Selecting a Camera and Accessories

Chapter 1

Choices, choices, choices. Although any number of prices and features are available, three principal grades of digital camera exist: consumer, midrange, and professional. The first step you have to undertake is, of course, deciding which type of camera and which accessories are really important to you as a photographer. You may regard a digital camera as an easy way to handle photographs for family events and things that happen along the way — an inexpensive and user-friendly little camera for casual use. On the other hand, you may be interested in increasing your skill and understanding of photography and want to learn all the "bells and whistles" to become really proficient in photo shooting and editing.

Regardless of which goal you currently embrace (and, make no mistake, many, many people begin with the first and segue into the second), you want to take good, clear pictures and enjoy those camera features and accessories that can help you do that.

This chapter helps you through the process of evaluating and choosing a camera, features, and accessories that are appropriate for your needs and pocketbook. You may want to pay little and expect only a basic camera; or you may want a lot of flexibility and features, and therefore expect to pay more. You want to consider carefully how you expect to use your camera, and choose features and quality accordingly. If you have already purchased a camera, then you can either skip this chapter or read on and start choosing your second digital camera!

Get ready to . . .

Choose a Camera Form Factor

Style	Comments	Cost
Ultra Compact	Size of a credit card, depth <1", fits comfortably in front jeans pocket.	$300–$1400 (average $400)
Subcompact	Fits comfortably in shirt pocket.	$200–$800 (average $300)
Point and Shoot	Normal size automatic camera that has more features for the price than compacts (requires a camera bag).	$40–$600 (average $300)
Prosumer	Size similar to SLR cameras. Usually lacks detachable lenses.	$600–$1200 (average $500)
Single Lens Reflex (SLR)	For serious hobbyists and professionals. High quality cameras that look and function like 35mm cameras, including detachable lenses.	$800–$15,000 (average $1400)

Buy the most camera your budget allows, but budget for the type and frequency of use. Buying a $5000 digital camera to take the occasional snapshot makes no sense. On the other hand, don't trust a $15 throwaway to take the wedding or first baby pictures except in an emergency, in which case you should buy a throwaway film camera instead.

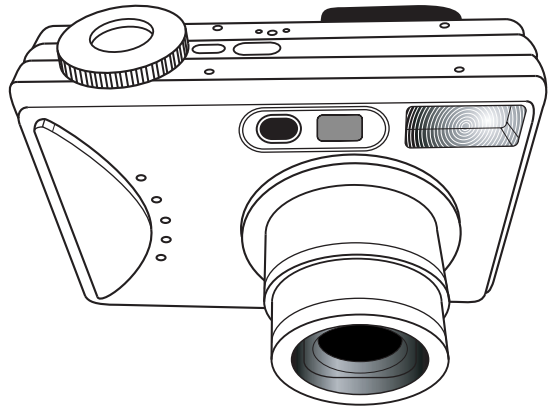

Figure 1-1: Subcompact camera

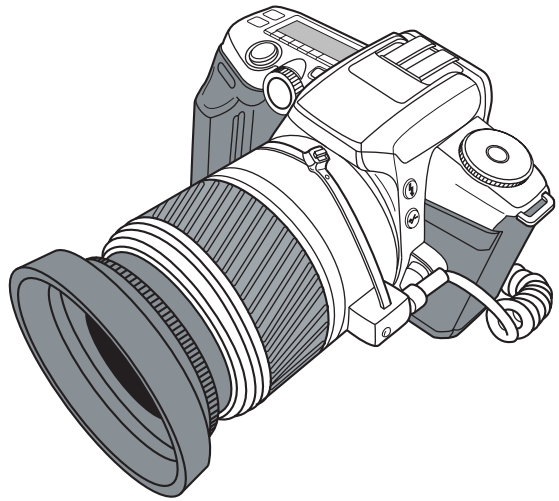

Figure 1-2: SLR camera

Choose Camera Resolution

Megapixels	What You Can Do with It	Cost
<1	Acceptable Web graphics	$30–$100
1-2	Very good Web graphics. Acceptable prints up to 4"×6"	$50–$350
2-3	Excellent Web graphics. Good prints up to 5"×7"	$150–$400
3-4	Excellent prints up to 4"×6". Very good prints up to 10"×12"	$200–$500
4-5	Excellent prints up to 5"×7". Very good prints up to 11"×14"	$250–$600
5-6	Excellent prints up to 8"×10". Very good prints up to 16"×20"	$400–$750
>6	Excellent prints up to 16"×20" and beyond	$800–$15,000

Bigger is better when it comes to resolution. You can always set your camera to take smaller resolution photos, but you can't increase the camera's maximum resolution. Buy the highest resolution camera you can afford that also has the other features you desire. On the other hand, balance is the watchword. Many professional photographers use 4 to 6 megapixel cameras on a daily basis.

