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Getting Started Taking Pictures

Getting started taking pictures with a digital camera can be as easy as putting in some batteries (you may have to charge them first), putting in the camera's storage card, uncovering the lens, and taking pictures. Virtually any digital camera you wind up with will have a fully automatic mode that will ensure the camera will take decent photos without you having to worry about them.

Relying on automatic mode, however, is not always your best choice. The vast majority of cameras will also have additional features you need to know about before you can take full advantage of the camera. At the very least, virtually any camera should give you a choice of settings that will help determine the resolution of the picture—both in the sense of how many pixels it will have and how well it can resolve fine detail. Keep in mind also that after you take the picture, you'll have to figure out how to do something with it—move it to your computer, e-mail it, print it, or simply delete it.

What follows is a whirlwind tour of all of these things. It's meant as an introduction to what you need to know to get started with point-and-shoot digital photography. We'll cover the most common settings that most cameras offer and talk a little about how—and in some cases whether—to use them. Your camera may not offer all the features we'll cover here, but for those it does offer, you'll find useful information about how to take advantage of them. The mechanics of using the features will vary from one camera to another, so we won't provide details about how to change settings. If it's not obvious from looking at the camera itself, you should be able to find the information in your camera's manual.

We assume at this point that you've already worked through the obvious steps in the camera manual for getting started—like charging the batteries if they're rechargeable, loading them, and inserting the camera's storage cards, often called *digital film*. We'll also assume that you've gotten as far as learning the mechanics of working through the camera menus and learning which are the right buttons to push. We'll pick up from there.

Common Features and How to Use Them

Most cameras come out of the box with everything set to use automatic modes—automatic flash, automatic white balance, automatic exposure, and more. The idea is to make sure that anyone can pick up the camera and get pretty good pictures without having to think about it. If you're willing to invest just a little time exploring the features, however, you'll take much better pictures. There are some features you need to set before you can use them at all, and there are some that may be on by default that you should turn off and ignore. Here's a strategy for getting familiar with your camera, covering the important points in the order you should learn them.

First Things First

You may have dived right in to take pictures already, and even gotten some good results. But if you can't answer questions like, "What's the minimum distance you have to be from your subject?" you should get the answers before you take your next picture. Mistakes aren't as expensive with digital cameras as with film cameras—at least you don't have to pay for film and for developing shots that don't come out. But there's no point wasting time taking pictures that are bound for deletion. So let's start with the basics.

Caution High on the list of first things: don't remove the memory card from your camera, or put it back in, without turning off the camera first. Otherwise you risk scrambling the files currently stored on the card.

Viewfinder and LCD

This sounds almost too obvious to mention, but check out the viewfinder and liquid crystal display (LCD). The viewfinder first. It's amazing how many people—including accomplished photographers—don't realize that cameras often give you a way to focus the viewfinder. Or maybe this isn't too surprising, considering that the information may be missing, or very well hidden, in the camera manual. If your camera lets you adjust the viewfinder, you can correct for nearsightedness or farsightedness, which will let you use the viewfinder without glasses and still see a clear image.

Note Where's the viewfinder? Not all digital cameras have viewfinders. The Nikon Coolpix 2500, for example, relies entirely on its LCD for framing the picture.

In any case, the feature is properly called a *diopter correction*, although you'll rarely see it called that. We'll just call it a viewfinder focus control. If you wear glasses, or if the view through the viewfinder looks blurry, look to see if there's a small knob or wheel somewhere in the immediate vicinity of the viewfinder. Figure 2-14 shows the viewfinder focus control on an Epson PhotoPC 3100Z, for example.

If you find something that looks like it may be a viewfinder focus control, you may be able to find a reference to it in the manual to confirm what it is. But it's probably faster to look through the viewfinder and turn the control to see if it affects the image. If it is a viewfinder focus control, set it to give you a sharp image, and you'll get a better view of the pictures you're taking. (And now that you're aware of the possibility, if you pick up a camera and notice the image through the viewfinder is blurry, you know how to fix the problem.)



Figure 2-14.

Look for a small focus control near the viewfinder.

While you're at it, check the LCD also, assuming your camera has one. Make sure you know where the control is that turns the LCD on and off. You'll often find it on a dial that sets the camera mode and is billed as a choice between using the LCD (LCD mode) and the viewfinder (viewfinder mode). On every camera we've ever seen, however, all the viewfinder mode does is turn the LCD off, just like the dedicated LCD on-off button that you'll find on other cameras. As you might guess, you can use the viewfinder even when the camera is set to use the LCD. However, you should get in the habit of turning off the LCD when you're not using it; your batteries last longer that way.

Also find out if there's a way to adjust the LCD brightness. You may find it helpful to turn up the brightness so you can see the LCD more easily in bright light, or turn it down to stretch out battery life when the light is low and you can see it easily.

Zoom

If the camera has a zoom control, you'll want to check that out too. Look in the manual, if necessary, to find out how to zoom—typically you press one button to zoom in and another to zoom out. More important, check the manual to see if there is a digital zoom, and, if so, if there's a way to turn it off. If there is, turn it off and forget that the feature is there. Digital zoom lowers the resolution of your photo, and it doesn't do anything for you that you can't do by cropping the picture later. There's no benefit to using it, and if

you don't turn it off, you may use it accidentally and wind up with a lower resolution than you want.

