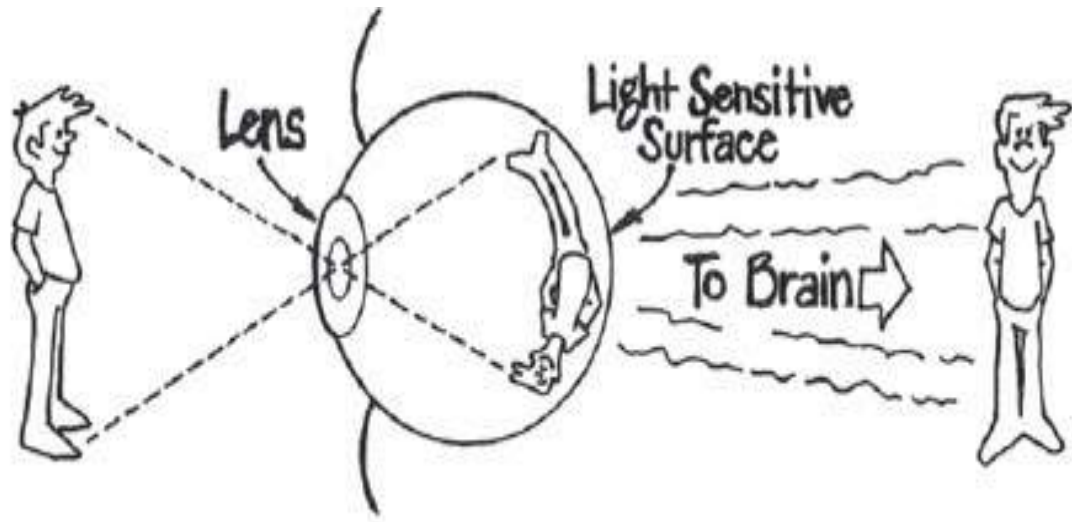




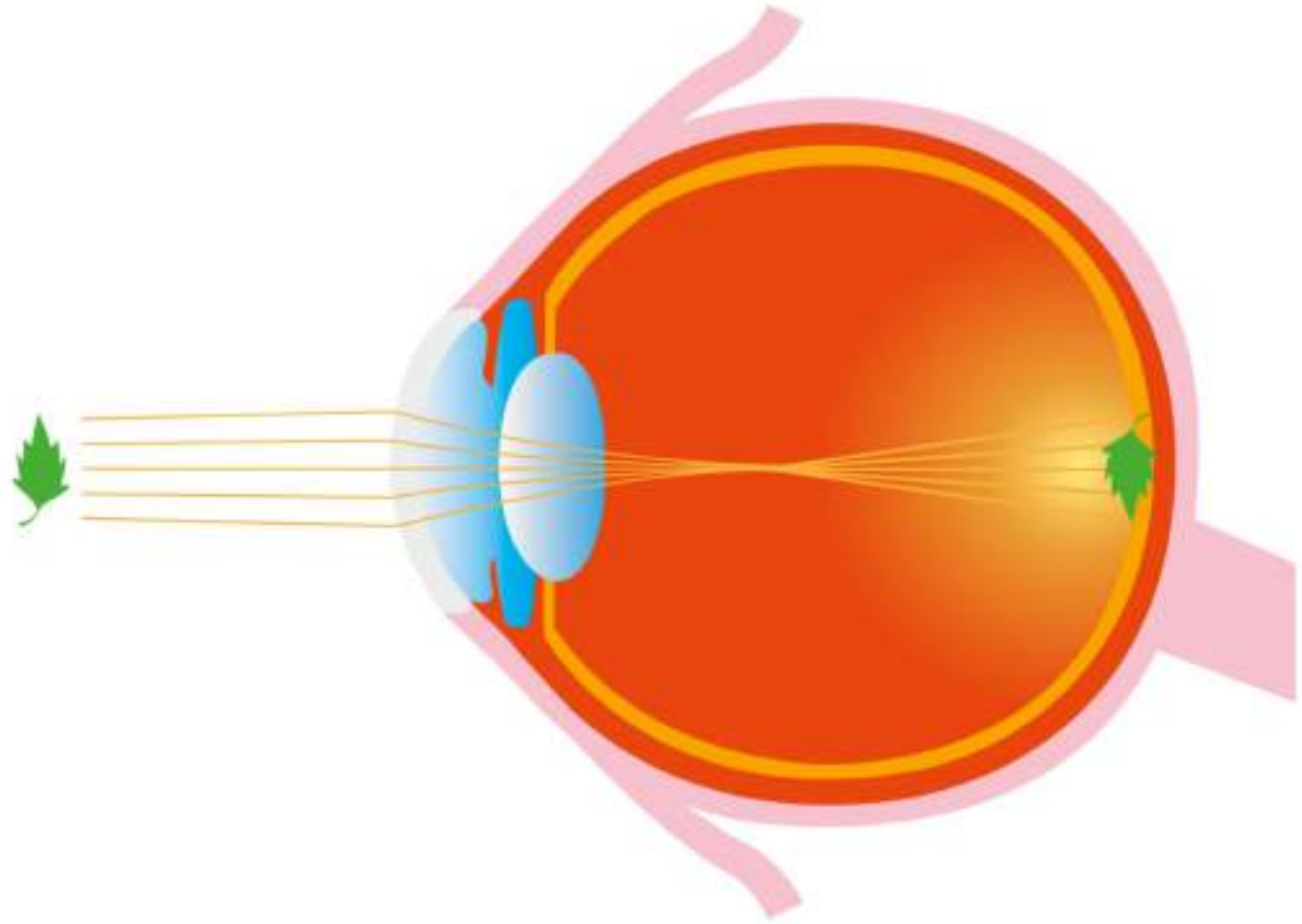
Camera