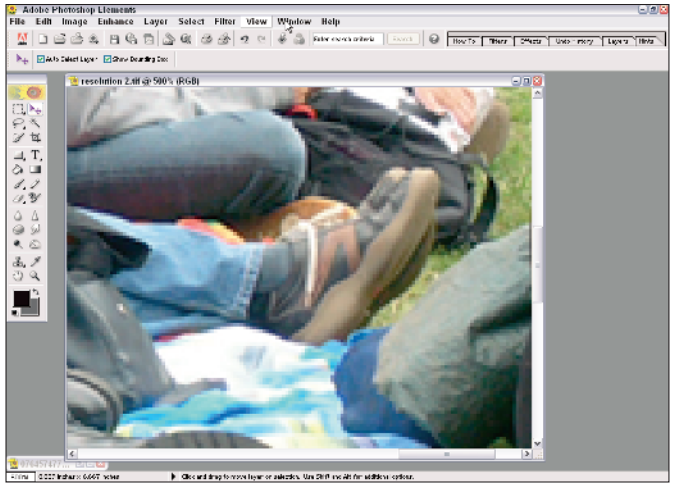

Figure 1-3: An 8"×10" print taken from a 1-megapixel camera

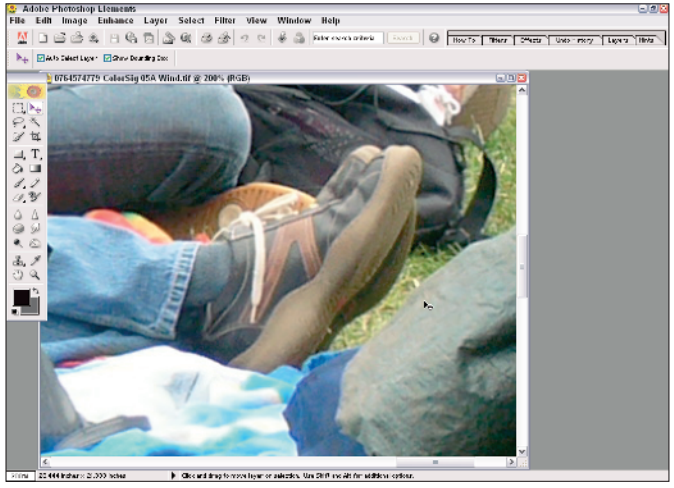

Figure 1-4: An 8"×10" print taken from a 5-megapixel camera

Evaluate Lens Features

Lens Feature	Comments
Focal length	The focal length of a lens is the distance between the optical center of the lens and the place where it focuses its image (film or digital CCD chip) and is expressed in millimeters. This determines the area of coverage from narrow to wide. Digital cameras generally rate their focal lengths as equivalent to 35mm film camera lenses. 20mm or less = Extreme Wide Angle 24mm to 35mm = Wide Angle 50mm to 80mm = Normal 100mm to 300mm = Telephoto 400mm and above = Super Telephoto
Macro mode or lens	This enables close-up photos of small objects. Good cameras have a macro mode built into their lenses.
Normal lens	Usually a 55mm focal length equivalent and is the most commonly used fixed lens.
Wide angle	A lens less than 35mm focal length equivalent. It allows shooting a more inclusive image in tight spaces. Lenses much wider than 28mm are referred to as fish-eye lenses because of their image distortion.
Telephoto	Lenses with more than 55mm focal length equivalent. These usually range from 75mm to over 1000mm and are used to snap photos of subjects at a distance.
Zoom	Zoom lenses have variable focal lengths and can be changed from wide angle to normal to telephoto. Digital cameras feature both optical and digital zooms. Optical zooms result in highest quality.

Figure 1-5: A shot taken with a lens with a wide focal length

Figure 1-6: The same shot taken with a lens with a narrow focal length

Lens Feature	*Comments*
Interchangeable lenses	Prosumer and professional cameras permit the use of different lenses. These can range from wide angle to telephoto. Some digital cameras allow the use of the same manufacturers film camera lenses for flexibility.
Lens extenders	These are available to multiply the magnification of zoom or macro lenses. They attach to the camera's lens. Some cameras don't accept extenders.
Filters	Better quality cameras allow the use of filters on the end of the camera lens. These can compensate for light color differences and can create special effects.

Most digital cameras, from consumer to prosumer, come with non-changeable optical zoom lenses. Most also have digital zoom features. Buy the camera with the largest zoom ratio you can afford. They range from 1.2x to 10x or more.

To see more examples of the effect of different focal lengths, point your browser to `www.usa.canon.com/html/eflenses/lens101/focallength/`.