If there's no way to turn off the digital zoom, at least find out how it works, and how you can tell when the zooming switches from optical to digital. (This assumes, of course that the camera has an optical zoom. Some cameras offer digital zoom only.) The camera may zoom to the extreme of its optical zoom, for example, then wait a full two seconds before continuing on with digital zoom. Depending on how obvious the switch is, you may find that it's easy to avoid using the feature. If the camera has digital zoom only, our advice is not to zoom at all. Leave the camera in its unzoomed state and ignore the feature.

Assuming your camera includes an optical zoom, if you don't already know the camera's focal length range from one extreme of zoom to the other, you should look it up. The focal lengths will tell you if the camera has a wide angle or telephoto capability, and if so, how much of a wide angle or telephoto feature it offers. You can see the range for yourself by zooming the lens and looking at the image on the LCD, but it's useful to know the numbers, if only to understand how the range you have available fits into the wider context of wide angle and telephoto possibilities.

You may see the focal length printed on the lens casing itself, as in Figure 2-15. However, the actual focal length will mean something different in practical terms depending on the size of the sensor in the camera.



Figure 2-15.

What you need to know is not the focal length printed on the lens as shown here, but the 35mm equivalent.

A better place to look is on a specifications page in the manual, where you should find both the focal length of the lens and what the 35mm equivalent is. Remember, for 35mm cameras, 50mm is a normal lens that sees the world pretty much as you see it. Anything much below that is a wide angle lens. Anything much above that is a telephoto lens. Table 2-1 gives some typical uses for various focal lengths (in terms of a 35mm camera).

Table 2-1 Appropriate Focal Length for Different Types of Photos

Type of Photo or Use	Appropriate Focal Length (with Typical 35mm Lenses)
Special purpose, fisheye photos: often used to get	15mm to 18mm

180 degree view of tight spaces and interiors

Wide angle: Landscape, seascape, room interiors, buildings with surrounding landscaping, large groups	24mm to 35mm
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Normal: Midrange photos, snapshots, small groups	35mm to 55mm
Moderate telephoto: Close-ups from a moderate distance, allows candid shots without disturbing the subject	70mm to 100mm

Telephoto: Sports events, wildlife, distant subjects	100mm to 200mm
Extreme telephoto: Tight close-up in sporting events, surveillance, dangerous wildlife	Over 200mm

How Close Can You Go?

It's critical to know the minimum distance you have to be from a subject to take a picture, which is to say, how close you can get to something and still be in focus. If your camera has a macro mode, there will actually be two closest distances, one with macro mode off and one with it on.

Look for a section in the manual telling you how to take a picture. It should include a warning about how close you can get without turning on macro mode (assuming the camera has one), and how much closer you can get with macro mode. If you can't find the information anywhere else, turn to the camera specifications and look for focus range, shooting range, or some similar name. By whatever name, the range will run from some number to infinity, with the first number varying widely. The numbers for four cameras whose manuals we have handy as we write this, for example, are 11.8 inches, 20 inches, 20 inches (again), and 2 feet. Still other cameras have to be as much as 3 or 4 feet from the subject.

Macro mode, which some cameras call close-up mode, will let you focus at much closer distances. Here again, you'll see wide variations. The closest distances for the same four cameras we just referred to are 1.6 inches, 2.3 inches, 3.9 inches, and 9.6 inches.

Whatever the numbers for your camera, find out what they are and keep them in mind when you're taking a close-up. If your camera has a macro mode, make sure you know the distance at which you have to switch from standard mode to macro mode. You might even want to write these numbers on a label and stick it on your camera or camera case.

Find Out How to Frame the Shot

If you use the camera's LCD to frame your pictures, framing is not a problem because you're looking at the scene as the camera sees it. Similarly, if you have one of the few digital cameras available that uses the same lens for the viewfinder that the camera uses for taking the picture, framing is not a problem. You look through the viewfinder, and whatever you see, once again, is what the camera will see.

Unfortunately, you may not be able to use the LCD in bright daylight, because it's too washed out. Or you may prefer turning off the LCD to extend battery life. Either way—assuming you have one of the vast majority of cameras, with a viewfinder that doesn't look through the camera lens—you have a problem. Look through the viewfinder, and you'll see a slightly different image than what the camera sees. The exact difference between the views will depend on where the viewfinder lens is in relation to the camera lens and on how far you are from the subject when you take your picture. It's helpful to have some idea of the difference so you can compensate for it and avoid chopping off the top of someone's head.

Check your camera's manual to see if there's any useful information about the difference between the views. If you're lucky, you'll find something that tells you the distance to the subject that will give you the same view in both. For example, the two may be set to match at, say, 10 feet. If you're closer than that, the top of the scene as you see it in the viewfinder would be chopped off in the photo. If you can find that information you'll know when to leave extra room at the top of the frame. (Of course, then you'll have to remember to do it, but that's another issue.)