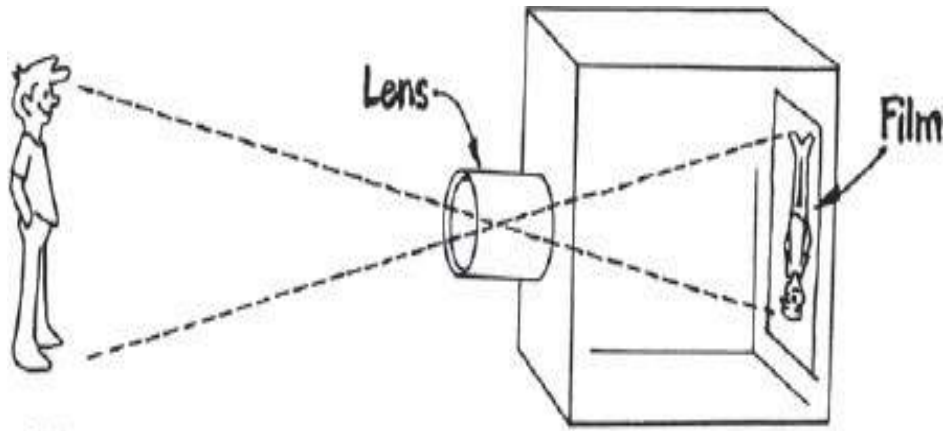
The camera is an imperfect imitation of the human eye