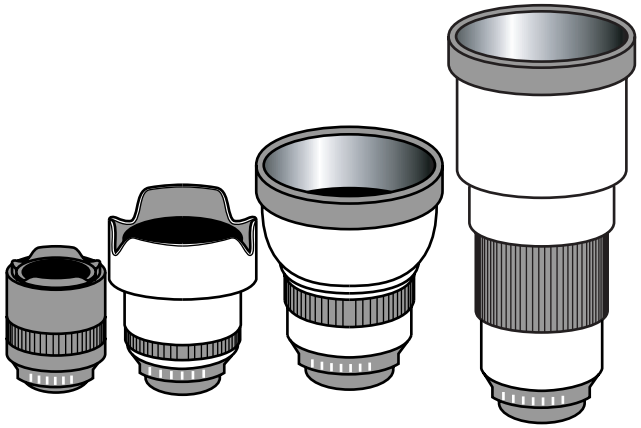

Figure 1-7: A variety of detachable lenses

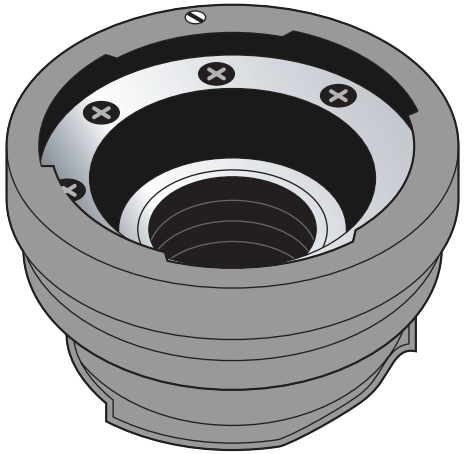

Figure 1-8: A lens extender goes between the camera and lens

Evaluate Picture Storage Solutions

Media Type	Sizes Available	Comments
Floppy Disk	1.44MB	Sony made floppy disk-based cameras for a while. These have generally been replaced by CD-ROM or memory cards.
CD-ROM	156MB	Some cameras have onboard CD-ROM burners. These are slow to save images.
Compact Flash Card Type I & II	16, 32, 64, 128, 256, 512MB; 1GB	Most common memory storage for digital cameras and PDAs. This is the largest format.
Memory Stick	32, 64, 128, 256, 512MB; 1GB	Sony's memory solution that is interoperable with a wide range of Sony products.
Smart Media Card	32, 64, 128, 256MB	Olympus and Fuji primarily use this memory type. They have started to use XD memory.
MMC Card	32, 64, 128, 256MB	They lack security facilities and are usually compatible with devices using SD cards.
SD Card	64, 128, 256, 512MB; 1GB	These are also a widely used storage card format.
XD Card	32, 64, 128, 256, 512MB	XD are recent innovations and store images faster than earlier formats. This memory type is largely specific to Olympus and Fuji cameras.

Some camera models, Sony for example, use floppy disks or CD-ROMs as alternative storage systems for digital photos. Many of these cameras now also support memory cards or sticks of at least one format. Some cameras accept more than one memory card format. Both of these alternatives can add flexibility in the field. Storage media can store approximately 25 pictures at 1600–1200 resolution per 16MB. So a 128MB card can store approximately 100 pictures.

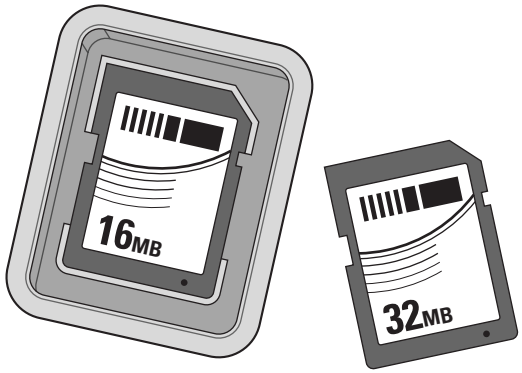

Figure 1-9: Typical card storage devices

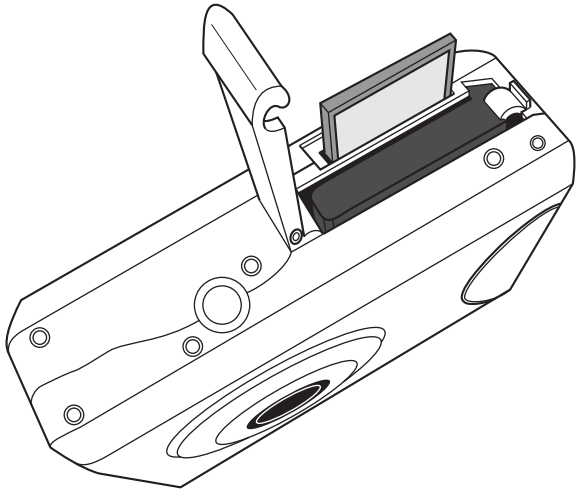

Figure 1-10: Inserting storage card in camera

Evaluate Zoom Lenses

Feature	Comments
Optical	Optical zoom uses the lens mechanism to change the focal length of the lens and allows the lens to zoom closer or farther away from the subject. Optical zoom maintains its quality at all levels. This is the most important type of zoom in a digital camera. A 10x zoom on a digital camera is roughly the equivalent of a 28mm to 200mm zoom lens on a 35mm film camera. The zoom factor of most optical zoom lenses ranges from 1.2x to 10x.
Digital	Digital zoom does much the same thing as zoom in Photoshop. The camera selects part of the digital image and saves only that part of the photo. Digital zoom reduces the actual resolution of your image, increases noise, and emphasizes shaky camera syndrome. Avoid using digital zoom if possible. If you need to accomplish a digital zoom effect, cropping the best photo you can get in Photoshop later is best. Digital zooms range from 2x to 10x.
Zoom Ratio	The difference between the size of the image that is projected onto the film at the widest (or smallest focal length) setting of a zoom lens and the size at the narrowest (or longest focal length). A 10x zoom lens magnifies the image in the narrow end of the lens exactly 10 times as much as the image at the wide-angle end.

