full-size megazoom or DSLR, the majority still aren’t quite small enough to slip in a pants pocket. A jacket pocket or purse should be big enough to accommodate them, however.

Although many pocket megazoom cameras have manual controls for aperture and shutter speed, not all of them do; be sure to check the specs if you’d like those features. These cameras normally have very good optical image stabilization to bolster their high-zoom lenses.

**PROS** Very high optical zoom range for a pocketable camera; portable but versatile; excellent image stabilization; many offer manual controls.

**CONS** Bulky for a pocket camera; some models lack manual controls.
CHAPTER 1 Choose a Camera

Ruggedized Point-and-Shoot

These are the ultimate cameras for extreme-sports enthusiasts, mountaineers, snorkelers, and the just plain clumsy. Quite a few waterproof, freezeproof, drop-proof, and dustproof cameras are available, and they’re great for taking underwater shots of fish, lugging to the beach, or going on a snowboarding trip.

Due to their unique looks and often limited feature sets, these cameras aren't the first choice for everyday on-the-go use. Image quality can be a mixed bag as well: These cameras usually don't have the best optics or the biggest sensors. But they’re durable, and for some photographers that’s a more important trait.

**PROS** Can withstand drops, crushing, water, freezing, and sand.

**CONS** Usually has fewer features than a standard point-and-shoot camera; subpar image quality compared to other cameras.

**INTO THE WILD**

Ruggedized cameras aren't the only option for getting great pictures in the wild: If you want to bring your current camera somewhere dangerous, many companies sell special housings for underwater and rugged use. These may end up costing you more than a ruggedized point-and-shoot, though.

For adventurers who need to shoot video in an extreme situation but don't want to bring along a huge camera, the tiny GoPro camera shoots wide-angle HD video and is literally strong enough to survive a jump from space.
A popular and fast-growing category, CILCs combine many of a DSLR’s features into a package the size of a point-and-shoot.

Though CILCs may outwardly resemble a large point-and-shoot, they have two major advantages: They can use interchangeable lenses, like a DSLR, and they usually contain much larger sensors than their point-and-shoot brethren.

To fit these features into a smaller package, however, CILCs leave out or miniaturize other typical DSLR components. The traditional viewfinder and mirror box are gone, which means there’s no optical viewfinder built into the camera; instead, you compose shots on the LCD screen. This results in a much smaller camera body. The larger sensor also means you’ll generally get better low-light performance than with a compact point-and-shoot.

Several companies are currently promoting CILC, each with its own lens format. This means if you plan to buy a CILC, you need to choose which format you want it to support: If you buy a Sony NEX CILC, for example, you have to stick with Sony lenses. Plenty of CILC lenses are available, and they’re all priced similarly to DSLR lenses. Companies including Lensbaby have released specialized lenses that can fit several different kinds of CILC bodies. You can also purchase an adapter mount to repurpose SLR and DSLR lenses for CILCs.

**PROS** More compact than a DSLR; excellent photo and video quality; no shutter lag; versatile interchangeable lenses; manual controls for exposure and focus.

**CONS** No through-the-lens optical viewfinder; can be expensive; a bit bulky for everyday use.
CHAPTER 1 Choose a Camera

DSLR Camera

For the greatest amount of flexibility and creative control, consider a DSLR camera. These cameras use the same lens for both viewing and capturing a picture, which means that you can immediately see the effect of any physical filters or lens attachments you use. DSLRs also offer interchangeable lenses, so you can quickly swap your lenses if you want to take both a telephoto shot of a faraway bird and a wide-angle shot of a meadow.

DSLRs generally have the largest camera sensors and the highest megapixel count— anywhere from 8 to 36 megapixels. They also don't suffer from shutter lag, which afflicts many compact cameras and decreases your chance of getting the shot you're after.

DSLRs often have more-advanced features than you'll find on a point-and-shoot: faster burst rates for shooting images in sequence, speedier playback and navigation, the ability to shoot images in raw format, and manual modes that afford you a high degree of creative control. Many recent SLRs feature a live view mode that lets you frame your shots on the LCD screen, and some can even capture video—though working with video on a DSLR can be more complicated than it is on a compact camera. In the right hands, DSLRs can capture stunning photographs that would be all but impossible to take with other digital cameras.

Of course, all of this flexibility comes at a significant cost. DSLR bodies start at around $500 and can cost up to thousands of dollars; lenses are separate purchases. They're also considerably larger and heavier than other digital cameras—especially if you're carrying around multiple lenses.