If you can't find this information in the manual, you can figure it out quickly for yourself, thanks to the instant availability of digital photos. It won't even cost you any thing, since you can delete the test shots when you're done. First, be aware that the difference between the two views will only show up in the direction or directions that the viewfinder lens is offset from the camera lens. If the viewfinder lens is immediately above the camera lens, so the centers of both are lined up parallel to the side of the camera, the only offset in the view will be in the up and down direction. If the viewfinder lens is both above the camera lens and offset to the side, the offset in the images will be both left to right and top to bottom. For this discussion, we'll assume your camera lens and viewfinder are lined up top to bottom. If they aren't, you'll have to take the left to right offset into account also.

Find something you can take a picture of that includes an obvious horizontal line, like the frame of a painting or a door frame. Then measure distances at 2-foot intervals from 2 feet away from the subject (assuming the camera lets you focus from 2 feet away) to 14 feet away. (You can use a tape measure if you want to be exact, or you can be more casual and just count paces.) Starting at the 2-foot distance, take a picture with the top edge of the horizontal line just barely inside the viewfinder frame. Then step 2 feet further

away and take the same picture again. When you're done, you should have one picture that's a close match for the view in the viewfinder, with the top of the frame just barely in view at the top of the photo. That tells you the distance that gives you a matching picture. The other shots will give you a sense of how much extra room you need to allow at the top of the viewfinder at different distances.

Keep in mind too that if the offset is, say, top to bottom when you're holding the camera horizontally (so the long side of the picture is parallel to the ground), it will be offset to the side when you're holding the camera vertically. Figure 2-16, for example, shows two shots taken at 2 feet and 10 feet from a lamppost. In both cases, the lamppost was centered in the viewfinder. In the version taken at 2 feet, it is noticeably off to one side.



Figure 2-16.

When we took these pictures, the lamppost in both cases was centered as seen through the viewfinder.

Having said all this, note that if you're taking a picture that you really care about framing just so, you should use the LCD to ensure that you're doing it right. And if you're using macro mode, you should absolutely, without question, use the LCD to frame your picture.

Half Measures: Auto-Focus and Auto-Exposure

If you're using the auto-focus and auto-exposure settings—and you're well advised to, at least while you're learning your way around the camera—make sure you know how to use them. With virtually any camera today, you aim the camera at the subject of the picture, and gently push the shutter button part way down. The camera then focuses the lens, determines the exposure, and locks in the settings.

The camera will give you some indication when it's ready to go on. For example, if you're looking through the viewfinder, you may see a blinking light turn to a solid light. If you're looking at the LCD, you may see an icon change shape or appear out of nowhere. (You'll have to check the camera manual to find out what you're looking for.) Once the camera indicates that it's ready, you can press the button the rest of the way to take the picture.

Flash

Most cameras today have a built-in flash, and virtually all cameras with this feature offer several modes. You want to know what modes are available, both because there are some you might want to use right away, even for outdoor shots, and because you'll want to keep some of them in mind for special situations even if you have no need for them right away.

The most common modes are auto, forced flash (also called fill-in flash), red-eye reduction, and off. Many cameras offer additional settings as well. Among the cameras we gathered for writing this book, for example, the Epson PhotoPC 3100Z and Olympus D-380 offer variations on something called slow synchronized flash (although the Olympus camera uses a different name for it). Here's what you need to know about each of these settings.

Auto is usually the default setting, and it will be the right choice for many, if not most, photos. With auto-flash, the camera uses the flash when it decides it's needed, and it doesn't use the flash otherwise. If you leave the camera at this setting, you'll usually get good pictures, but you can get better pictures if you're a little smarter about what you do and use the other modes when they're called for.

Forced flash will tell the camera to flash whether there's enough light or not. This feature is often called *fill-in flash* because if you use flash in some situations, like taking a picture outside in bright sunlight, the flash will fill in shadows. The photo on the top of Figure 2-17 on the following page, for example, was taken without flash in sunlight, with the sun in a position where it's casting harsh shadows. The photo on the bottom is the same scene with the camera set to flash, to fill in light and lessen the shadows.



Figure 2-17.

Fill-in flash can help minimize shadows falling on your subject.

Forced flash can also come in handy if you are taking a picture of someone, or something, with the light behind the subject. Probably the first thing most people learn about outdoor photography is that you're not supposed to take a picture of someone with the sun behind him or her. The left side of Figure 2-9 shows what happens if you do.

The situation is known as *backlighting*, because the light is in back of the subject. What often happens with a backlit subject is that the camera will adjust its exposure setting for the bright light behind the object you're taking a picture of. The object itself will wind up dark, if not completely black, as in the photo on the left side of Figure 2-18. With forced flash, the flash will provide enough light so you can see the front of the object, as in the right side of the figure.



Figure 2-18.

Take a picture with the sun behind the subject, and your subject may appear dark, as in the picture on the left. You can use flash to light the subject, as on the right.

Backlighting can be a problem indoors too, as in the photo on the top of Figure 2-19 on the following page. Here again, you can use forced flash to light the scene, as in the version on the bottom. This scene is similar to the one we used to discuss the auto-exposure setting, with light coming through a window that's in the middle of the scene. You may need to use both tricks at the same time for the best picture.



Figure 2-19.

Use forced flash to light up the front of a subject that is lit from behind.

Red-eye reduction is one of those features that sounds great but causes more problems than it solves. We strongly recommend staying away from this setting.