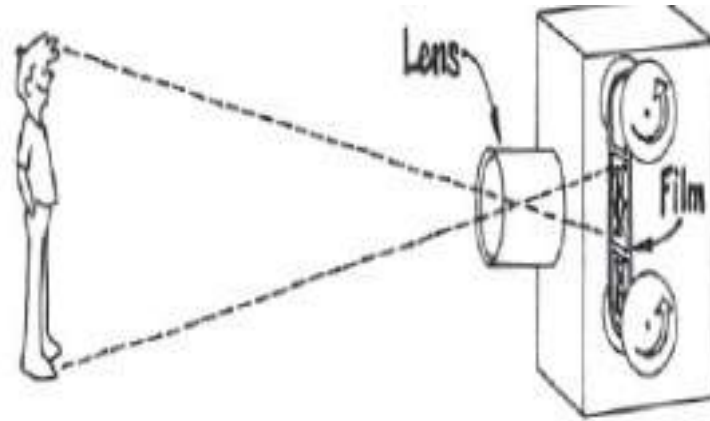
THE EYE GATHERS PATTERNS OF REFLECTED LIGHT WHICH THE BRAIN TRANSLATES INTO IMAGES WE SEE.



In the case of the camera, the lens directs the patterns of light onto a variety of sensitive surfaces.



*STILL FILM CAMERAS RECORD LIGHT PATTERNS ON FILM
COATED WITH LIGHT-SENSITIVE CHEMICALS*



MOVIE CAMERAS TAKE MANY DIFFERENT PICTURES EVERY SECOND.

In digital cameras—both still and video—the lens focuses light patterns onto an image sensor, either a CCD (charge coupled device) or a CMOS (complementary metal oxide semiconductor). The image formed by all the pixels taken together is electronically collected off the sensor at a rate of either twenty-five or thirty complete images per second. These images can then be recorded or broadcast. At the viewfinder or TV set the process is reversed to recreate the original image. Persistence of vision causes the viewer to perceive the separate pictures, or frames, as continuous movement.

Optics

For your camera to operate, it must be able to concentrate light reflected from the surface of subjects to the light-sensitive sensor.

provided by the lens, a series of optical glass or plastic elements cemented together and mounted in such a way as to focus light on the surface of the light-conversion chips

The three basic characteristics of a lens are

- focal length
- its focus range
- its aperture settings



Focal Length

The focal length of a lens is a measurement of the ratio between the diameter of the lens and the distance from its optical center to the focal plane, when the subject is in focus.

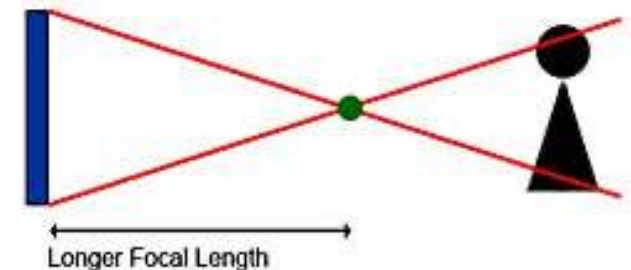
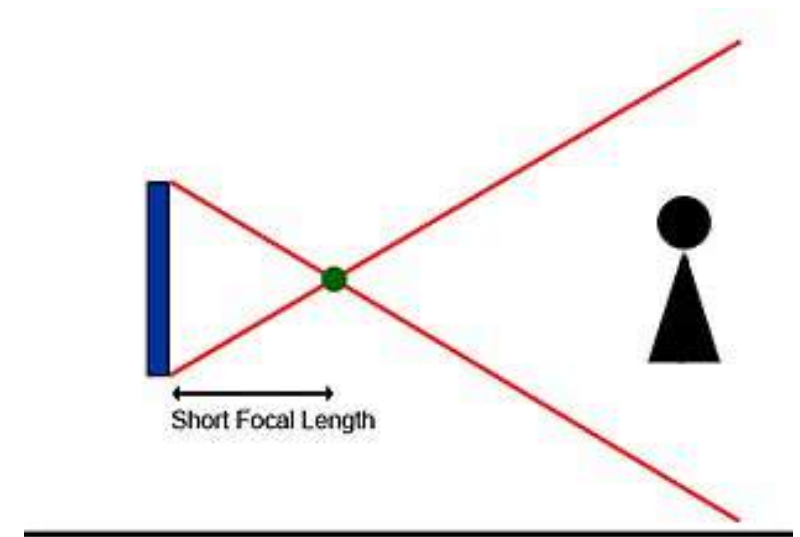
Represented in millimeter (mm)

