

1 What's in the Box?

BUYING A CAMERA

Digital cameras by their nature are more complicated than film cameras, but both types require intelligent physical design to be useful. All the items in the table below may not be camera features per se, but they do affect how easy a camera is to use. For example, if a camera is too bulky and heavy, it won't leave your house, let alone make it into your pocket or pack. If a camera has long shutter response or poor auto-focus performance, you will miss those fleeting moments of kids looking cute or that game-winning goal. Too often people judge a camera by its number of megapixels, but what good is a huge image sensor if you didn't get the shot?

Top Priority Features	Secondary Features
Overall camera usability	Built-in flash and/or external flash
Final picture quality	ISO range
Megapixels	Storage media (memory) format
Processor speed	Manual focus
Lens zoom range	
Lens quality	Custom white balance
LCD monitor/viewfinder	Video capture
Battery life, battery type	File format/resolution (JPEG, TIFF, RAW)
Shape/size/design	Available accessories
Weight	Durability/build quality
Shutter response/autofocus	
Shot-to-shot speed/start-up time	
Other unique features	

It is important to keep in mind your photographic style and preferences as you evaluate the features. In the overall scheme of things, you'll have to make trade-offs between desirable features, so you'll need a clear set of priorities to steer you effectively to a decision. Also remember that no single camera feature is responsible for creating a quality picture. Each feature is but one link in the chain — and you know the old saying about the chain being only as strong as the weakest link. And by the way, your photographic experience is part of that chain!

Buying a digital camera can be daunting. With all the different types available, it may seem impossible to make the right choice. Fortunately, almost all digital cameras can be readily grouped by the intended

audience for which it was created by the manufacturer. And while some camera specs (like zoom, etc.) can sometimes overlap between these groupings, some basic criteria has evolved over the past few years that make identifying a camera's intended audience relatively straightforward.

For our purposes we'll segment the digital camera market into the following categories:

Basic Point & Shoot Cameras - These are totally automatic models designed for casual photography. They are, by definition, very simple to operate. This also means that without controls for things like exposure or even a zoom, the type of pictures you can take are sometimes very limited. Resolution in this class is usually limited to 3MP (up to 5x7 print) and lower quality lenses. Lag time and shot-to-shot times are usually very noticeable.

Mid Range Point & Shoot Cameras - With resolutions in the 4-6MP range (up to 12x16 print), these cameras are a significant step up in design. Here you will see the introduction of white balance options, multiple focus modes, expanded zoom range (35-110mm is common) and ISO setting flexibility as well as others. Speed and processing is improved but lag time is still noticeable.

Advanced Compact Cameras - These high end 'prosumer' models have versatile controls and can be employed in challenging lighting such as sunsets and dimly lit areas. Many have external flash capabilities. The list of manual settings such as independent shutter and aperture settings is extensive in order to match their 7MP+ resolutions (up to 16x22 print), falling just short of those offered by digital SLR's. Long zooms are common as are specialized modes for focus and color balance. Camera speed is superb with lag time and shot-to-shot times being very manageable.

Subcompact Cameras - Once long on looks and short on specs, these supermodel-thin status symbols are becoming more capable with each new generation. Many models now sport 7MP of resolution. Still, with sizes comparable to a deck of cards, there's only so much functionality that can be built in to a few ounces. They're defining attribute is still the ability to be carried in a shirt pocket. For serious picture taking, the premium paid for portability could be better spent on camera features in one of the other categories.

Super Zoom Cameras - A hit with the travel, nature and sports photographers, these models are terrific for bringing distant action up close or for zeroing in that close up. Recent advances in lightweight precision optics and affordable image stabilization have made this class of camera extremely popular although they are a bit heavier than when compared to all but SLR's. Typically falling into the Advanced Compact category in terms of specs, their very long zoom range and telephoto capability makeup somewhat for the point & shoot camera's inability to use multiple lenses. In the digital world, they are the current leaders in the one-size-fits-all race.

SLR Cameras - Single-Lens-Reflex (SLR) cameras offer through the lens (TTL) viewing, interchangeable lenses, instant startup, virtually zero lag time, fast continuous shooting, RAW image capture, full manual controls and a myriad of available filters and accessories. Of course this all comes for a price. SLRs are both expensive (starting at

about \$1000 w/lens) and heavy. Their full metal or magnesium bodies are usually sealed against moisture and dust. In short, Digital SLR's are becoming almost indistinguishable from their film-based counterparts. One potential drawback - because these models are generally aimed at professional photographers, their controls are not necessarily designed for ease of use. A factor you should consider if you make a living at something other than photography and won't be taking pictures every day.

