

Focal length and angle of view

The focal length of an optical system is a measure of how strongly it converges (focuses) or diverges (diffuses) light. A system with a shorter focal length has greater optical power than one with a long focal length. In photography, angle of view describes the angular extent of a given scene that is imaged by a camera. It parallels, and may be used interchangeably with, the more general visual term field of view.

The focal length of a lens, together with the size of the image sensor in the camera (or size of the 35 mm film), determines the angle of view. A lens is considered to be a "normal lens", in terms of its angle of view on a camera, when its focal length is approximately equal to the diagonal dimension of the film format or image sensor format. A wide-angle lens has a shorter focal length, and includes more of the viewed scene than a normal lens; a telephoto lens has a longer focal length, and images a small portion of the scene, making it seem closer.

Lenses are not labeled or sold according to their angle of view, but rather by their focal length, usually expressed in millimeters. In order to make it easier to compare lens–camera pairs, it is common to talk about their 35 mm equivalent focal length.

	Sensor size:	35 mm or full-frame	APS-H	APS-C	Foveon X3	Four Thirds
	Crop factor:	1.0	1.3	1.5 or 1.6	1.7	2.0
Lens view	Angle of view (deg. diagonal)	Focal length (mm)				
Ultra wide-angle	118	13	10	8	8	7
Ultra wide-angle	111	15	12	10	9	8
Ultra wide-angle	100	15	12	10	9	8
Ultra wide-angle	92	21	16	14	12	11
Typical wide-angle	84	24	18	15	14	12
Typical wide-angle	75	28	22	18	16	14
Slightly wide-angle	63	35	27	23	21	18
"Normal"	59 – 47	40 – 50	30 – 38	25 – 32	23 – 29	20 – 25
Portrait lens	29	85	65	55	50	43
Portrait lens	23	105	81	68	62	53
Telephoto	18	135	104	87	79	68
Telephoto	14	180	138	116	106	90
Telephoto	12	210	162	135	134	105
Long telephoto	8	300	231	192	176	150
Long telephoto	6	400	308	258	235	200
Long telephoto	5	500	385	323	294	250
Long telephoto	4	600	462	387	353	300
Long telephoto	3	830	638	535	488	415
Very long telephoto	2	1200	923	774	706	600