The longer the measurement, the greater the enlargement of your subject; the shorter the measurement, the smaller your subject will appear

Conversely, the longer focal length allows space for fewer subjects in your frame, and the shorter focal length allows more subjects to be included in your frame

The focal length of a lens also determines its ability to focus over a range from close to farther away from the camera, called depth of field (**DOF**)

50 mm lenses regarded as the Standard focal length for film



Types of focal length

- Fisheye and Ultra Wide Lens -- 8mm – 24mm -typically used for Landscape or architecture (Wide angle view)
- Wide Angle Lens – 24mm – 35 mm - No distortion on the images
- Standard Lens– 35mm –70mm – closely reproduce images to what our eyes see
- Telephoto Lens –70mm -300mm – Patriate lenses come in this range

Prime and zoom lenses

Prime lenses have fixed focal length

Zoom lenses have variable focal lengths

Focus

The ability of the lens to concentrate light reflected from a subject to create the sharpest image is called focus.

The most obvious way is called the front focus. You achieve front focus by adjusting (usually by turning the barrel of the lens) until the image is sharply focused at a point behind the lens called the focal point.

Aperture

Aperture or Iris

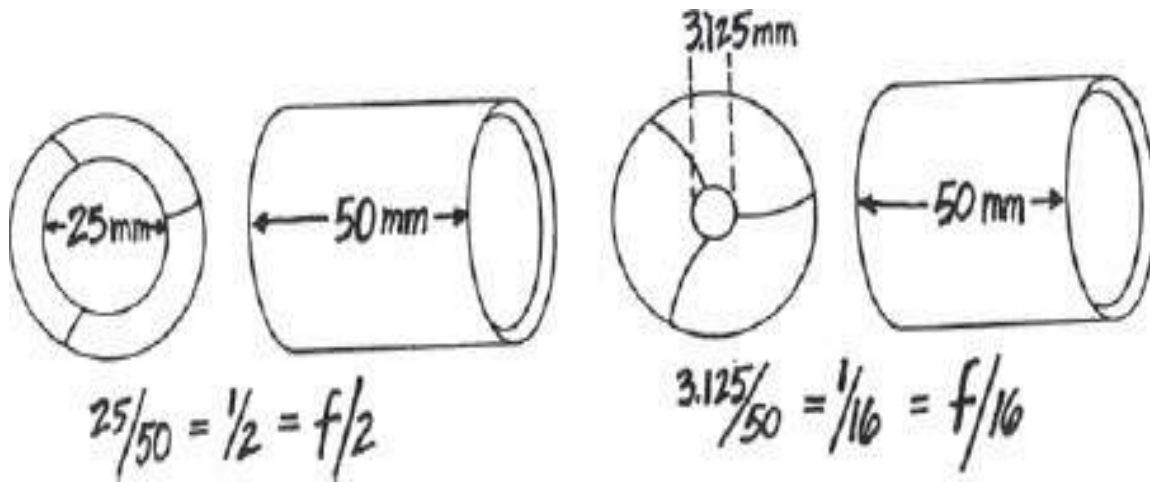
To better control the amount of light that strikes the surface of the chips, an iris or variable opening is built into the lens

The carefully calibrated sizes of the opening in the aperture are labeled with numbers called f-stops.