As you can see, there are really only a few variations on a theme when it comes to types of digital cameras. Aligning your photography requirements with one of these categories should make your purchase process much easier the next time you browse the display case at your local camera or electronics store.

To spend your money wisely, estimate your total budget by considering not only how much money to spend on a camera, but also how much to spend for accessories that will make the camera more useful. Similarly featured cameras tend to sell for similar prices, regardless of the brand. Table ??? shows what you might find at certain retail price points for non-SLR cameras announced through January 2006.

Price Range	Comments	Major Manufacturers
\$100-\$300	<ul style="list-style-type: none"> • Small size, simple controls, low-resolution sensors, limited options, questionable durability, and possible lack of software. • Save for a better model or buy a recently discontinued, higher-end model. • Stick with a major brand in case you run into reliability, support, or software issues. 	All major manufacturers and many no-name brands
\$300-\$500	<ul style="list-style-type: none"> • Basic to extensive controls and features, medium to high resolution, and various sizes. • Most people buy in this range, so many models are available for various purposes. • Physical size and build quality varies greatly. 	Many, including Kodak, HP, Nikon, Canon, Casio, Sony, Fuji, and Panasonic
\$450-\$700	<ul style="list-style-type: none"> • Higher resolution sensors and faster camera responsiveness. More features (e.g., stabilization). • Physical size ranges from tiny to medium-large. • High build quality. 	Same as above, but the better models typically come from the list below
#700+	<ul style="list-style-type: none"> • Highest resolution sensors available at time of manufacture, advanced features, ability to use external lighting, better lenses, and camera speed. • High build quality but physically 	Canon, Nikon, Olympus, Fuji, Konica/Minolta, Pentax, Sony, and Panasonic/Leica

	larger than others. • May approach quality of entry-level DSLRs.	
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IMAGE SENSOR SIZE: MEGAPIXELS

If you believe the advertising, a big image sensor measured in megapixels (MP) is the most important feature, and “more is better,” right? Well, not exactly. Not all image sensors are created equal, not all lenses match their sensors well, and not all internal camera software produces clean, noise-free picture data. Even color accuracy varies among camera models. If picture quality is important to you, you probably do want a high megapixel count, but not at the expense of good picture data: a big, ugly picture is definitely worse than a little, ugly picture! However, since a camera’s price is often related to its megapixels, you may wish to begin with the question of how much is enough.

How many megapixels are enough?

Let me just mention here that although the following information applies primarily to point-and-shoot cameras, much of it is relevant to DSLRs as well. More megapixels are desirable for making large prints, for cropping your photos significantly, or for any other uses that require a large amount of data. When you crop a picture on your computer, for example, a higher number of pixels ensures that the cropped picture still contains enough data so that it won’t have unacceptably low resolution to display or print the image properly. Keep the following recommendations in mind as a framework for determining what you need:

- Snapshotters generally don’t need more than 3 MP to 5 MP unless they can afford to buy higher-resolution models and want the capability to make enlargements “some day.”
- Snapshotters on a budget should look for a 3 MP or 4 MP model. Major brands currently offer good quality models that shoot pictures that can be enlarged with reasonably good results.
- Artistic photographers usually want as many megapixels as they can afford, provided that the quality matches the sensor size. The recommended minimum is 4 MP, although photographers with broader budgets should seek quality 5 MP models and beyond.
- Recent 4 MP and 5 MP models are suitable for all types of photographers, because they strike a balance between quality, features, and price.
- Point-and-shoots with 7 MP or 8 MP are now common, and while it may seem that DSLRs are getting a run for their money, DSLRs still get the nod for ultimate image quality.

LENS ZOOM RANGE (WIDE ANGLE TO TELEPHOTO)

Instead of using removable lenses like an SLR camera, most point-and-shoot cameras come with one zoom lens that covers a range from somewhat wide angle to telephoto. Camera manufacturers list zoom capability in multiples—such as 3x, 5x, and 12x—but these don't tell the whole story. Zoom isn't just about making an object larger in the frame; it's also about understanding your preference for wide angle (big, wide field of view) or telephoto (telescopic) pictures, or both. Evaluating zooms this way is better than choosing by multiples, which don't tell how wide or long the lens is compared to others.