Figure 1-11: Subject at normal range

Figure 1-12: Same subject at 9x optical zoom

Choose a Tripod

Type	Weight	Comments
Still photo		A tripod designed for still photography is designed to position the camera and then lock it into place. Stability and durability are key factors.
	Light	Good for point-and-shoot cameras.
	Medium	Good for all weight cameras.
	Pro	Good for pro and prosumer cameras. Has extra features, such as levels and fancy angle adjustments.
Video		A video tripod is designed to steady the camcorder and allow smooth pans and other camera movements as well as a stable platform when the camera is locked down.
Table top		Good for subcompact and for close-up photography.
Monopod	Light to Heavy	The monopod is a single tripod leg that you can attach a camera to. It doesn't stand by itself but works well to stabilize a shot and is ultra portable.

Figure 1-13: A lightweight tripod

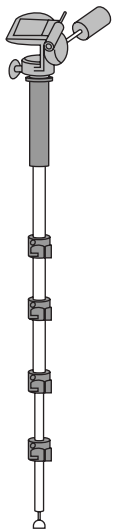

Figure 1-14: A monopod

Evaluate Camera Power Solutions

Battery Type	Comments
Alkaline	Alkaline batteries come in all standard sizes. If your camera uses a standard sized battery, it's probably AA. Alkaline batteries in cameras used with a flash last only a few photos. This is an expensive solution for frequent use.
Lithium	Disposable batteries. These may be called "photo batteries." They last well but are very expensive. The are available in most formats.
Nickel Cadmium	Rechargeable. These must be fully discharged before recharging to avoid "charge memory" and poor performance. Be careful not to overcharge.
NiMH (Nickel-Metal Hydride)	Nickel-Metal Hydride are excellent batteries and are rechargeable. These are the best value. They come in all standard sizes. Many proprietary batteries used in digital cameras are NiMH. These are powerful batteries and last about 400 charges.
Lion (Lithium Ion)	Lithium ion batteries are a good choice. They don't have "charge memory" and they last twice as long as NiMH batteries. These are usually after-market optional batteries and are purchased as extras. These are newer and not as widely available. They last about 400 charges.
External battery packs	You can power some cameras through the AC power socket using external battery packs. These come in many of the previous formats. These can be much larger with greater storage capacity. Clip them to your belt with a wire running to the camera. These are great on vacations or long shoots like weddings.

More expensive cameras may use proprietary batteries rather than standard AA, AAA, and so on. This means that you must purchase the manufacturers' batteries or after-market batteries designed for your camera when you need extras or replacements.