Briefly, eyes do a great job of reflecting light. If your cat ever gets out at night and won't come when you call (a normal state of affairs for a cat), try walking around and shining a flashlight into the bushes. If your cat is in the path of the light and is looking your way, the light will get reflected back to you, and the glowing eyes will stand out like two gigantic fireflies next to each other. Human eyes do essentially the same thing.

This reflection can be a problem when you're using a flash. The iris, which opens and closes to let more or less light into the eye, is going to be nearly wide open if it's dark enough so you need a flash. Press the shutter button and you have lots of light going into the eyes and getting reflected back to you. Fairly often, this results in the camera seeing the eyes as red, because that's the color being reflected back. That's the *red-eye effect*.

One way to get rid of red eye is to force the iris in your subject's eye to shut down, and make the pupil, which is the opening into the eye, smaller before taking the picture. With the iris closed down, there won't be as much light getting into the eye or reflecting back to the camera. The red-eye reduction setting for a flash accomplishes that by setting the flash off before taking the picture, giving your subject's eye a chance to react, and then, finally, taking the picture.

Unfortunately, there's a problem with trying to fix red eye this way. By the time the camera finally gets around to taking the picture, it may not be there any more. The subject may have moved or simply changed his or her expression from the one that you wanted to get. Worse, if you accidentally leave the feature on for pictures that don't need it, the possibility of losing a shot is even greater.

Say you've been taking pictures of people at a party with the red-eye feature on, and now want to get a shot of the birthday girl blowing out the candles on the cake. If you forget to turn off the red-eye feature, there will be a significant lag between pressing the shutter button and taking the picture. The candles may all be out by then.

The first thing you should know about red eye is that you can avoid it without the red-eye reduction feature. Tell your subject not to look directly at the camera, turn up the lights so the subject's irises will close down, or both.

The other thing you need to know is that one of the real advantages of using a digital camera is that you don't have to worry about red-eye very much. That's not because a digital camera is any better than a film camera for avoiding red eye—it isn't. However, fixing red eye after you move the photo to your computer is trivial. Most photo editing programs even have a simple command to remove red eye, as shown in Figure 2-20. Select the area around the eyes, choose Remove Red Eye, and the problem is gone.

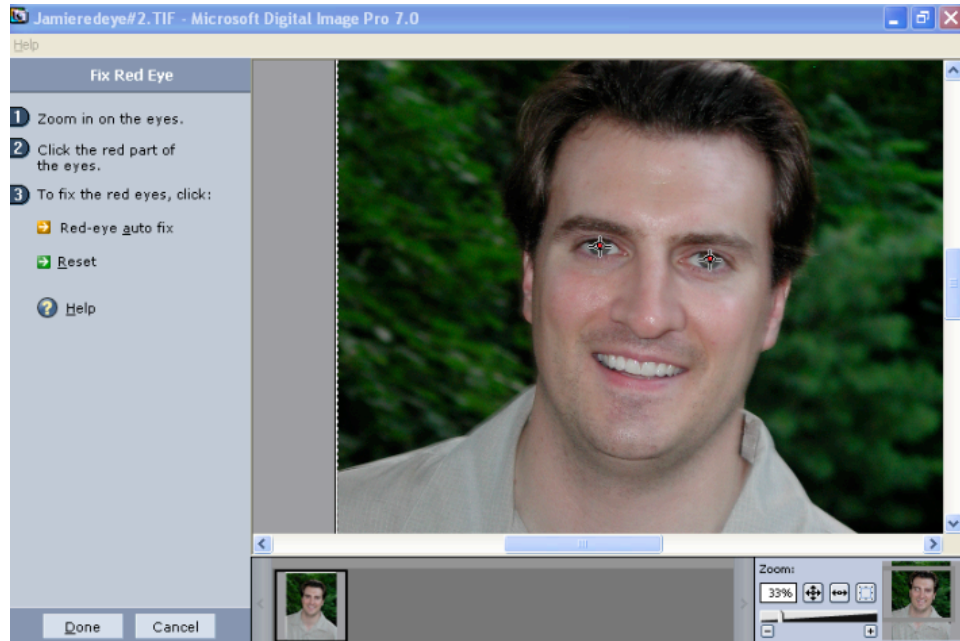


Figure 2-20.

Removing red eye is as easy as selecting the area around the eye, as shown here, and giving the command to remove red eye.

Not so incidentally, not all cameras even bother with a red-eye reduction mode. And by our lights (there's a pun in there somewhere), you're better off without it.

Slow synchronized flash is a more sophisticated flash mode that comes in two basic variations. Both versions keep the shutter open for longer than the flash lasts (that's the slow part), but in one version the flash comes at the beginning of the process of taking the picture. In the other version, it comes at the end. More important, the two approaches yield different results visually and are meant for very different purposes.

One version of slow synchronized flash starts out with a flash, then keeps the shutter open for a while longer. It's meant to solve a common problem for taking pictures outdoors at night. As the photo on the top of Figure 2-21 shows, if you use a normal flash mode for this sort of picture the background will be relatively dark. In many cases, in fact, your subject will be surrounded by black. The photo on the bottom shows the same scene using slow synchronized flash with a leading flash. The leading flash first captures the subject, and then the background fills in slowly over the next few seconds or few tenths of a second. As you can see, the lit area inside the house in the background is lit much more brightly in the photo on the bottom.