Wide angle encompasses what you see from left to far right in one picture frame. This is called a field-of-view and is measured in degrees (your eyes normally have a field-of-view of almost 180 degrees). The wide field-of-view also applies from top to bottom.

In contrast, when you look through a telescope, you see exactly what telephoto lenses do. Distant objects appear larger and closer in a narrow field-of-view. Telephoto lenses also distort the perceived distance between objects. The distortion makes objects appear closer together than they really are by magnifying their relative sizes—the opposite of wide-angle lenses.

Zoom lenses are mostly great: one lens does it all. Unfortunately, they have their issues. One is varying degrees of lens quality. Due to practical constraints, wide-angle lenses are expensive. Lower-quality wide-angle lenses are available, but they suffer from visible distortions that some people will find unacceptable.

To keep costs low, digital cameras are built with zoom lenses that tend to favor the telephoto over the wide angle, meaning they provide strong telescopic power but minimal wide-angle range. This is not necessarily a problem unless you often find yourself taking a picture and wishing for a wider-angle view. Snapshooters may not really miss wide-angle views, but artistic shooters probably want that capability. If true wide angle is important, you will find it on models priced \$500 and above. Other models may be advertised as wide angle, but they probably just meet the definition.

Note that zooms come in two varieties: Optical and Digital. Without going into detail, suffice it to say that you want to avoid digital zoom at all costs. Digital zoom uses software tricks to 'enhance' the image. The result is most often terrible. Insist on optical zoom,

LCD MONITOR AND VIEWFINDER

Digital technology has changed how we frame pictures. An LCD monitor has largely replaced the traditional optical viewfinder. Although many cameras now provide both, often only the monitor works with any precision (except on SLR cameras).

However, for serious serious photography (translated, "you get paid to take good pictures") I recommend using a camera that has a viewfinder. It is important to be able brace the camera against your face in order to eliminate camera shake and blurry pictures.

Consequently, the average digital camera user no longer "hides behind" the camera. Instead, she holds it away from her face to view the

screen. Consider the following factors when examining a particular model's LCD screen. Some of these points can be determined only by using the camera or by reading a thoughtful review of its actual use.

- How large is the screen? Many newer models feature screens measuring between 2 and 2.5 inches; however just as with the image sensor, the number of pixels varies between models, so look for a higher pixel count to see more detail.
- How bright is it, and can the brightness be adjusted? • Is the screen readable in full sunlight outside? Is glare a problem?
- When switched on, is the display cluttered with control information, or can you reasonably see what you're photographing? Can you switch off the display's control information?
- Does the picture show the same area displayed on the monitor? This is called framing accuracy. You may have to practice "seeing" (imagining) the final result until you are familiar with how your camera crops the scene.
- Does the monitor pivot or twist out from the camera body so you can use the camera at unconventional angles (such as overhead in a crowd)? Is the pivot hinge durable and well constructed?
- Does the monitor provide useful information before, during, or after the shutter release?
- Is a quick-review feature (one-touch) available to see the last shot?

A relatively recent development is the electronic viewfinder (EVF) found on some models. On a camera, it looks just like an optical viewfinder (usually above the LCD), but you're actually just looking at a much smaller LCD screen.

In theory, it works like a video camera's viewfinder, enabling you hold the camera up to your eye in the traditional fashion. In practice, however, the EVF doesn't (yet) live up to its potential. The image seen through the EVF is often too grainy and the reproduction of light too harsh. Thus, it's difficult to relate what you're seeing to what the camera captures. Also, many EVFs don't provide control status info, or if they do, the information clutters the viewfinder so much that it interferes with your ability to compose the subject. If an EVF appeals to you, be sure to try it out before you buy.

BATTERY LIFE AND BATTERY TYPE

You can expect that any digital camera on the market today has an adequate battery life for typical use, so don't weigh your digital camera buying decision too much on battery life unless you are a serious hobbyist and know that your camera will be seeing heavy use. I would buy a camera with less than spectacular battery life if it did many other things extremely well. (You can always buy extra batteries.) However, battery life is still something to investigate so you know what you are getting. If you're on a job in another country or out in the wilderness away from electrical outlets, battery life becomes an important consideration.