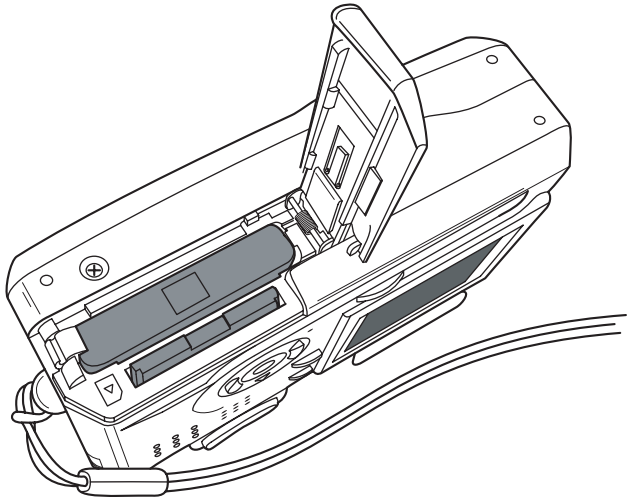

Figure 1-15: Loading a lithium ion battery

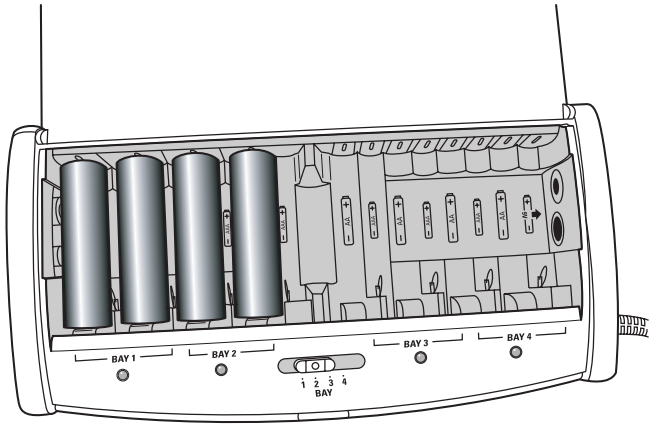

Figure 1-16: Loading batteries into a camera with AA batteries

Evaluate Supported Output Formats

Format	Compression	Comments
JPEG	Lossy	This file format is the most common. It's universally recognized. You can select the amount of compression and subsequent quality or loss of quality in the camera or in the computer.
TIFF	Lossless	TIFF is a standard photo or digital publishing format. It can be somewhat compressed but in order to lose no quality, the amount of compression is limited. This is a good finished file format and retains high image quality. You can select to shoot TIFF photos with many cameras.
CCD RAW	Lossless	You can set the more expensive prosumer and professional cameras to save the data directly from the CCD chip in the camera. This saves a huge amount of image information and is used by professional photographers and graphic artists to gain maximum image quality and flexibility. It's a very large file and severely limits the number of images that can be stored on common memory cards.

When a lossless compression image is uncompressed, its quality matches the original source. Lossy compression degrades images to some degree, and more compression equals more image loss. Use the least compression you can for the original image. You can always compress it more with editing software.

Figure 1-17: A JPEG stored without compression

Figure 1-18: The same shot with high compression

Review Image Statistics

Image Type	Image Size	File Size	Print Size	# on 32MB Card	# on 1GB Card
RAW	2272x1704	3.3MB	11x8.5	10	359
TIFF	2272x1704	3.3MB	11x8.5	10	359
Super Fine JPEG	2272x1704	2.2MB	11x8.5	14	512
Fine JPEG	2272x1704	1.4MB	11x8.5	27	910
Normal JPEG	2272x1704	.76MB	11x8.5	54	1726
Fine JPEG	1600x1200	.76MB	8x6	54	1726
Fine JPEG	1024x768	.28MB	5x4	94	2981
Fine JPEG	640x480	.12MB	3x2.5	196	5466

Use this table to determine the amount of memory required to store images of various sizes. You can easily plan memory needs for a vacation or photo shoot.

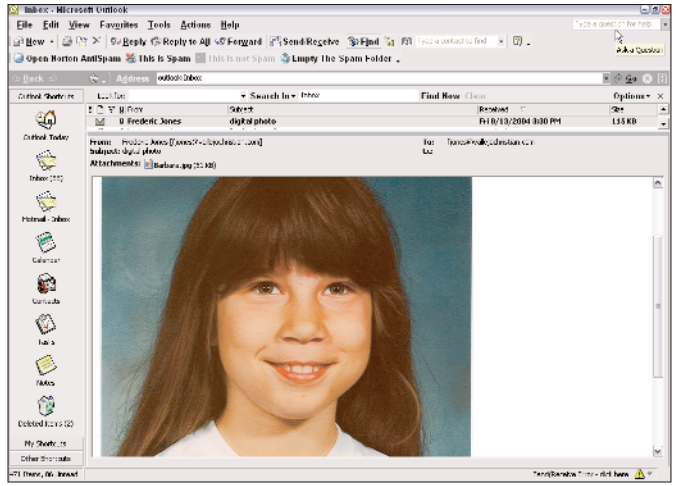

Figure 1-19: Choose a low resolution, such as 640x480 if you only want to e-mail your photo

Figure 1-20: Choose a high-resolution setting with no (or low) compression for photos that you want to print and frame

Evaluate Camera Functions

Function (Mode)	How to Use It	Comments
Automatic	Both aperture and shutter speed are set automatically.	
Exposure Compensation	A dial or control that allows you to increase or decrease the exposure one or two stops.	This is used to lighten or darken an image.
Shutter Priority	The shutter speed is set manually and the camera automatically sets the aperture.	Good for sports shots.
Aperture priority	The aperture is set manually and the camera automatically sets the shutter speed.	Good to control the depth of field in close-up shots.
Burst mode	Shoots a "burst" or group of photos rapidly and automatically.	Good when you need to take several shot to assure one is good as in a wedding or sport events.
Time-lapse mode	Sets the camera to automatically shoot an image at a set interval.	Good for nature photos.
Video mode	Allows the recording of short limited resolution video clips.	
Manual	Allows you to set all the controls manually.	

Figure 1-21: Exposure compensation can clean up overexposed photos like this

Figure 1-22: Aperture priority allows you to shorten depth of field in a close up

Function (Mode)	How to Use It	Comments
Fixed Focus	Simple camera lenses that can't be manually or automatically focused.	Found only in inexpensive and disposable cameras.
Automatic Focus	The camera adjusts the focus automatically.	Better cameras allow you to turn off this feature to allow manual focus.
Manual Focus	You manually focus the camera.	Good for busy pictures and patient photographers.
Focus & Exposure Lock	The camera automatically sets the focus and exposure when you hold down the shutter button while pointing to the subject.	
White Balance	The camera adjusts the image to compensate for differences in light.	Maintains color accuracy in daylight, fluorescent, and incandescent lighting situations.
Sport	Automatically presets the camera for sports photos.	
Portrait	Automatically presets the camera for portraits.	
Landscape	Automatically presets the camera for landscape shots.	