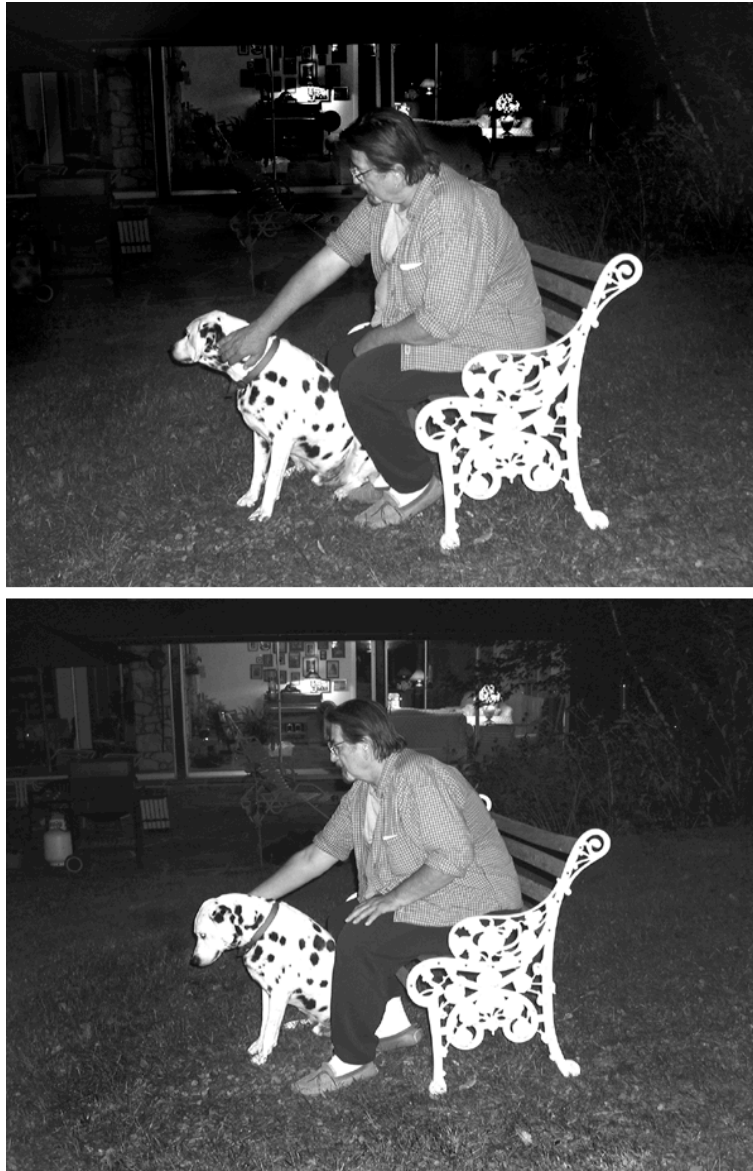


Figure 2-21.

Slow synchronized flash with leading flash lets you capture both your subject and the background at night.

This slow synchronized mode with a leading flash is so tied to taking pictures at night that Olympus identifies it as Night Scene flash mode on its cameras. If your camera

includes this flash mode by whatever name, you should mount the camera on a tripod when you use it. It's important that the camera stays steady while it's filling in the back ground. Otherwise, you may get a blurry picture.

Slow synchronized flash that ends with a trailing flash is a different animal altogether. It's basically a way to get a special effect as part of the picture, with the subject in your photo surrounded by one or more blurred objects. Figure 2-22 gives you some idea of what you can do with the version with trailing flash.



Figure 2-22.

Slow synchronized flash with trailing flash lets you create some special effects in the camera, rather than adding them later by editing the photo.

As you can see in the figure, slow synchronized mode with a trailing flash lets you capture a blur of movement, which in this case is a train rushing past a platform in a train station, and then end with a flash to freeze the subject of the picture. In this photo, you can see both the streak left by windows as the train went by the camera and a frozen shot (from the flash) of the train emergency exit, a door, and some ghostly individual windows. The resulting photo gives a sense of movement overlaid with a frozen moment in time.

Note that you don't necessarily need to use a tripod with the trailing version of slow synchronized flash, because the blur from camera movement can actually enhance the effect. In the photo in Figure 2-23, for example, you can also see some blurred lights,

vaguely resembling question marks, caused by camera movement while the shutter was open.

Ultimately, any version of slow synchronized flash is a relatively sophisticated option that you probably won't have reason to use right away. But if your camera offers one or more variations on the mode, tuck that piece of information into the back of your mind. You might want to experiment with the feature once you are otherwise familiar with the camera.

Macro Mode

Using a macro mode, if your camera offers it, is reasonably straightforward: when you're too close for normal mode, switch to macro mode and take the picture. There are a couple of special considerations about macro mode that aren't immediately obvious, however.

We mentioned earlier, when discussing framing, that for cameras whose viewfinders do not look through the camera lens, you should always use the LCD to frame your pictures in macro mode. That's because the difference between the view in the viewfinder and the view through the lens grows greater as you come closer to the object you're taking a picture of. The more extreme the difference, the harder it will be to know what the picture will look like by looking through the viewfinder. Using the LCD eliminates this problem.