If you are a snapshotter who pulls out the camera only every so often to take a picture, you may not need an extra battery. If you don't walk

around with your camera turned on taking lots of pictures even while on vacation, you may not need another battery. Everyone else should seriously consider buying a spare. Artistic photographers should definitely budget for an extra battery. When you find a camera you like, check the price of its replacement batteries. It might surprise you to find them run \$50 or more. If you can afford it, save yourself some heartache and buy an extra battery.

As with most electronic devices, cameras are powered by several types of batteries. Some models use standard battery sizes (such as AAA and AA), so you can usually find fresh disposable ones for sale nearby when needed.

Standard sizes are also available in rechargeable nickel-metal-hydride (NiMH) formulations; these are long-lasting and inexpensive over time compared to the spare batteries you may have stashed away in a drawer somewhere. As with all rechargeable batteries, be aware of proper charging and recharging procedures.

Other cameras use special battery types, often designed specifically for a camera model or family, which can be charged in-camera or by separate chargers. It can be inconvenient to charge your batteries in the camera. Obviously you will not be shooting if your camera is in the battery charger. Although the manufacturers want you to buy their branded batteries, generic spare batteries are often available for substantially less.

After charging the batteries before every use and the significant amount of zooming I do with my DSLR lens while photographing, it is my experience that the manufacturers' batteries last about two years.

I track each battery with a number (consecutive from the first battery purchased) so that I know when each battery is getting old. I use this information to know when it's time to buy a new one and bring it into service.

When shopping for extras, make sure the voltage rating is the same as the original battery. Rechargeable batteries rate their energy capacity in milliamperes; a larger number equals a longer-lasting battery. You can buy longer lasting batteries if the voltage is the same as the one that comes with the camera. Check online for the best deals in both branded and aftermarket batteries.

SHUTTER RESPONSE AND AUTOFOCUS

Shutter response, or shutter lag, is the delay between the moment you press the shutter release button and the moment the camera captures the image. Anyone who has tried to catch a candid moment with digital point-and-shoot cameras knows the frustration of repeatedly missing the peak action. A responsive shutter release like that usually found on SLR cameras is much better.

Manufacturers are, in fact, starting to address this deficiency in consumer point-and-shoot models. If you like candid snapshots of people, sports action, wildlife, or other moving subjects, you need the fastest shutter release possible. If you mainly photograph stationary subjects, this is not a concern.

A camera has shutter lag because it takes time to autofocus the subject. When the autofocus system runs into trouble, it “hunts” for focus by starting at one end of its range and motoring through to the other, looking (and hoping) for a clear image. Depending on what you’re shooting, this approach can be quick or it can fail completely.

Autofocus systems are especially challenged by dim light, flat (low-contrast) light and moving subjects. Even professional SLR users, such as sports photographers, practice with their equipment to become familiar with situations that fool the system. Be aware that autofocus speed and consistency also vary with lens zoom range. Wide-angle settings tend to be easier for the camera to focus than the telephoto settings. Aside from borrowing the actual model you are interested in, the only way to gain a sense of a camera’s shutter response and autofocus performance is by reading knowledgeable reviews.

You can also visit a camera store and ask to try their equipment before you buy.

START-UP TIME AND SHOT-TO-SHOT SPEED

If your photographic subjects are landscapes or portraits, start-up time is not likely to be important to you. However, if you’re capturing candid shots of sports or kids (or both), speed matters.

Another factor is a camera’s shot-to-shot speed, sometimes called cycle time. You’ll experience this in two facets of camera operation:

- The first is the number of consecutive shots you can make while holding down the shutter button. This is like the motor drive on a film camera; the speed is described as a number of frames per second, up to some maximum number (3 frames per second is good when shooting fast-moving subjects, but 5 or more frames per second is better). If a particular model is not advertised as having any frames per second, the camera is probably not built for speed; expect a 1–2 second delay between shots.
- The second facet of shot-to-shot speed is the functionality of the camera while writing to the storage card. Some cameras are useless while data is being written to the card, which means you wait impatiently for the machine to come back to life so you can view the last photo or make another one.

The delay in shot-to-shot speed is caused by the time it takes the camera to write image data to the storage card. Some cameras write data to a faster built-in memory buffer before writing to the relatively slower storage card. You can speed this process by shooting at a lower resolution (which moves less image information to the card), but obviously you are trading off image quality when doing so. You can also improve your camera’s speed by using higher-speed (and more expensive) storage media.

