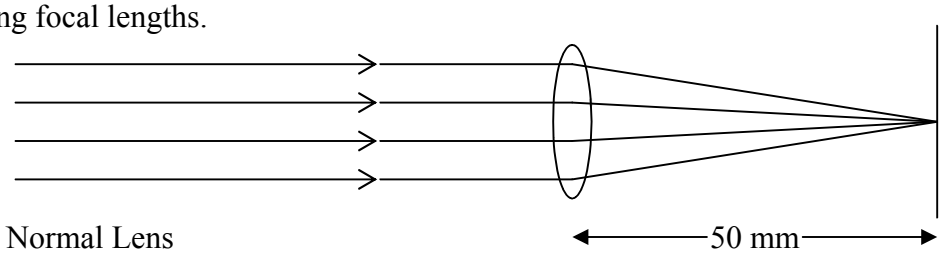
GET THE MOST FROM YOUR LENS

DEFINITIONS:
Camera lenses are used to project a sharp image onto the film in a camera. Lenses all have at least one *focal length*, at least one *aperture*, and most have the ability to *focus*.

Focal Length equals the distance from the lens to the point where light rays converge when the lens is focused on infinity. A normal lens for a 35mm camera is about 50mm. Anything much less is a wide angle lens, anything much greater is a "long" or telephoto lens. Zoom lenses are capable of changing focal lengths.



For practical purposes, *aperture* and "*f stop*" mean the same thing, and they refer to the size of the opening in the lens. Most cameras have adjustable *f* stops so that exposure can be controlled, but point and shoot cameras may have a fixed aperture. They must depend on adjustments in shutter speed or corrections in the printing process to provide decent exposure. The bigger the opening, the smaller the aperture, and the more light is admitted to expose the film. An increase of one *f* number step requires twice the amount of light to get the same exposure. For example, *f*11 requires twice as much light as *f*8. Here is a chart of *f* stops, although few lenses are capable of using them all and many will only range from about *f*2.8 to *f*22

← OPEN APERTURE……CLOSED APERTURE →												
1	1.4	2	2.8	4	5.6	8	11	16	22	32	45	64

*f*2 *f*4 *f*8 *f*16

Depth of field is defined as the amount of the picture that is in focus from front to back, and is determined by both focal length and aperture.
a. The longer the focal length, the shorter the depth of field.
b. The larger the aperture, the shorter the depth of field.
Therefore, a wide angle lens "stopped down" to its smallest aperture will maximize the depth of field. A long lens, "wide open" will have very little in focus.

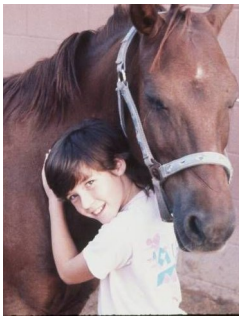
The ability to *focus* a lens provides a sharp image on the film, but an image that is slightly out of focus may actually be fairly sharp as long as the print is small. Very inexpensive cameras with fixed focus rely on this principal.

CAMERA TYPE AND LENS CONSIDERATIONS

Single Lens Reflex (SLR) cameras usually allow you to interchange lenses, so they are much more versatile than a point-and-shoot. The viewfinder on an SLR lets you actually look through the lens to compose the photo. Even so, an SLR viewfinder usually shows a little less than the actual photo. This is because the edge of the photo will be hidden under a slide mount or will be left off of a print from a negative.

A point-and-shoot viewfinder does not line up with the lens and is almost always inaccurate. This is called parallax failure. Compare the viewfinder with the photo below.

VIEWFINDER



PHOTO

When you look through the viewfinder of an SLR, you are looking through the lens at the widest aperture so that you will have a bright view. But if your lens is set to a smaller aperture (stopped down), such as *f*16, the actual photos have greater depth of field than what you see in the viewfinder.

Therefore, some SLR cameras have a *depth of field preview* button that allows you to see how much of your photo is in focus at various *f* stops by stopping down while you are looking through the viewfinder. Occasionally, shallow depth of field can improve a photo by blurring distracting features in the background. To do this, "open up" to a wider aperture, then check the results with the depth of field preview button.