**PROS** Superb photos, videos, and low-light shooting; no shutter lag; versatile interchangeable lenses; manual controls for exposure and focus; through-the-lens optical viewfinder.

**CONS** Expensive; lack of portability; can be complex and intimidating.
Features to Consider

Now that you're familiar with most camera types, it's time to look at features—and what ones matter the most to you.

IT'S GREEK TO ME Don't care to learn what ISO stands for or what all the dial symbols mean? A point-and-shoot might suit you better than a DSLR.

If you're a beginner, for instance, you may not necessarily want to buy a $2000 DSLR with full manual controls; likewise, an advanced user may not get much use out of a single-lens megazoom if he wants to be able to switch lenses.

Here's a list of the features you'll want to consider when making your purchase.

Camera Size

Though we don't always like to admit it, size and weight can be a major factor when you're purchasing a new camera or device. After all, you may hanker for manual features and interchangeable lenses, but if you never carry a bag with you, that DSLR might wind up collecting dust on the shelf.

Our best recommendation here is to go to a local camera store or major electronics retailers and handle any cameras you're interested in. You may even want to make sure they'll fit in your backpack or pocket of choice—though we recommend asking an in-store representative before sticking any floor items in your bag.

If you don't have a chance to get to the store, here's a basic rundown of the major camera models and their respective weights and sizes.
CHAPTER 1  Choose a Camera

SMARTPHONES These range from easily pocketable to near tablet size; generally they weigh no more than a pound.

POINT-AND-SHOOTS These diminutive cameras are usually a little heavier than your average smartphone, but not by much; they’re almost all pocketable.

MEGAZOOMS If you want a megazoom, you may have to get a small camera case for it; with their large lenses, most of these cameras will not fit in the average pants pocket.

CILCS These are much lighter than DSLRs—around 1 pound—but you’ll still most likely need a bag or case for basic protection and carrying any additional lenses.

DSLRs The body alone of a full-size DSLR is larger and heavier than the cameras previously mentioned—without lenses, a typical camera body weighs around 2 pounds. Add lenses, external flash, and extra batteries, and you’ll probably need a dedicated bag.

Flash

Your camera’s flash can be an excellent tool for both low- and full-light situations. Outdoor portraits in daylight can benefit from an extra pop of light on the subject’s face, and of course you’ll need extra light in nighttime situations.

FLASHY Some cameras come with a built-in flash, while others offer external mounts.
CHAPTER 1  Choose a Camera

Even if you rarely use your camera’s flash, you should know what kind of flash it has and how much control you have over its settings. Some cameras have a small built-in flash, some have a hot-shoe mount (a bracket that lets you attach an external flash to the camera), and others have both. If a camera has a mount but no flash, check to see if the kit includes an external flash or if you’ll need to buy it separately. A built-in flash is extremely handy to have, but it’s not going to be as high quality as an external flash.

If you’re an advanced photographer who wants to greatly improve the quality of your flash photography, and you aren’t concerned about the heft of the camera, choose a camera with a hot-shoe mount. External flashes throw light wider and farther than built-in flashes can, producing more consistent light. They also raise the flash head above the lens, which helps reduce red-eye. Some external flashes even have rotating heads that let you bounce the light off ceilings for a diffused, natural look. Finally, external flashes don’t drain your camera’s batteries.

TIP: GET A CAMERA WITH FLASH MODES

It’s incredibly useful to have a camera with quick access to flash modes, including on (which forces the flash to fire even if the camera detects enough light), off (to prevent your flash from firing even in low-light situations), and slow sync (sometimes referred to as nighttime mode). This last mode is particularly useful, as it tells your camera to use a slow shutter speed in combination with the flash, thereby preventing background detail from getting washed out. Some cameras also include a nifty flash exposure lock (FE lock) feature. This lets you tell the camera what the most important aspect of the scene is, and then provides just enough flash to illuminate it.

SMARTPHONES  It’s likely your camera phone will have a basic flash, but it’s probably going to be LED based; these flashes are designed for short-range photographs only and tend to wash out their subjects with a blue hue. Some smartphones may have external flash accessories that you can connect to your phone via Bluetooth.

POINT-AND-SHOOTS  Your tiny point-and-shoot probably comes with a small flash located next to the camera’s lens. Flashes on point-and-shoots are rarely good because they project light from a location right next to the lens. Because of this, your photos won’t have dynamic lighting and you’ll likely see red-eye in some subjects.