Choosing a camera is always a compromise. Choose the feature set that addresses most of your needs or those you anticipate.

Figure 1-23: Shutter priority allows you to stop the action

Figure 1-24: Manual focus enables you to focus on something not in the center of the picture

Evaluate Image Transfer Solutions

Mode	Rate	Comments
Direct Transfer from memory cards	150Kbsec–2Mbsec	This is easy but the slowest way to transfer large numbers of photos. A full 128MB memory card takes 2–4 minutes to transfer to your hard drive.
Infrared Connection	4Mbsec	This is a faster connection but most cameras don't support it. A full 128MB memory card takes 30 seconds to transfer to your hard drive.
USB cable	12Mbsec USB 2.0 = 480Mbsec	This is the most common connection and as fast as most people need. A full 128MB memory card takes 10 seconds to transfer to your hard drive.
IEEE 1394 (Firewire)	100–400Mbsec	This is the fastest connection but depends on the network speed.

File transfer speeds in real life are slower because of the nature of opening and transferring individual files by Microsoft Windows.

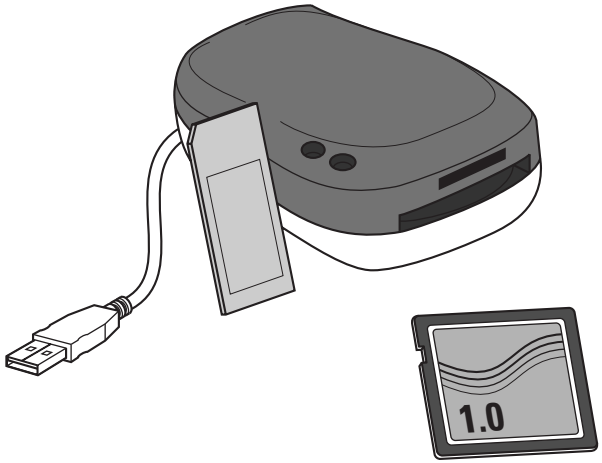

Figure 1-25: A card reader

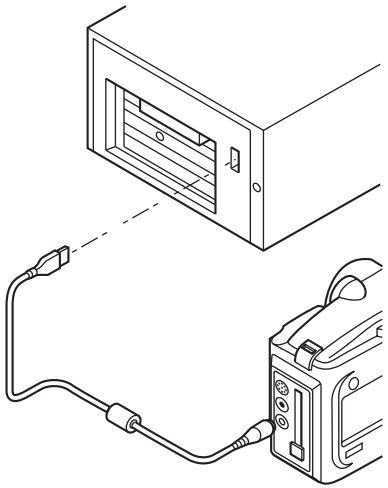

Figure 1-26: A USB cable connecting the camera and computer

Evaluate Supported Camera Technologies

Technology	What It Does	Comments
PictBridge	Allows a camera to plug directly into a supported printer.	Becoming available in new cameras and printers. It can be handy for portable printers.
Exif 2.1	The current standard physical file format used in most digital cameras.	Stores additional camera and other information beyond the JPEG image information. The physical file format is read by the software used to view and edit the photos.
Exif 2.2	The newest physical file format. Not yet widely used.	Includes a file header portion specifically designed to be interpreted by printer drivers and printers, which enables them to synchronize before printing.
PIM	Print Image Matching. Saves image information that assists printing more accurately.	A proprietary Epson technology that's not yet widely available outside Epson products. Exif 2.2 is a new industrywide standard addressing the same issues.

PictBridge and PIM are the only two of these technologies that you need to consider in choosing a camera. The others are a function of the state of the art at the time you purchase a camera. Because of the rapid development of new technology, choosing a new camera and a recent model is always best when purchasing digital cameras.

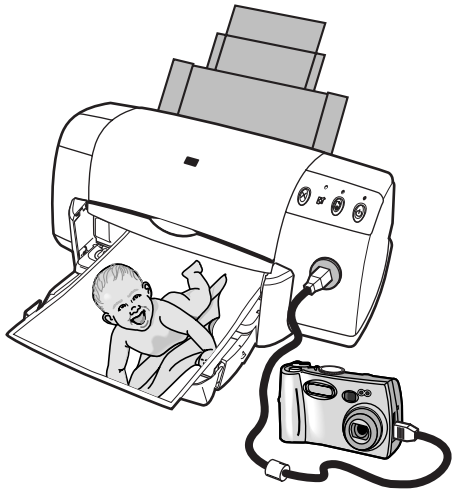

Figure 1-27: PictBridge allows you to print directly to a printer

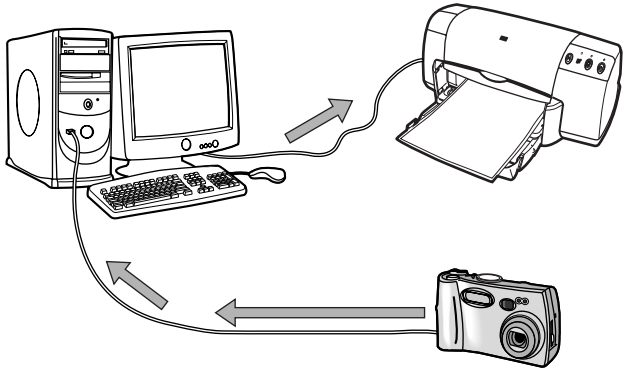

Figure 1-28: Exif 2.2 and PIM give the printer better information about the photo