The second issue is lighting. Some camera manuals warn that you shouldn't use the built-in flash with macro mode because it may wash out the image. In truth, if you take a picture from just a few inches away, that's the least of your problems. The camera itself may be blocking the light, so the subject of the picture is in the camera's shadow. And depending on the shape of the camera, the lens may sit between the flash and the subject, which would block the light from the flash as well. Some cameras offer special lighting options for macro photography. For taking an occasional close macro shot, you can improvise. For example, we took many of the macro shots for this book outside to take advantage of daylight lighting. The only trick was to be careful not to let the camera shadow fall on the subject of the picture.

One last consideration for a macro shot is that the closer you get to your subject, the more important it is for the camera to be rock-solid steady to make sure the details are sharp and clear. Most often, that means using a tripod. Also, if the camera has a zoom, be sure to check the camera manual to see if you have to set it to any particular position, like zoom it to the extreme wide angle position.

Choosing Resolution and Compression Settings

Someday, memory will be cheap enough and camera processing fast enough to let you take all your pictures at resolutions we can only wish for today. When that day comes, you won't have to worry about how many shots can fit on your digital film. Until then, however, you have to make compromises. And that means making decisions.

To have any chance of making smart decisions, you need (among other things) to understand the difference between a camera's resolution setting—the number of pixels it uses—and its *compression* setting, or how much it will compress the image to save space on the storage card. Since we've already covered resolution, let's start here with compression.

Compression: Lossless and Lossy

The first thing you need to know about compression is that there are two fundamentally different kinds of compression: *lossless* and *lossy*. The difference between the two is just what the names imply: With lossless compression, you don't lose any information. With lossy compression, you do.

More precisely, when you decompress information that's been compressed with a lossless compression scheme, you get every single bit back. And we mean *every bit* in both the generic sense and the technical sense. If you do a bit-by-bit comparison, the before and after versions of the file will match exactly. On the other hand, when you decompress information that's been compressed with lossy compression, you lose some information. If you do a bit-by-bit comparison with the original file, the before and after versions will not match.

Whether you realize it or not, you may already have some experience with both kinds of compression. If you've ever used a zip file format to compress a file before sending it by e-mail, or if you've unzipped a file, you've used lossless compression. If you've taken any pictures with your camera yet, you've almost certainly used lossy compression.

The two kinds of compression serve different purposes. Some kinds of files—programs, spreadsheets, word processing documents, and the like—can't tolerate losing any information. Drop a few bits, and your program won't work, your critical spreadsheet will be scrambled, and your research paper will no longer open in your word processing program.

Unfortunately, the requirement that you be able to fully reconstruct the original file limits how much you can compress the file. There's no point in getting into how compression works. Suffice it to say that there are all sorts of tricks that will let you drop file size. Even so, you will eventually reach a point where any further compression will lose information. On average, most compression schemes can cut files to roughly half their

original size before you get to that point. That's nowhere near enough to do you much good for storing photos.

However, photos are a different kind of data. If you lose information from a photo file because of compression, you won't be able to exactly reconstruct the original file bit by bit, but if you lose only a little information, you'll be able to reconstruct it closely enough so the human eye won't see much difference. If you lose a touch more, you may be able to tell the difference, but you might have to look for it. Lose a bit more, and the difference may be obvious, but you can still produce an acceptable image. And so on. Basically, you can trade off information for image quality, and choose between more compression with small file size and lower image quality, or better image quality with less compression and larger files.

JPEG Format

The standard format for compressing photos is *JPEG* (pronounced *jaypeg*), a lossy compression scheme named for the acronym for the Joint Photographic Experts Group. You can recognize files that use this format by the file extension *.jpg* (which is also pronounced *jaypeg*.). If you have compression turned on when taking a given photo, most, if not all, cameras will store the photo as a *.jpg* file. Some cameras don't use anything but JPEG format.

JPEG is designed to let you choose between compression and small files on the one hand and maintaining image quality on the other, with a wide range of compression levels available. Individual cameras and programs can offer one or more compression choices. Most cameras offer at least two or three settings.

For an example of what JPEG compression actually does to a photo, take a look at Figures 2-23 through 2-26. The first picture in the group is not compressed.



Figure 2-23.

An uncompressed image at 1200 pixels per inch width.

We took the photo in Figure 2-23 without compression, so it's an unadulterated 1200 pixels across. The original color version of this photo, cropped as shown, took 1.7 megabytes (MB) of disk space.



Figure 2-24.

This is a compressed version of the photo in Figure 2-23.

The photo in Figure 2-24 is identical to the one in Figure 2-23, except that we compressed it using the maximum compression that our graphics editor allowed. Printed at this size, it's hard to see any difference between the uncompressed and compressed versions, and the compressed color version takes up only 70.8 kilobytes (KB) on disk.



Figure 2-25.

Here's an enlargement of part of the uncompressed version of the file.

The difference between the compressed and uncompressed versions of the files shows up when you enlarge the image. Interestingly, the difference is far more obvious on

screen than in printed output, but if you compare Figures 2-25 and 2-26, you can see the difference.