MEGAZOOMS  Full-size megazooms have a pop-up flash that can be powerful enough to reach subjects up to 50 feet away. Pocket megazooms, on the other hand, often have the same flash limitations as point-and-shoots.

CILCS  Because CILCs have tiny bodies compared to their large lenses, built-in flash options range from inventive pop-up flashes to no flash at all. Some have hot-shoe attachments for external flashes.

DSLRs  All low- to medium-priced DSLRs have a pop-up flash to shine light on subjects up to 50 feet away, as well as a hot-shoe mount for external flashes. High-priced professional DSLRs often have only a hot-shoe mount.
MEGAPIXEL COUNT

A high megapixel rating doesn't mean better image quality. However, it does give you more flexibility when making enlargements or cropping. These days most cameras offer a resolution of at least 10 megapixels, which is overkill for most photo shooters. A 5-megapixel image can be printed as an 8-by-10-inch photo—enough for almost any picture frame. It is nice to have a few extra megapixels for cropping, but after about 10 megapixels, you're just creating unnecessarily large files.

<table>
<thead>
<tr>
<th>MEGAPIXEL COUNT</th>
<th>MAXIMUM HIGH-QUALITY PRINT SIZE (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>8 by 10</td>
</tr>
<tr>
<td>8</td>
<td>11 by 14</td>
</tr>
<tr>
<td>10</td>
<td>13 by 19</td>
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<td>13</td>
<td>16 by 24</td>
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</tbody>
</table>

Sensor Size

Cameras with larger sensors and better lenses normally take better shots, regardless of the megapixel count. An 8-megapixel DSLR takes a much more stunning photo than an 8-megapixel smartphone because the DSLR's sensor is roughly four times bigger. If you can't get hands-on time with a camera before deciding whether to buy it, you can at least study its tech specs to see how big its sensor is.

Zoom Type and Range

When it comes to evaluating the zoom on a camera, you should always focus on optical zoom numbers and ignore digital zoom. Though digital zoom offers a longer zoom range, you're not actually zooming with your lens—you're essentially just cropping your image. Instead, we recommend skipping the digital zoom while shooting, and cropping the images when you sit down to edit them.
MEASURING ZOOM

When we talk about cameras with built-in lenses, we tend to speak in terms of how many times closer a fully zoomed image is than the unzoomed image. A pocket megazoom, for example, may have a zoom range of 28–448mm. Manufacturers will say it has 16X zoom—meaning the 448mm image is 16 times closer than the 28mm starting image. DSLR and CILC lenses, on the other hand, display zoom capabilities in terms of millimeters (for instance, a kit lens—one that comes standard with a DSLR body—might be listed as having an 18–55mm range).

SMARTPHONES All smartphones use digital zoom, but if you need to get in close to the action, you can purchase tiny lenses to clip onto your smartphone’s camera.

POINT-AND-SHOOTS Advanced point-and-shoots generally do not have more than 5X optical zoom. If you’re looking for a compact camera but are concerned that the typical 3X zoom (the equivalent of a 35–105mm lens) won’t be sufficient, consider investing in a camera with 8 megapixels or more so you’ll have room to crop later. If you do a lot of nature or sports photography, you may want to look for a camera with at least a 10X optical zoom lens.

MEGAZOOMS Pocket megazooms can zoom optically up to 16X, but full-size megazooms can reach over 30X. If you choose a camera with a long zoom lens (generally anything over 5X), make sure it also offers optical image stabilization to minimize the likelihood of blurry photos from camera shake.

CILCS AND DSLRS Interchangeable-lens cameras offer endless options for zooming. You can basically turn your camera into a telescope by adding telephoto lenses and special attachments.
**LENS TYPES**

The type of lens varies based on its focal and zoom length. Here’s a list of the most common lenses.