BUILT-IN FLASH VS. EXTERNAL FLASH

Almost every digital point-and-shoot camera comes with a built-in flash that can adequately light subjects within 3 to 14 feet. Flash is used

when conditions are too dim, but it can also be used to smooth out or fill in harsh shadows when the existing lighting is too bright from overhead, or coming from behind the subject.

If you're a snapshotter, just knowing that your camera has built-in flash is good enough for most purposes, so this feature may not be as critical to you as others.

Artistic photographers may or may not find flash capabilities important, since using anything but the built-in flash requires purchasing one or more external flash units (which can be bulky and cost at least \$100, and frequently more).

If you need more light than the built-in flash provides, or if you want more control over your light, then you must use an external flash. You need a camera with a mount for external flash units. A hotshoe is a standard external flash mount found on many cameras (usually mid- to high-priced models). Be aware that some manufacturers use proprietary mounts that work only with their flashes. Obtaining a good exposure with a flash can be tricky, so if you purchase an external unit, buy one designed to work with a camera from the same manufacturer.



Figure 1: Hotshoe

STORAGE MEDIA

Remember the Betamax versus VHS videotape format wars? Current memory card formats include CompactFlash, SD memory, xD-Picture Card, Sony MemoryStick, IBM Microdrives, and others. Fortunately, the format is secondary unless you own several digital cameras or need a lot of storage for an extended vacation.

Storage is available in two physical types: flash memory and micro-drives. Both now boast large capacities beyond 1 GB. Flash memory is relatively inexpensive and has no moving parts—a significant long term advantage. Micro-drives are complicated precision devices and amazing feats of engineering. Unfortunately, your pictures stored on them may not survive a simple drop to the floor. They are also not likely to survive a trip through your washing machine if you forget to empty your pockets on laundry day; people have reported that flash memory cards have survived both such misadventures.

Practically speaking, though, storage media is electronic memory and occasionally, albeit rarely, fails. For this reason, it may be wiser to purchase two or more medium sized cards instead of one huge card.

For example, choose two 512 MB cards instead of one 1 GB card, or two 2 GB cards instead of one 4 GB card. Depending on memory prices, two smaller cards may cost less than one large card.

Like most computer memory, prices of storage cards generally come down, but they are still not inexpensive.

Storage media speed

Storage media comes in different speeds; the media's internal software determines how fast it transfers data. For most people the difference in speed is not noticeable, so paying top dollar for the fastest card doesn't make sense unless you buy a DSLR. On the other hand, faster cards may affect things like shot-to-shot speed, depending on the design of the camera. Go with the big name brands such as SanDisk, Lexar, Kingston, Hitachi, and Microtech. If speed isn't an issue, look for significant discounts on older cards with slower data transfer speeds.

MANUAL FOCUS

Autofocus works well when the light is bright enough and the subject is standing still, but in some situations, the light is often dim and people have a tendency to move around. Manually focusing the lens puts you in control, rather than leaving you at the whim of the camera's electronics. Also, people interested in macro photography (extreme close-up shots) will find manual focusing helpful.

On the other hand it can be much slower and clumsier than autofocusing. In all likelihood, only advanced photographers care about manual focus. Snapshooters rarely use it, but may want it for specific shots such as photographing hazy clouds, where the autofocus can't find something to lock onto.

Many mid- to high-end cameras include a manual focus control, accomplished by rotating the lens by hand or (more commonly) by using digital controls to focus. Remember film cameras with manual focus? Remember the smooth focusing action of the lens barrel? If so, you'll be disappointed with digital manual focusing. The controls are usually awkward, and the lens typically focuses on a limited number of preset distances between the closest focus point and infinity. Unless you know you'll use manual focus frequently for specific purposes, prioritize on other features. Still, landscape photographers seeking to maximize depth of field may find this feature useful. Setting your camera to manual focus mode should also increase shutter responsiveness, since the autofocus mechanism doesn't need to acquire focus before releasing the shutter.

UNIQUE FEATURES AND FUNCTIONS

As with computers, you may wish to wait for some new function before you buy, but we generally recommend you buy what you need now. Tomorrow will always offer something new. Here's a sampling of features you might find worthwhile:

- **Anti-shake/image stabilization/vibration reduction:** This stuff works. It allows you to hand hold the camera at much slower exposure speeds than before (instead of using a tripod). This feature is great for low-light situations. However, it does not help

to freeze moving subjects—you still need a fast shutter speed and high ISO setting for that.