WHAT ARE DIFFERENT FOCAL LENGTHS USED FOR?

Normal focal length lenses (about 50mm) are general purpose lenses. They usually have less distortion than other lenses and produce sharp images with good depth of field.

Wide angle lenses (about 35mm or less) are good for taking photos in a cramped area, panoramic photos, or photos including both near and distant objects. These lenses tend to have greater depth of field than normal lenses, but can produce distorted pictures. Some photographers use this distortion for an artistic effect.

Telephoto (long) lenses (about 100 mm or more) are used to photograph distant images or details on closer images while maintaining space from the subject. They have less depth of field than a normal lens, have smaller maximum apertures, and are difficult to hold steady enough to get a sharp image. Try to use a tripod and fast film (at least ISO 400) to reduce the problem of shakiness.

Long lenses tend to compress objects in the photo; another effect that can be used artistically. Telephoto lenses have two designs, standard and mirror. Mirror lenses are more compact and often cheaper, but have just one *f* stop.

SHOULD YOU USE SINGLE FOCAL LENGTH OR ZOOM LENSES?

Single focal length lenses have the reputation of being sharper than zoom lenses, but modern zoom lenses are very sharp, so the difference is minimal. But, single focal length lenses are generally cheaper than zooms and have a greater maximum aperture. That means they can be used in dimmer light than zooms.

Zoom lenses have variable focal lengths and are much more convenient when composing a photo. Instead of moving closer to your subject, all you have to do is zoom the lens to a longer focal length. If you have a camera capable of changing lenses, one zoom can do the job of several single focal length lenses. They are bulkier and heavier than single focal length lenses, but modern manufacturing techniques have reduced these differences. A disadvantage of most zooms is that the aperture changes as the focal length changes, causing exposure problems in some rare circumstances such as manual flash. Zooms can be used for special effects by changing the focal length (zooming) during a long exposure, for example photographing Christmas lights at night. Zoom lens may have a large or short zoom range, for example 28-80 or 28-200. Which should you get? The 28-80 doesn't zoom as far, but it will be cheaper, sharper, lighter, and have a larger maximum aperture (faster). However, you will also have to buy an 80-200 to get the same coverage as the more convenient 28-200, so you should compare convenience to cost, sharpness, weight, and speed before you decide what is best for you.

SHOULD YOU USE AUTOFOCUS OR MANUAL LENSES?

Autofocus lenses are the standard now. These lenses must be paired with a matching camera so that the autofocus features will work. However, the camera may sometimes try to focus on something in the frame other than what you want or may have trouble with certain objects, such as a white wall, so be sure you can turn the autofocus feature off. Autofocus is also better as you get older and your eyesight gets worse. Autofocus is great for action shots as long as the camera can react to the action fast enough.

Manual focus lenses are becoming uncommon, but are less expensive. There are fewer parts to break on manual focus lenses and cameras, and in some situations you may be able to focus faster manually because the camera may try to focus on the wrong object.

MISCELLANEOUS LENSES

Macro lenses are designed to allow extreme close-up photography; sometimes life size. You should be aware that the closer you get to an object, the less depth of field there is, so if you want a sharp image you need to stop down to a small *f* stop and use a tripod. Some long lenses also have close-up capability. They allow you to take close-up photos from further away, which is useful when trying not to scare away your subject, but the depth of field is worse than a shorter lens.

Close-up lenses screw on a normal lens like a filter and allow you to focus on a nearby object. They usually are not as sharp as macro lenses, but are much less expensive.

Fish-eye lenses are extremely wide angle lenses. They are so wide that the entire lens diameter is in the image so that it appears as a complete circle.

Teleconverters are lenses to be mounted between a removable lens and the camera to increase the focal length of the lens. For example, if you mount a 2X teleconverter with a 200mm lens, the new focal length is 400mm. This combination is usually much cheaper than buying a 400 mm lens, but is much less sharp and allows much less light to pass.

Extension tubes look like teleconverters without any glass and are used between the camera and lens just like a teleconverter. They are not really a lens, but have the effect of forcing the lens to focus closer, and are another alternative to an expensive macro lens.