<table>
<thead>
<tr>
<th>LENS LENGTH</th>
<th>ZOOM LENGTH</th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 22mm</td>
<td>Ultrawide, fish-eye</td>
<td>Adds a distinctive round feel to photos and can be good for natural landscapes and architecture. Creates an exaggerated sense of space, which can make a living room look cavernous or a line of fence posts appear more spread out.</td>
<td>Creates distortion in portraits and warps straight lines in photos. Extremely susceptible to lens flare.</td>
</tr>
<tr>
<td>22–35mm</td>
<td>Wide angle</td>
<td>Captures a lot of subjects in a small space. Excellent for landscapes.</td>
<td>Compositions can easily get cluttered and are susceptible to lens flare.</td>
</tr>
<tr>
<td>35–70mm</td>
<td>Close to normal vision</td>
<td>Commonly used in documentary photography. Good for street photography and most everyday snapshots.</td>
<td>Cannot capture a wide scene or zoom superclose.</td>
</tr>
<tr>
<td>70–135mm</td>
<td>Medium telephoto</td>
<td>Excellent for portrait and food photography because it flattens features and keeps the composition focused tightly on the subject.</td>
<td>Somewhat sensitive to camera shake.</td>
</tr>
<tr>
<td>135–300mm</td>
<td>Telephoto</td>
<td>Good for sports and wildlife photography where you have to stay far away from the subject.</td>
<td>Flattens image and is sensitive to camera shake.</td>
</tr>
<tr>
<td>More than 300mm</td>
<td>Extreme telephoto</td>
<td>Used in extreme sports, wildlife photography, and some astronomy.</td>
<td>Very sensitive to camera shake.</td>
</tr>
</tbody>
</table>
CHAPTER 1  Choose a Camera

Manual Controls

While some photographers may want to just set their camera to auto mode and shoot, those who want more control over their shots should make sure they pick a camera with manual settings—this includes shutter priority, aperture priority, and manual.

MANUAL MAGIC If you want more control over how your photographs look, invest in a camera with manual modes.

A camera with full manual settings will include modes where you can choose your shutter or aperture and let the camera adjust everything else to properly expose the photo. Some cameras have shutter and aperture priority modes, but not all have manual mode.

SMARTPHONES Some smartphones have better native camera controls than others. Windows Phone 8 devices, for example, allow users to select separate exposure and focusing points in its native camera application, while Apple only allows one point for both exposure and focus. Every mobile platform that permits the download of third-party apps has a section for manual photography programs. (For more information, see the “Master Mobile Photography” chapter.)

POINT-AND-SHOOTS All advanced point-and-shoots have some sort of exposure controls. Because these cameras are intended to make image capture as easy as possible for beginners, they offer automatic modes you can try out rather than having to jump into manual controls (although some offer basic shutter speed and aperture control as well).
CHAPTER 1  Choose a Camera

MEGAZOOMS Many pocket megazooms and most full-size megazooms feature basic manual controls and specialty modes for common shooting situations. Check your camera’s manual for details.

CILCS All CILCs offer manual controls for exposure and focus, as well as specialty modes for common shooting situations.

DSLRs All DSLRs feature manual shooting modes, including shutter and aperture priority. Basic DSLRs also include beginner options for common photography situations, while professional-grade DSLRs only have advanced manual controls and maybe a basic auto mode.

**GET A GUIDE MODE**

Many cameras, especially entry-level DSLRs, feature in-camera help or guide modes. These guides walk new users through the basics of using manual controls and explain what settings to use to get specific types of photographs. If you’re buying your first camera with manual controls, look for one with a guide mode.

**White Balance**

In many cases, a camera’s automatic white balance does a good job of adjusting to different lighting situations to make sure you get accurate colors. But if it messes up, you need easy access to additional white balance options. Check to see whether you can change the white balance setting from the back of the camera or a top-level menu. You shouldn’t have to scour your camera’s menus each time the lighting changes.

If you often shoot without a flash to better capture ambient light, you should also make sure the camera offers a custom white balance setting. With this mode, you simply point your camera at a white surface; the camera measures the light and applies the appropriate color correction. This takes the guesswork out of choosing the correct settings.

**Focus Systems and the Viewfinder**

While shopping, you’ll hear a lot about different autofocus systems and how many “points” they have. More points means that the system can detect a subject in more parts of the frame. Having more points is better, but the speed of the autofocus mechanism is equally important. While autofocus systems are generally very reliable, manual focus can be very important for careful composition. Users who wish to combine the best of both worlds can look into single-point autofocus, which allows photographers to preframe their composition by choosing a point of focus before they shoot.
FOCUS TIME With single-point autofocus, you can choose a point to focus on, and then use manual or automatic focus to refine it.

Cameras come with one of two types of viewfinders—optical viewfinders (OVFs) and electronic viewfinders (EVFs). Most current DSLRs have an LCD screen in addition to an optical viewfinder.

When evaluating a camera, make sure that its viewfinder is bright, that you can see from edge to edge, and that the focusing screen is clear. (For a more expansive look at the pros and cons of different viewfinders, check out our comparison.)