Choose Flash Features

Feature	What It Does	Comments
Flash range	Maximum range in which the flash is effective.	Expressed in feet or meters.
Auto mode	Turns the flash on when it's needed.	Good feature.
Auto mode off	Allows you to override auto flash.	Important feature for better cameras.
Fill or forced mode	Flash fires even when there is enough light to fill in shadows.	Good for portraits.
Slow sync mode	Allows the adjustment of relative brightness of foreground subject with the background.	This is an advanced tool.
Red-eye reduction	Fires an initial flash to close the subjects iris before taking the photo to prevent red eye.	This is great for portraits and group shots.
Hot shoe connector	Allows the use of external flash.	This allows for maximum flexibility.

The more expensive the camera, the more features you find. Choose the minimum set for your needs and budget.

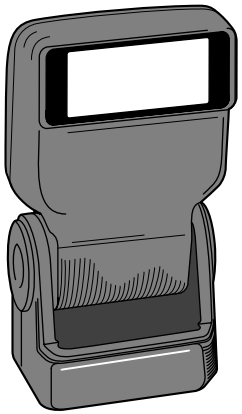

Figure 1-29: An external flash

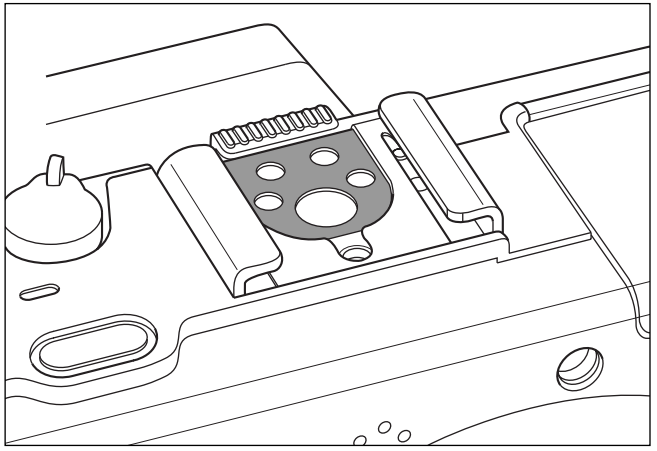

Figure 1-30: A hot shoe connector

Choose Other Features

Feature	Comments
Size and weight	A heavier camera is easer to hold steady, but a lighter camera is easier to store and carry. Prosumer cameras split the difference between size and features.
Panoramic	Some digital cameras can capture a single-image panorama; others feature multiple-image panorama that you can assemble in the computer later.
Multiple exposures	Takes a preset number of images when you hold the button.
Tripod mount	Allows you to attach a tripod to the camera.
Self-timer	Camera automatically shoots after a set period of time.
Remote control	Camera may be set and operated from a distance.
Date/time indicators	Stamps the header of images with the time and date the photo was shot. This information doesn't show up on the image but the camera or software displays it while being viewed.
Sound recording	Enables the recording of audio notes or comments with the camera's built-in microphone.

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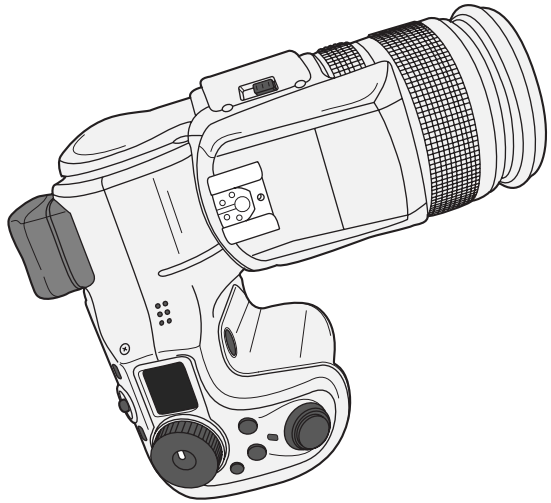

Figure 1-31: A prosumer camera splits the difference between size, cost, and performance

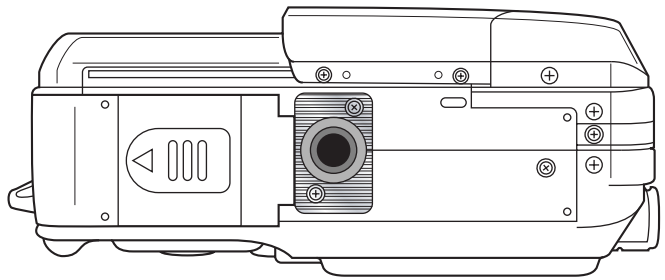

Figure 1-32: A tripod mount is necessary to use a tripod

Feature	Comments
Software	Most digital cameras are bundled with editing and other software. The software supplied might be a factor when choosing a camera.
LCD viewfinder	Better cameras include these. Choose the largest available. These use battery power.
Eyepiece viewfinders	Most cameras have these even if they have LCD viewfinders. These work best in bright light. They also increase battery life.
Through the lens viewing	Single lens reflex professional cameras allow viewing directly through the camera lens. This is the most accurate view.