Note that in Figure 2-25 the enlargement is a little grainy, but there are no obvious problems in the photo. In Figure 2-26, you can see artifacts—problems introduced by the process of compression—in the form of little rectangular areas in many of the rocks, particularly on the upper left. These rectangles are much more obvious when you view this on screen, and they become more obvious in print with greater enlargements.



Figure 2-26.

Here's an enlargement of the same part of the compressed version of the file.

Not so incidentally, we created the compressed version of the file by compressing the original, uncompressed version using Adobe Photoshop, so both started with the same image quality. In addition to comparing them for quality, look at Table 2-2, which compares the file size for different levels of compression for color versions of the image. To give a sense of the range available, we included file sizes for four different levels of compression, as well as the uncompressed file size.

Table 2-2 Sample of File Size with Different Levels of Compression

Compression Level	File Size
No compression (original .tiff file)	1.7 MB
Low	367 KB
Medium	221 KB
High	142 KB
Highest	102 KB

As you can see in the table, the difference in file size between no compression and even the lowest level of compression can save a significant amount of storage space (1.7 MB compared to 367 KB). The difference between no compression and the highest level of compression can be enormous (1.7 MB compared to 102 KB). Note also that the file

size for an *uncompressed* photo at a given resolution and color depth will always be the same. However, the file size of a compressed file will change from one file to another for any given compression setting, because the amount of compression you actually get depends on the amount of detail in the image.

The trade-off you're willing to make between compression and quality is very much a matter of personal taste, with no hard and fast rules to follow. You have to decide on the minimum quality level you're willing to accept based on what the pictures look like, and then weigh quality against the convenience of fitting more photos in your camera memory at once. But whatever quality level you're willing to accept, your choices are limited by what your camera offers—at least until after you move the pictures to your computer.

Now on to resolution.

About Resolution

Like compression, resolution has a visible effect on image quality. In Figures 2-23 through 2-26 we used the same resolution with and without compression. The next set of three pictures, Figures 2-27 through 2-29, are all without any compression, but with different levels of resolution. More precisely, the final versions of each photograph have the same number of pixels, because it's required by the printing process. However, all except the first started out with lower resolutions, and increasing the resolution for printing the photos doesn't increase sharpness or level of detail.



Figure 2-27.

This first image looks sharp, with crisp, clean edges.

Figure 2-27 is a cropped version of the photo in Figure 2-23. In addition to cropping it, we then enlarged it to be 1200 pixels across. Even though we've enlarged the photo, it still shows crisp focus, which you can see along the edges of the rocks in the rock wall, and the leaves in the bushes above the wall.

**Figure 2-28.**

This image, at 640 pixels across, has a soft focus effect compared to Figure 2-20.

In Figure 2-28, we took the original photo and dropped its resolution to 640 pixels across, which is a standard low resolution you'll find in many cameras. We then cropped it and enlarged it, following the same steps we used for Figure 2-27. Many people will still find this acceptable, but if you look closely you'll see a soft focus effect compared to the version in Figure 2-27. Not so incidentally, the color version of this file is 540 KB, compared to 1.6 MB for the color version of Figure 2-27.



Figure 2-29.

At 320 pixels across this image goes beyond a soft focus effect to being outright blurry.

For Figure 2-29 we dropped the resolution down to 320 pixels across, a standard resolution for video clips. We otherwise followed the same steps as for Figure 2-28. You don't have to look closely at this picture to see that it's blurry.

Resolution and Compression Together

Both pixel resolution and compression work together to determine image quality. These two settings also determine how large a file the photo turns into, and how long it takes to save the photo to the camera's digital film. Saving a high-resolution photograph that's not compressed at all can take long enough to leave you drumming your fingers and watching the next good shot get away. And all of this taken together is why cameras use compression and why they offer more than one resolution setting.

As we already mentioned, choosing a compression level and resolution setting is very much dependent on what's available in your camera. That gets a little complicated to talk about, because cameras use different strategies for mixing the choices of resolution and compression settings.

Some cameras let you choose resolution separately from the compression, so you can combine any level of resolution with any level of compression. Others offer some resolution choices that are compressed and one or more choices that aren't compressed. Still others don't offer an uncompressed choice at all. And you may or may not have different levels of compression to choose from for any given resolution.

Given all this, your first step in choosing resolution and compression settings is to find out what choices you have in your camera. Start by looking for information on resolution and compression, but be aware that your camera manual may use different terms. For example, the Nikon and Casio manuals talk about "image size" when they mean the resolution in pixels and "image quality" when they mean the level of compression.

Once you track down the settings available in your camera, you can decide which setting to use when. Given that the final choice is really a matter of taste, you'll ultimately come to your own conclusions based on your own experience. But there are a couple of tips we can give you to help you get started.

First, use the lowest resolution you need for any given picture. To view your photos on screen, you never need more pixels in the photo than there are pixels on the screen. More often, you'll want fewer pixels in the image, because you'll want to look at the image in a window. Even if the window is full screen, as in Figure 2-30, the title bar, menus, scroll bars, and so on will take up some pixels. If the photo has as many pixels as the screen, you either won't be able to see it all at once, as in the figure (which you can tell by looking at how much room the scroll bars give you for scrolling), or you'll have to zoom out to make it smaller, which may hurt picture quality.



Figure 2-30.