OPTICAL VIEWFINDERS OVs are found primarily on DSLRs. They show exactly what the lens sees, but often with a small amount of cropping around the edges. They are the preferred choice for many pro photographers as they have all the dynamic range of the human eye and no lag time. The OVs on more expensive cameras are better quality.

ELECTRONIC VIEWFINDERS Nearly every new digital camera relies on some sort of electronic viewfinder to send a live feed of an image to the camera’s LCD screen. Most recent DSLRs have a live view mode on an adjust-
Choose a Camera

able LCD screen in addition to an optical viewfinder. This is useful when you need to shoot over your head, down low, or in other positions where looking through the viewfinder is impossible. If the LCD screen isn't adjustable, live view still makes for more relaxed tripod-mounted shooting. Unfortunately, LCD screens can have reflections and glare, making them difficult to see in bright light.

SEEING DOUBLE You can add an optical viewfinder to certain cameras that have only a digital viewfinder, but you won't see directly through the lens—instead, you'll be looking slightly above it.

SCREEN QUALITY Inexpensive cameras in particular tend to have poor-quality LCDs that show streaks of light in bright sunshine. When you're comparing LCDs, the image should be sharp and saturated, even in bright lighting. As you pan the camera, make sure the LCD’s image can keep up with the motion; it shouldn't be jerky or delayed (a particularly common problem with compact cameras).
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You’ll also want to consider what settings and parameters appear on the screen when you’re shooting. Ideally you want a display of the number of pictures remaining, battery life, shooting mode, current ISO setting, white balance setting, and exposure compensation setting. To assess exposure, serious photographers will want the option of displaying an image's histogram (a graph of the shadows, midtones, and highlights of your image) while in playback mode.

TOUCHSCREENS  Inspired by camera phones, some point-and-shoot cameras and a few more-advanced cameras are adding touchscreen capabilities to their LCDs. The effectiveness of the touchscreen user interface varies wildly from camera to camera, but if executed well, it can be easier to learn and use than traditional buttons and settings.

Image Stabilization

Some cameras offer image stabilization (also called antishake) as a shooting mode or as a feature. This is helpful when you’re shooting photos in situations where it’s difficult to get a sharp image, such as in low light when the shutter has to stay open longer. Many camera manufacturers offer cameras and lenses that include image stabilization technology. But there are different approaches to image stabilization, each with its advantages and disadvantages.

OPTICAL STABILIZATION  Used in compact cameras and SLRs, optical stabilization is the most common image stabilization method. Optical stabilization uses gyroscopes within the camera or the camera's lens to detect camera shake, and then steadies the path of the image as it makes its way to the camera's sensor. In SLRs, the gyroscopes are often located in the lens.

SENSOR STABILIZATION  This technology works similarly to optical stabilization. With sensor stabilization, gyroscopes located in the camera body detect shake and move the image sensor to counteract the motion. Although it's available on some point-and-shoots, sensor stabilization is more commonly used in SLRs.

DIGITAL STABILIZATION  Digital stabilization attempts to make a picture clearer by simply changing the camera's settings or altering the image after the camera has captured it. There are several approaches to digital stabilization. One of the most useful is intelligent ISO. Used primarily in compact cameras, an intelligent ISO feature automatically increases the ISO, or light sensitivity, setting when the image sensor detects a moving object. As a result, the camera can use a faster shutter speed to snap a picture, thus freezing the motion of the subject and reducing blur. Digital stabilization is less effective than optical stabilization.

Camera Modes

Point-and-shoots offer shooting modes that automatically set the camera based on your situation. For example, portrait mode keeps a foreground subject in focus; sports mode is good for fast-action shots. If you like to tinker with camera settings, look for a point-and-shoot with manual shooting modes. Another handy mode to look out for is HDR (high dynamic range), which shoots three images at varying exposures, and then combines the best parts of each into one image. (For more information on common camera modes and how to use them, see “Camera Settings” in the “Take Photos” chapter.)
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Other Features to Consider

We've listed many of the major features you might want to consider when buying a new camera above, but here are a few other miscellaneous options you might be interested in.