- **Histogram review:** A histogram is a graphical chart representing the amount of colors and light values in an image.
- **Diopter correction for the optical viewfinder:** Older photographers with glasses may find this feature necessary in order to use a camera's optical viewfinder.
- **Video or television signal output:** This useful feature allows you to display images on a regular television directly from the camera. Most cameras with this feature include the cable for connection to a television.
- **Long exposure capability ("bulb" mode):** Photographers seeking to make exposures longer than 30 seconds use a setting called bulb mode. Bulb mode is a term that comes from traditional film cameras of old, which gave photographers manual control over the shutter release (by squeezing a rubber bulb whose air pressure triggered the shutter). A remote control has replaced the old bulb, enabling you to make the long exposures needed for night photography or astrophotography.
- **Remote control:** While most people will find the built-in self-timer adequate, a remote control may be useful for self-portraits, group photos, and other situations where you can't be behind the camera to take the shot.
- **Built-in neutral density filter:** This feature is highly useful (but not necessary) for making portraits in the middle of the day under bright sunlight. When you use your flash to fill in the shadows cast by the sun, the neutral density filter brings the overall brightness down, which is often more pleasing to look at than harsh daylight.
- **Audio recording/audio annotation:** These features are useful for making notes on a specific image (versus writing them down in a separate journal), but only if such audio warrants the effort and the memory space used.
- **Panorama mode:** This feature normally just crops the image size in the camera to fit the wider aspect ratio of panoramas. It's a simple and convenient feature, but if you want greater quality stitching a series of images together with special software is probably a better bet. This software does not always work perfectly, but it can create viable collages from a series of overlapping images.
- **Accessory lenses adapter/threaded lens mount:** This feature enables a camera to accept extra lenses that boost the telephoto range or widen the wide-angle view. Close-up lenses for macro photography are also available. The adapter or threads may also allow you to mount standard photographic filters such as polarizing filters and graduated neutral density filters.

Telephoto extenders usually work okay, although your autofocus speed may suffer a bit. Wide-angle extenders are expensive and often introduce significant distortion. Try before you buy, if possible.

- **Direct printing:** This feature allows the camera to print directly to a compatible printer without using a computer. It can be a

useful feature if printing via your computer is not desirable for any reason. If you prefer that someone else do the printing, or you don't care to deal with the paper and ink costs, another option is online print services. DPOF and PictBridge are two print compliance standards.

- **Metadata:** Every picture you take includes some amount of metadata, which is, essentially, information about information. For digital pictures, it includes obvious things like exposure settings and the time and date when the picture was taken. You won't see any visible information in the picture itself, because it's kept in a special part of the picture's data file. But when you import the picture into a computer, that information can help you organize your images

CAMERA CASES

For many small consumer cameras, you may wish to purchase a thin sleeve or small padded case to protect the camera when it is in a purse or other bag. As you accumulate other camera-related items, however, you may want to move up to a dedicated bag with padding and plenty of pockets.

The advantage is that you'll have a padded, protective place for all your photographic gear. The disadvantage is that you may not be able to carry much else. For example, a camera backpack (for DSLRs) often includes padded dividers and pockets for lenses, but no place for an extra jacket or your lunch.

With a fancy camera bag, you may also be advertising to thieves that you're carrying a camera, so be careful when and where you set your bag down—a nice case often carries a nice camera inside. As you're shopping around for cases, consider these aspects:

- Will you have fast and easy access to the camera?
- Does the bag or case carry easily on your shoulder or hips?
- Does the cover/lid open away from you or provide you with a "deck" to place small objects on?

TRIPOD

Tripods take discipline to use, because they tend to be inconvenient to carry and unwieldy to set up. However, they can be worth the effort, especially for landscape and macro photographers. They come in many sizes, shapes, and prices for all types of photography. If you're serious about using a tripod, consider the lightest you can afford and, if applicable, buy a decent ball head for the tripod (good tripods come in two parts, the legs and the head). Also consider mini-tripods and monopods if you're looking for quick, light support.

