APERTURE, ƒ-STOPS, ƒ-NUMBERS,

Historically, The earliest camera lenses used metal plates (called 'Stops') with holes of different sizes that were inserted in or near the lens to 'Stop' excessive light passing through the camera lens (as you would close curtains to 'Stop' light through a window). The word "Stop" has carried over all the years of photography, but 'Stops' are now controlled by an adjustable iris aperture.

As the size of the aperture changes, so does the 'brightness' of the light allowed through the lens. Aperture size (area), and therefore brightness affecting Exposure, is controlled by the iris diaphragm, made up of a number of thin, interleaving blades which move to make the circular aperture larger or smaller. Making it smaller in area ('**stopping down'** the lens) reduces the amount of light reaching the film; increasing the size ('**opening up'** the lens) allows more light through.

The ƒ -number system

The brightness of the image on the sensor depends on two factors- the area size of the Aperture and the Focal Length of the lens.

The scale photographers use to relate Focal Length and Aperture size is called the ƒ-NUMBER system (ƒ stands for the mathematical term, **FACTOR**, and it is expressed by measuring the diameter of the Aperture and dividing it into the Focal Length. (FL / Diameter)

Simple Examples- An aperture of 25mm diameter on a 100mm Focal Length lens (100/25= 4) is represented as ƒ4.

A smaller aperture, 9mm diameter on a 100mm FL lens (100/9=11) will represent ƒ11.

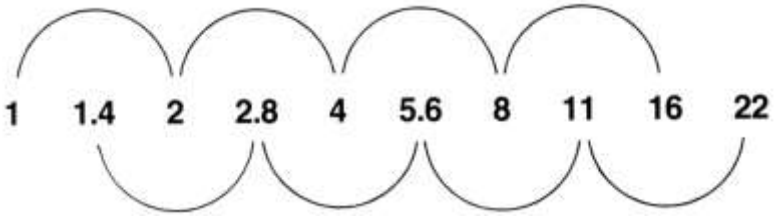
Large aperture diameters allow more light to reach the sensor with **smaller ƒ-number** values **(ƒ2 ƒ4 etc).**

Small aperture diameters restrict the light reaching the sensor with **Larger ƒ-number** values **(ƒ11 ƒ16 etc)**.

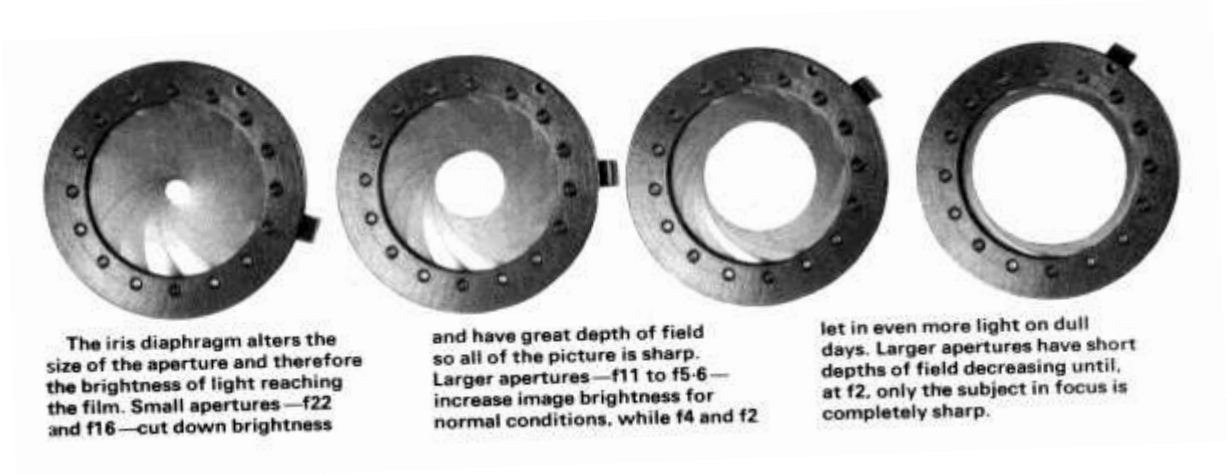
The ƒ-numbers for any lens are calibrated by the maker on the basis that an aperture of ƒ8, set on any lens, will always transmit the same brightness of light whatever the focal length. This means that when changing lenses on the camera the same set ƒ-stop will give the same exposure for every lens (with Shutter & ISO unchanged). The series as a whole is arranged so that each ƒ-number lets in twice as much light as the next larger number, and half as much as the next smaller number. For example, ƒ4 admits eight times more light than ƒ11, and half as much as ƒ2.8.

The size of the aperture can affect the image definition of a lens. The sharpness of the image at maximum aperture may not be as good as sharpness with the aperture stopped down two or three stops from maximum.

To commit to memory the ƒ-number series (of 'whole' ƒ-STOPS)- start with two numbers: 1 and 1.4 Begin the series with those two numbers and then double them alternately as shown. (with slight rounding off for convenience).



The maximum size aperture of a lens will determine the maximum amount of light it will allow through. Larger apertures will allow faster shutter speeds for correct exposure, hence they are known as '**fast'** lenses. Eg. A standard lens with a maximum aperture of f1.4 will allow 16 times the light transmitted by a 'slow' zoom lens of maximum aperture f5.6 Note that the viewfinder of a SLR type camera will also be 16 times brighter when viewing through the f1.4 lens compared to the f5.6 lens. This can explain why some f5.6 lenses have trouble focusing in dim light situations (not enough light to assist the focusing systems).



The iris diaphragm alters the size of the aperture and therefore the brightness of light reaching the film. Small apertures—f22 and f16—cut down brightness and have great depth of field so all of the picture is sharp. Larger apertures—f11 to f5·6—increase image brightness for normal conditions, while f4 and f2 let in even more light on dull days. Larger apertures have short depths of field decreasing until, at f2, only the subject in focus is completely sharp.