RAW AND JPEG MODES By default, all digital cameras shoot JPEG images. When you shoot in JPEG mode, your camera does a bunch of processing and image correction before finally compressing the image as a JPEG file and storing it on the card. However, some cameras can also shoot in raw mode, in which case the camera doesn't perform any processing on the image. Instead, it simply stores the data that comes directly off the camera's sensor. You can fit fewer raw images on a card, but you'll be able to perform much more sophisticated edits and adjustments later. If you enjoy spending time in an image editor, and you want the option to get the best photos you can, a camera that supports raw files can be a great asset. All digital SLRs shoot raw, but only a few higher-end point-and-shoots do.

FACE RECOGNITION One of the more useful modes on many cameras is facial recognition. In detecting people's faces, the camera aims to optimize both focus and exposure for the subjects. We've found the results to be very helpful, especially for candid shots in a group or party setting, and we think it's worth spending a little extra to get this feature. Some new cameras even have smile recognition, which automatically takes a picture when someone in the frame smiles; this feature may help with baby pictures or when shooting an otherwise moody subject, but it's not an essential feature.

USER INTERFACE When evaluating a camera, consider how easily you can navigate common settings—resolution, macro mode, flash, and exposure adjustments—and play back just-taken images. Too many buttons, and you waste time trying to figure out which button does what; too many menus, and you waste time digging through them.

IN-CAMERA EDITING Not every image needs to take a trip to a desktop image editor. If you want to tinker with your photo on a camera's LCD screen, find a camera that offers simple in-camera edits such as brightness, contrast, color correction, and cropping. Art filters are also catching on, thanks in part to the success of iPhone editing apps. Now, on cameras like Olympus's PEN line, you can add fun filters to your photo in-camera, including tilt shift, soft focus, and film effects.

BATTERY OPTIONS Some cameras use AA batteries, while others come with a proprietary rechargeable battery. If you plan to be out and about with your camera, consider the battery type and figure out what it takes to have an extra battery at hand. AA batteries are readily available (you can even use rechargeable ones). A proprietary rechargeable battery can carry a charge longer than AA batteries but is more expensive to replace.

VIDEO Many point-and-shoots and newer DSLRs are able to shoot HD video, either at 1280 by 720 or at 1920 by 1080. Smartphones can also shoot HD video. The video quality often isn't as good as what you'll get from a dedicated camcorder with a large sensor, but it will do in a pinch.

INCLUDED SOFTWARE BUNDLES Almost all point-and-shoot cameras work with your computer's built-in software for importing pictures from the camera. You can also access the memory card using a card reader, and use the card as you would any other storage device. Your camera may also come with its own software to install, but you're generally better off using your computer's built-in apps to manage your pictures and to make minor adjustments.
WI-FI If you like to upload photos to an Internet photo-sharing site, consider a camera with built-in Wi-Fi. When connected to the Internet via a Wi-Fi hotspot, these cameras let you upload directly to the site. Currently, camera phones are way ahead of regular cameras on the sharing front, thanks to the phone’s built-in Wi-Fi and cellular network connections. With the press of a button, you can upload an image taken on your phone to the Web, email it, or pop it into a text message. Some memory cards are available with built-in Wi-Fi so you can send photos wirelessly to your computer or store them online.

SPECIALTY FEATURES In addition to these more common features, some cameras offer a number of newer and niche features. These features aren’t for everyone, but if you take advantage of them, they can add significant value to your camera. Some items to consider include a rugged or water-resistant body for outdoors photography. And if two dimensions aren’t enough for you, pick up a camera that shoots 3D images.
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Choose a Camera

Find New Accessories

A camera body is only the first part of a proper camera kit. Once you’ve settled on a camera type and model, it’s time to accessorize. Smartphones and point-and-shoots may not need many accessories to take a great photo, but many DSLRs and CILCs come with body only out of the box—meaning that you still have to purchase a lens to properly equip your camera.

Lenses

If you purchased your DSLR or CILC as part of a kit, you got a basic lens that takes pretty good pictures. However, part of the attraction of this type of camera is that you can switch out lenses to get the best shot in any situation. From powerful zooms that get you up close to high-speed lenses that specialize in low-light settings, you have plenty of options for your second lens. The real question is: How do you find the right one for your needs? To understand what makes one lens different from another, you first need to be familiar with a few basic concepts.

WHAT’S IN A LENS? There are many different types of lenses out there, and not all of them will work with your specific camera.

FOCAL LENGTH Technically speaking, a lens’s focal length (represented in millimeters) is the distance between the rear element of the lens and the focal plane, where the parallel beams of light entering a lens converge to a point. This matters because the focal length determines the lens’s viewing angle. The shorter the focal length, the wider the field of view and the more of a scene your camera can capture. As you increase the focal length, the field of view narrows so you see less of the scene—and objects appear magnified in relation to their environment.