Each full f-stop doubles (if opening) or halves (if closing) the amount of light allowed to pass through the lens. The f-stop number is the ratio of the focal length to the diameter of the aperture opening

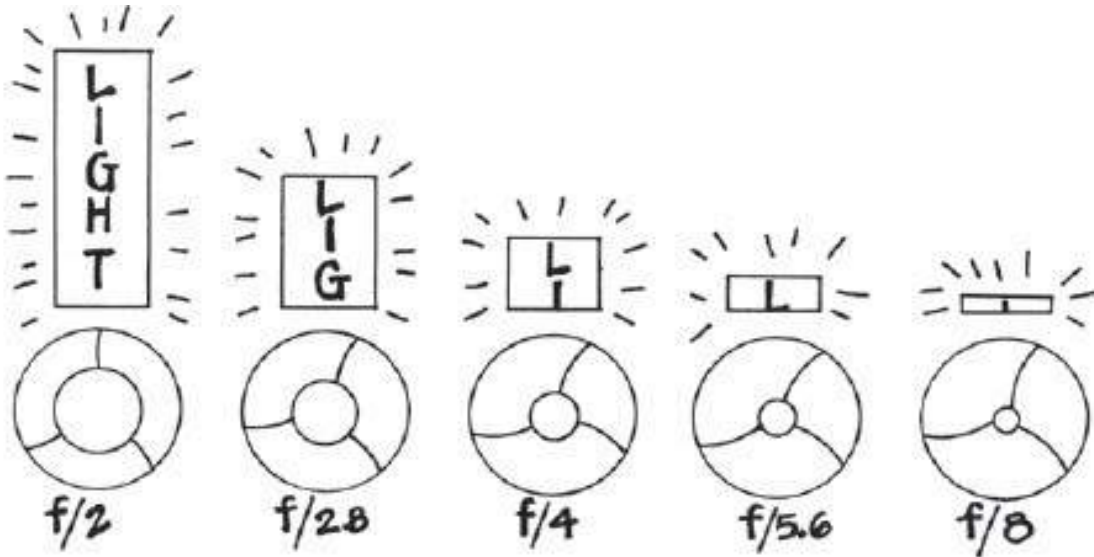
The common full f-stops used in videography are f 1.4, 2, 2.8, 4, 5.6, 8, 11, 16, and 22

The term stop down means to close the aperture or increase the f-stop number; to open up means to increase the size of the aperture opening but lower the f-stop number.



F/stops are constructed so that as you go from f/1 to f/22 and beyond, each stop admits 1/2 as much light as the one before.

The progression is: f/1, f/1.4, f/2, f/2.8, f/4, f/5.6, f/8, f/11, f/16, f/22, f/32, f/45, f/64, and so on. F/1.4 admits half as much light as f/1. F/4 admits half as much light as f/2.8.



EACH F/STOP ADMITS HALF AS MUCH LIGHT AS THE ONE BEFORE.

EXPOSURE

Exposure is the amount of light that comes through the lens and hits the film or CCD chip.



The hole in the center of the lens that the light travels through is called the aperture.

If the aperture is big, it lets in lots of light. If it's small, it lets in very little light.

The size of the aperture is adjusted by the f/stop ring on the outside of the lens.