No ultimate camera exists for everyone. In the end, you must choose the camera that you like best and that does what you want it to do.

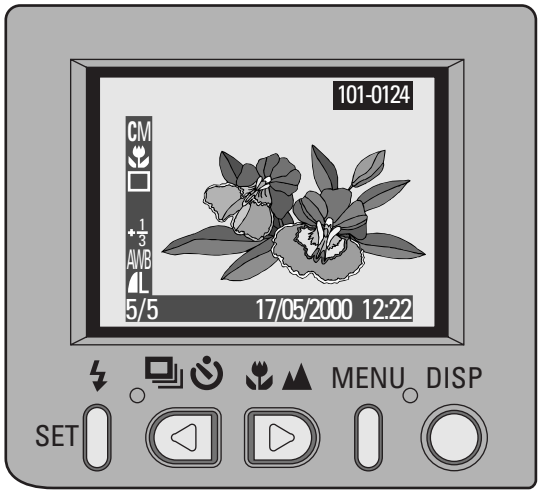

Figure 1-33: An LCD viewfinder allows you to see exactly what the picture will look like

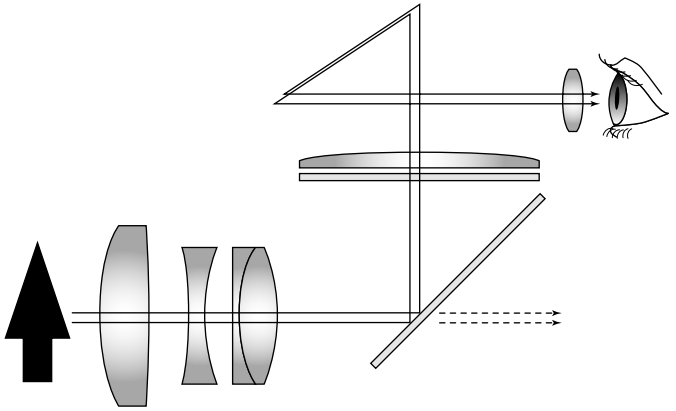

Figure 1-34: How you view the object through the lens of an SLR camera

Choose Other Accessories

Accessory	What It's Used For	Comments
Camera bag	To carry and protect camera.	Don't get one too large or small; waterproof is good.
Lens cloth	Clean the lens without scratches.	
LCD shield	Shield the LCD viewfinder from bright sunlight.	Not available for all cameras.
Battery charger	Charge rechargeable batteries.	Comes with cameras that use rechargeable batteries. If your camera uses AA or similar batteries you may need to supply your own recharger.
Card reader	Attaches to a computer via USB port and copies images from memory cards onto a computer.	Most work with multiple card formats. Make sure you choose one that includes the card or cards you use. Many new computers come with these built in.
Straps	Prevents dropping your camera.	Usually supplied with cameras. You might purchase heavier duty straps or more comfortable ones.

Many of us enjoy the study, acquisition, and occasional use of photo stuff. You don't need to get carried away with unnecessary accessories to become a good digital photographer. You can always use an old briefcase as a camera case!

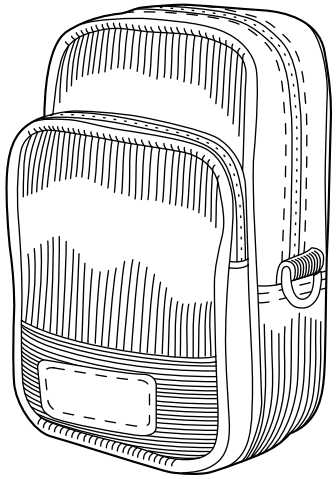

Figure 1-35: A camera bag is necessary for larger cameras

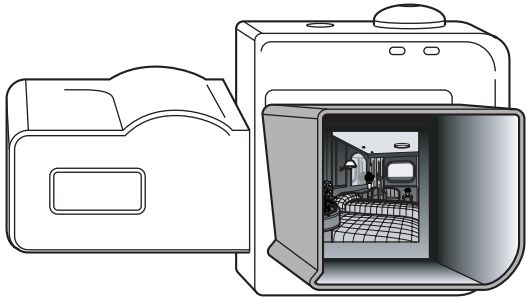

Figure 1-36: An LCD shield blocks out sunlight to reduce glare