In the world of traditional 35mm film, focal lengths of 16–35mm are generally considered wide angle. A 50mm lens is referred to as “normal” because it comes closest to covering the same field of view as the human eye,
and anything over 100mm is considered telephoto. However, focal length is a bit more complicated when it comes to SLRs. That’s because the cameras’ image sensors are smaller than 35mm film, so they crop out some of the image and give the effect of a longer focal length. To get a sense of how this discrepancy will affect the viewing angle of your lens, you have to multiply the digital camera’s crop factor—which you’ll find in its manual—by the focal length of the lens. A Canon Rebel T3i, for example, has a crop factor of 1.6X. As a result, a 35mm lens has a field of view equivalent to that of a 56mm lens when placed on the T3.

**WHAT LENS SHOULD YOU BUY FIRST?**

The zoom lens included with many SLR kits offers a focal length range of 18–55mm. This takes you from a moderate wide-angle view to a slight telephoto. These lenses aren’t bad—they’re lightweight and take good pictures when you’re shooting outdoors in daylight or indoors with a flash. However, they tend to be slow, which means they don’t do well in low-light conditions. When you’re ready to expand, consider investing in a prime lens (which has a single focal length) or a longer zoom lens.

**APERTURE** The other key component in evaluating a lens is its aperture. The aperture is one of the mechanisms controlling the amount of light that passes through the lens to the image sensor. The aperture is usually referred to in terms of f-stops, and is represented by a number such as f/2.8. The smaller the number, the larger the opening, and the more light it allows into the camera. Because it collects more light, a lens that opens to a wide aperture lets you maintain faster shutter speeds in low light. This can be essential for obtaining sharp images from a handheld camera. Wider apertures also provide more creative control, giving you the option to throw backgrounds out of focus.

The maximum aperture describes the speed of a lens. Some lenses, for example, max out at f/4.5, while others can open all the way to f/2 or wider. If you’re looking at a zoom lens, which has a range of focal lengths, you’ll see the maximum aperture listed as a range, such as 55–200mm and f/4 to f/5.6. This lens zooms from 55mm, with a maximum aperture of f/4, to 200mm, with a maximum aperture of f/5.6. This means your camera will choose a slower shutter speed as you zoom in. Keep in mind that faster lenses, with smaller maximum apertures, are generally both heavier and more expensive than slower lenses.

**IMAGE STABILIZATION** With slower shutter speeds, an imperceptible move on your part can create a blurry photo, but a lens or camera with stabilization can counteract this shaking, letting you shoot handheld shots in low light. Canon lenses with image stabilization have IS in their name, while Nikon uses the term vibration reduction, or VR. You’ll pay a bit more for image-stabilized lenses, but they’re generally worth it. Of course, you won’t need stabilized lenses if your camera body offers image stabilization.
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TIP: TRY BEFORE YOU BUY

While you can walk into a camera store, ask a few questions, and walk out with an expensive lens, doing a little re-search ahead of time can help prevent buyer’s remorse. One of the best ways to determine whether a lens will work for you is to rent it. Many camera stores that cater to the pro photographer let you rent popular lenses for a weekend. If you can’t find a local store, go online. Rentglass.com rents lenses for Canon and Nikon DSLRs on a weekly basis. Make sure you opt for the insurance coverage or check with your credit card company about damage claims.

Memory Cards

While some cameras come with a small starter card, most don’t. In either case, you’ll want to invest in a good card with lots of room for your pictures.

A GOOD MEMORY Memory cards for your camera are small, light, and easy to carry—making it a no-brainer to keep several of them on hand.
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If you are shooting video, you might need more room. SDHX cards can store up to 2TB but are not compatible with every camera. Faster cards (20 to 30 MBps) may improve performance of DSLR cameras in burst mode, and they decrease the time it takes to offload large files using a fast card reader. An SD card's speed is rated by Class. If you shoot HD video with your digital camera, a Class 4 card should be fast enough to cover your needs, unless the camera manufacturer states otherwise. If your camera can record HD video and shoot stills at the same time, look for a Class 10 card. If you are just taking photos and basic video, then Class 2 is fine.

Flash

If your camera has a hot-shoe mount or remote flash capabilities, you may want to pick up an external flash.