WATERPROOF/UNDERWATER HOUSING

A waterproof or water-resistant housing, if available, may be one of the best accessories you can buy for your camera if, of course, you plan to spend a significant amount of time shooting pictures under water or in very wet conditions. Be prepared to pay for this protection; camera housings can cost almost as much as the camera itself. Still, the better

ones make all controls available, and you can take some fun pictures on your next snorkeling or whitewater-rafting trip. Housings aren't available for all models, so if you're serious about this accessory, be sure to check what is available. Some housings are made by the camera manufacturer, such as Olympus, while others are made by aftermarket companies like Ikelite.

FILTERS OR FILTER SOFTWARE

A photo doesn't need to be an exact representation of reality. Artistic photographers often use filters that screw onto a lens to add effects, filter out ultraviolet light, or other variations. If your camera cannot accept traditional screw-on filters, you can create photographic filter effects in the PC.

THIRD-PARTY PICTURE EDITING SOFTWARE

Any camera you purchase will come with software to download the pictures to your computer, but it may not help you view or edit them, or organize them efficiently. In fact, the software supplied by manufacturers can be frustratingly difficult to understand and use. Although the camera manufacturers have steadily improved their homegrown software, a slew of third-party developers have sprung into existence to meet the demands of a software-savvy public.

What you need depends on how much you find yourself shooting with your camera. The more you shoot, the more you may want aftermarket photo software. Here's what they do:

- **Browser software:** You can quickly scan and select photos to keep and to reject with these programs. This is called photo editing. A photo browser helps you rapidly load pictures for viewing and copying to a folder for keeping or further editing.
- **Cataloging software:** Cataloging software helps you organize your pictures. Three common choices are Apple's iPhoto, iView MediaPro, Extensis Portfolio and ACD See (although Photoshop Elements now ships with a capable cataloger). The first two are powerful but simple, while the latter is suitable for large, professional image databases.
- **Image processing software:** Image processing software makes it possible to manipulate your pictures in hundreds of different ways. This can entail everything from basic color and contrast adjustments to digital image compositing. The industry standard is Adobe Photoshop, but Adobe also offers scaled-down, yet highly capable, versions called Photoshop Elements and Photoshop Album. Photoshop is not necessary for enjoying digital photography and making snapshots, but artistic photographers are likely to want this software.

There are also a number of very capable (and less expensive) alternatives such as Corel Paint Shop Pro X. Once again, knowing your style should help direct your purchase. Also be aware of the software's system requirements and whether or not your computer exceeds those minimums. If you can afford it, we recommend avoiding the camera manufacturer-supplied software in almost all cases.

SUMMARY

For general snapshots:

- Small physical size, generally rectangular with retracting lens; easy to carry and stow in small pockets
- Quick and easy one-handed shooting operation (power on/off, zoom control, and shutter release)
- Fast start-up time when powering on
- Responsive shutter release/fast auto-focus
- Fast shot-to-shot speed
- Telephoto lens range from 85mm and higher
- Wide angle lens or zoom (lens equivalent to 28mm, 24mm, or lower focal length)
- Large telephoto lens aperture (f4 or lower f-stop number)
- Quick review of last picture shot
- Quick white balance setting (if overriding automatic)
- Self-timer shutter release

For portraiture:

- Telephoto lens range from 85mm and higher
- Large telephoto lens aperture (f4 or lower f-stop number)
- Responsive shutter release
- Fast shot-to-shot speed

For macro photography:

- Tripod socket, preferably centered under lens
- Telephoto lens range from 85mm and higher
- Self-timer or remote control shutter release
- Manual aperture (f-stop number) control
- Long exposure mode (sometimes called "bulb" mode) or capability to keep shutter open as long as desired
- Long exposure noise reduction
- Close focusing distance
- Hotshoe for connecting dedicated macro speedlites

For sports/wildlife photography:

- High shutter speed (1/500th of a second and higher)
- Large telephoto lens aperture (f4 or lower f-stop number)
- Zoom lens, minimum telephoto specification of 135mm or higher
- Fast, accurate, consistent autofocus at longest telephoto range
- Fast shutter responsiveness
- High-speed data transfer to buffer/card
- Low noise at ISO 400 and higher
- Capability to shoot at ISO 800 or higher

For landscape photography:

- Tripod socket, preferably centered under lens
- Telephoto lens range from 85mm and higher

- Self-timer or remote control shutter release
- Manual aperture (f-stop number) control
- Long exposure mode (sometimes called “bulb” mode) or capability to keep shutter open as long as desired
- Long exposure noise reduction