For viewing an image on screen, you'll want fewer pixels in the image than in your screen resolution, or you won't see the whole picture at once at its best.

A useful rule of thumb for photos that you plan to show only on screen is to use a resolution that, after cropping, makes the photo roughly the same size as the next smaller standard for screen resolution. Table 2-3 shows the standard resolutions for PCs.

Table 2-3 Photo Resolution for Different Screen Resolutions

Screen Resolution (Name)	Screen Resolution (in Pixels)	Approximate Resolution to View Photos on Screen	File Size for Uncompressed Color Photo
Super VGA (SVGA)	800 _ 600	640 _ 480	0.92 MB
XGA	1024 _ 786	800 _ 600	1.4 MB
Super XGA (SXGA)	1280 _ 1024	1024 _ 768	2.4 MB
Ultra XGA (UXGA)	1600 _ 1200	1280 _ 1024	3.9 MB

Table 2-3 assumes that the lowest screen resolution worth taking into account is 800 _ 600. Some people are still using the older VGA (640 _ 480) resolution, but most computers today can handle at least SVGA (800 _ 600). If you don't have a specific com

puter in mind for showing a photo—if you’re putting it on a Web page, for example—assume viewers will have SVGA.

For printing, base your resolution on the largest size you ever expect to use for printing the photos. If you think you might print them at 8 _ 10 inches, for example, you’ll want to calculate the number of pixels you need to span 10 inches. If you want to print at 5 _ 7 inches, you need only enough pixels for 7 inches.

The other number you need to know is how many pixels you want per inch in the printed photo. For example, 150 pixels per inch (ppi) produces reasonably high-quality output. You’ll need to experiment with this a bit and decide whether 150 pixels is enough for your tastes. If you demand a somewhat higher quality, you may want to shoot for 200 ppi. Table 2-4 shows the number of pixels you need in the longer direction of the photo for some common photo sizes, for both 150 ppi and 200 ppi. If you expect to crop at all, keep in mind that each entry in the table shows the number of pixels you want *after* cropping the photo.

Table 2-4 Photo Resolution for Printing at Different Sizes

Photo Size (in Inches)	Number of Pixels in Longest Direction for Printing at 150 ppi	Number of Pixels in Longest Direction for Printing at 200 ppi
2.5 _ 3.5 (wallet size)	525	700
4 _ 6	900	1200
5 _ 7	1050	1400
8 _ 10	1500	2000

An important difference between picking resolutions for printing compared to picking resolutions for showing photos on screen is that for printing you can have more pixels than you need without hurting the quality of the printed photo. If you have a higher pixel resolution than you need, however, printing will take longer and you’ll use up disk space unnecessarily.

Having said that, also note that taking a picture at a higher resolution than you need is not a problem for photos that you intend to view on screen. You can lower the resolution with a graphics editor without losing image quality.

There’s one other thing you need to know about resolutions for printing: it’s easy to get confused between picture resolution and printer resolution. We’ve been careful to talk about picture resolution in *pixels* per inch. You will often hear it referred to in *dots* per inch, which is a more common way to talk about resolution in general. And pixels are, after all, dots in some sense.

We’re not splitting hairs by insisting on talking about pixels per inch instead of dots per inch; we’re trying to avoid confusion. The problem is that printers measure printing resolution in dots per inch. If we used the same term to refer to pixels, and then we told you that you should print your photos at 150 dots per inch, you might think we were talking about the printer setting. But you want the printer set at some higher resolu

tion—300 dots per inch, or 600 dots per inch, or higher still. No matter the printer resolution, however, you want the photo at 150 *pixels* per inch.

Finally, for choosing the resolution and compression to use, until you're familiar with your camera, take pictures with as little compression as the camera allows so you can learn how resolution affects image quality. Once you've sorted that out, you can start experimenting with the camera's compression settings or modes that use more compression to see what they do to image quality. In general, you should take pictures with the lowest resolution you need for the picture, and use compression only to the extent that you have to, either because the camera modes don't give you a choice, or it's the only way to fit a reasonable number of photos into a limited amount of memory in the camera.

What to Do with Your Photos After You Take Them

With film, you take the roll to your friendly neighborhood drug store or photo shop, drop it off, and come back to pick up the pictures later. Then you do all the familiar things: mail them to friends, put them in photo albums, frame them, or put them in your wallet. With digital photos, you have even more options, and some of them aren't so familiar.

First, you'll probably want to move the photos to your computer. You'd be surprised at how many ways there are to do that. Briefly, your camera most likely came with a cable to connect to your computer—most often by USB (universal serial bus) port on recent models. Most cameras connect directly to the cable; a few use a docking station. Once you get physically connected, you may be able to simply open the photo files or copy them to your computer, as if the camera memory were just another disk drive. With some cameras and some versions of Microsoft Windows, however, you'll need to install a special program to move the files. You should find details on all of this in your camera's manual.

Once the photos are on your system, you may want to edit them to enhance the image, fix flaws, or turn them into greeting cards; e-mail them or put them on a Web site; or print them. You can also upload them to a Web site to have the photos printed and delivered to your door by mail.

Our point, for now, is that you have a lot of choices. And some of them are, frankly, fun (at least we think so). So don't stop here: read on.