TAKE A FLASH  External flashes are useful in situations where you can't control lighting conditions.
Most flash mounts are universal, meaning you can use any brand of flash with the same mount. Unfortunately, some cameras have proprietary hot-shoes, meaning you must purchase flash units made specifically for that mount, usually from the maker of your camera.

**Tripod**

No matter how much you’ve spent on gear, a tripod is often the item that makes the difference between a successful shot and a blurry smear.

_EASY BALANCE_ A tripod helps stabilize your shots and lets you capture pictures with lengthy exposure times.
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A tripod gives you the stability you need to shoot at a longer shutter speed, which lets you capture an image in low light. Tripods are also essential if you need to repeatedly shoot the same scene—say, for a time-lapse sequence or HDR photographs. Modern digital sensors can work with very little light to begin with, but you'll still need a tripod to get really sharp shots.

Tripods run the gamut from inexpensive units that do the job but lack stability and versatility, to high-end, very expensive units made from lightweight carbon fiber and metal alloys.

Camera Cases

A good camera bag is comfortable to carry, protects all of your equipment from bumps and the elements, and fits your shooting style.

BAGGED AND READY A good camera bag is essential for toting and protecting high-value equipment.
A number of factors determine what type of bag you choose: how much equipment you’re carrying, comfort and ergonomic concerns, quick and easy access to equipment, personal style, and protection from bumps and the elements. You can get great camera bags from companies like Lowepro, Tamrac, and Crumpler; if you’re looking for something a little more stylish, many Etsy sellers make custom camera bags as well.

Other Accessories

Part of the fun of photography is using high and low-tech accessories to augment or improve your photos. Once you’re comfortable using your camera, consider purchasing some minor accessories: Filters and gels add a color tint to images; flash diffusers help bounce or soften light; and underwater housings keep your camera dry. Novelty lenses can also spice up the scene. Toy camera–inspired lenses add a unique look to your composition. And the ultimate accessory for many photographers is the right piece of editing software. (For more on photo editors, see the “Manage, Edit, and Back Up” chapter.)
THE WORLD AROUND US While it’s easy to capture a quick snapshot without knowing much about digital photography, you can do so much better than that once you learn the basics.
Manage, Edit, and Back Up

SORT IT OUT  Don't let your photo collection get out of control. Keep things organized from the moment you import your images.

Just like a garden, a photo library left untended can quickly become overgrown and uninviting. Unless you lay down some guidelines early on—and stick to them—you're likely to spend as much time searching for a photograph as you spend polishing it.

Luckily, several applications enable you to create an efficient workflow for managing, editing, and backing up your pictures. In this chapter, we'll provide an overview of these programs, in addition to a how-to on importing your images; sorting, organizing, and searching your library; editing your photos; and keeping them safe.
There are many circumstances in which a mobile camera is worlds better than a DSLR.

You don’t need to buy an expensive DSLR or lug around a point-and-shoot to capture good photos. If you have a smartphone with a built-in camera, the only camera you need may already be in your pocket. This chapter has tips on capturing the best possible images with your iOS, Android, or Windows Phone 8 smartphone. In addition, if you want to incorporate a tablet into your professional workflow, we offer tips and apps that can get the job done.

Tips and Tricks for Mobile Photographers

At its core, smartphone photography is very similar to its amateur and professional brethren: Many of the suggestions, tips, and tricks offered earlier in this book will serve you just as well with an iPhone as with a DSLR. That said, smartphones lack many of the features you’ll find in a traditional DSLR or CILC camera. The lens and lens aperture are often fixed, and your smartphone may try to decide shutter speed and aperture for you. The flashes also tend to be much weaker, employing LED lights rather than bulbs.
Share Your Photos

You’ve composed, organized, labeled, and edited your pictures to perfection. Now it’s time to show off those gems to the world. Unlike traditional negatives, digital images are easy to reproduce and insert into an online gallery, a calendar or card, a slideshow, or a movie—and you can even print them out using your home printer or a professional service. After all, shouldn’t you have as much fun sharing your photos as you had taking them?
Thanks for Reading!

We hope that our Digital Photography Superguide has helped you get to know your digital camera—whether it’s a smartphone, a point-and-shoot, or a DSLR—and that you’re on your way to enjoying what it has to offer. For even more information on digital photography, as well as the latest tips, tricks, how-tos, and news about cameras, mobile phones, fitness tech, and other interesting gadgets, check out TechHive.com and the rest of our Superguide program.