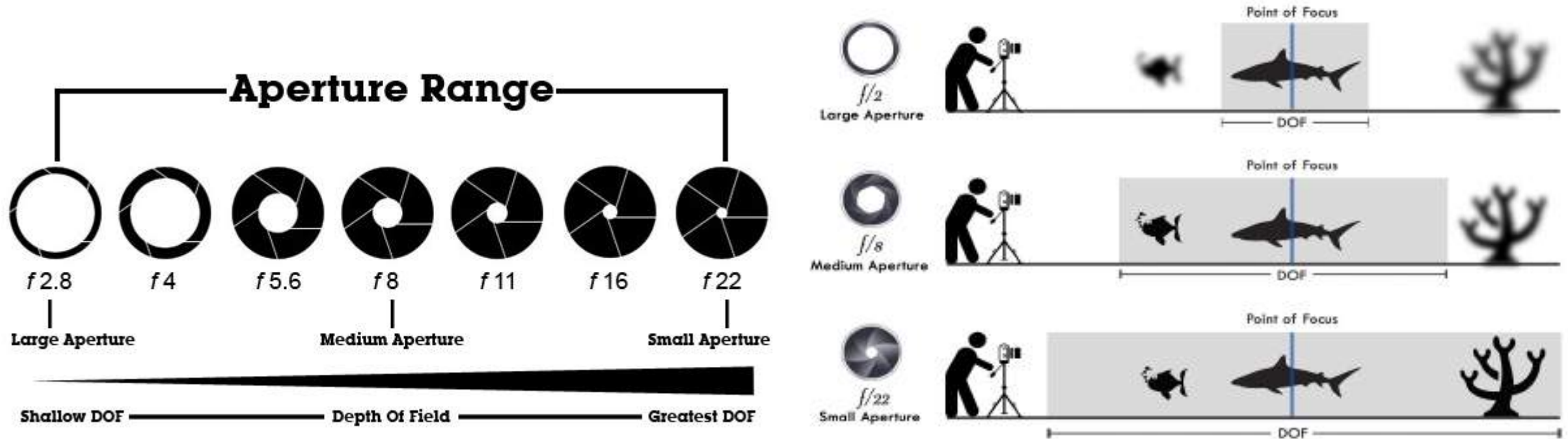
An f/stop is simply a measure of how big or how little the aperture is.

Depth of Field (DOF)

DOF is dependent on the 3 characteristics : Focus, Focal Length and aperture

Depth of field is the range from the camera that subjects appear in acceptable focus.

This distance depends on the focal length of the lens, its focus setting, and the aperture opening. The longer the focal length, the closer the focus point; the more wide open the aperture setting, the shallower the depth of field.



Shutter speed

Shutter speed is the term used to describe the amount of time that each frame is exposed.

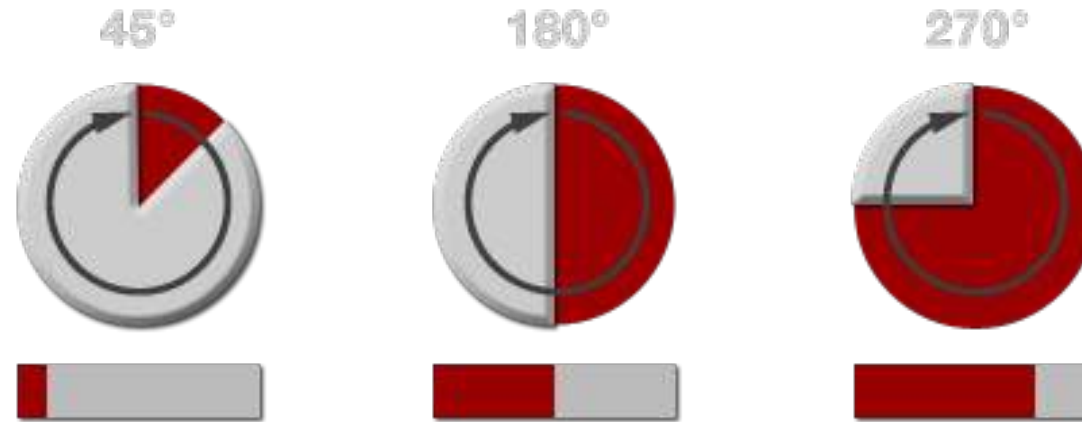
As a rule of thumb the shutter speed should be double your Frames per second (*FPS*)

The most commonly used shutter speed for filmmaking would be 1/48 or 1/50

Standard FPS	Shutter speed
23.98	48
24	48
25	50
30	60
60	120
120	200

Shutter angle is described as relative to the frame rate

The "shutter angle" is a useful way of describing the shutter speed relative to the frame rate. This term is a conceptual relic of rotary shutters, where a disc with an angled opening would spin and let in light once per revolution to expose each frame.



The larger the angle, the slower the shutter speed, all the way up to the limit of 360°.

where the shutter speed could become as slow as the frame rate. At the other extreme, the shutter speed can be made arbitrarily fast by decreasing the angle.