MOVIE FORMAT / CINEMA FORMATS / ASPECT RATIOS

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Cinema Formats

Academy Format

The first film format was developed in 1889 by Thomas Edison for his 'Kinetograph' using 35mm film, the picture format had a ratio of 1.37:1, the picture size was: width = 1 inch, height = 3/4 inch.

The 'Academy Format' was established in 1932 with an aspect ratio of 1.33:1. This format was the de facto standard until 1953.

Cinerama Format

In 1928 the Cinerama Format was developed that used three 35mm film side by side to achieve the first wide screen format.

Cinerama 70mm

Developed in the 1960's with famous movies like produced films like A Space Odyssey, with an aspect ratio of 2.75:1, aperture dimensions: 1.912x0.870".

CinemaScope / Panavision

It was developed in 1953 and was copyrighted by 20th Century Fox. It produces a wide screen image with standard 35 mm film by using an anamorphic lens to 'boost' the displayed picture in the horizontal plane. The projected picture has an aspect ratio of 2.35:1. CinemaScope, or Panavision, is the most common format today and it will be the most common format until the worldwide change to Digital Cinema formats.

CinemaScope 55

An alternative format by 20th Century Fox with the aspect ratio of 2.55:1, also using an anamorphic lens.

ArriScope-ArriVision

Designed by the Arriflex Camera Corporation with an aspect ratio of 2.35:1.

It was used for two 3D feature films in 1983. The aperture dimensions are 0.864" x 0.732".

Imax

The IMAX format was developed in the early 1970's. 70mm film is projected horizontally, screens are 80 feet high. Famous for IMAX re-mastered movies were Star

Wars Episode II Attack Of The Clones and Apollo 13.

Matted 1.66:1

Developed by Paramount in 1953 with an aspect ratio of 1.66:1. To achieve the wide format without an anamorphic lens, the top and bottom of the picture were masked.

Matted 1.85:1

Used by Universal and Columbia Pictures with the top and bottom masked to achieve an aspect ratio of 1.85:1.

Super 35mm

35mm film with wider optical sound track, without anamorphic lens, the picture is framed to fit the desired aspect ratio. Aspect ratio: variable, Standard 1.33:1,

Widescreen 1.85:1, Panavision 2.35:1, aperture dimensions: 0.980" x 0.735".

SuperScope

Format developed in the 1950s, with anamorphic lens, two versions: aspect ratio of 2:1 and 2.35:1.

Super Panavision 70mm

Developed in 1959, it was introduced by Panavision, Inc., aspect ratio: 2.2:1, aperture dimensions: 1.912" x .0.870".

Super Technirama 70mm

developed in the 1950s, aspect ratio: 2.35:1, aperture dimensions: 1.364" x .0.715".

Techniscope

Aspect ratio: 2.35:1

Technovision

Aspect ratio: 2.35:1

Ultra Panavision 70mm

Developed in the 1950s, Aspect Ratio: 2.76:1, aperture dimensions: 2.072"x0.906"

WarnerScope

Developed by Warner in the early 1950s, on 35mm film, aspect ratio: 2.35:1, aperture dimensions: 0.864"x0.732".

Widescreen 1.85:1

Today standard format with the aspect ratio of 1.85:1, with optical stereo sound and/or Dolby Digital 5.1.

Screen Brightness

The nominal screen luminance for movie theatres is 16 Foot-Lamberts. It was specified by the SMPTE (Society of Motion Picture and Television Engineers) as the minimum for film-type movie theatres. The unit Foot-Lamberts is a measurement related to the brightness of a particular image and is equal to 1 lumen per square foot of screen surface. 16 foot-lamberts is chosen because most films have an ideal balance between black and white saturation conditions at this brightness. A tolerance of 20% between the center brightness and a fall-off of at the screen edges is acceptable. Even for larger cinemas it is often hard to fulfill this requirement.

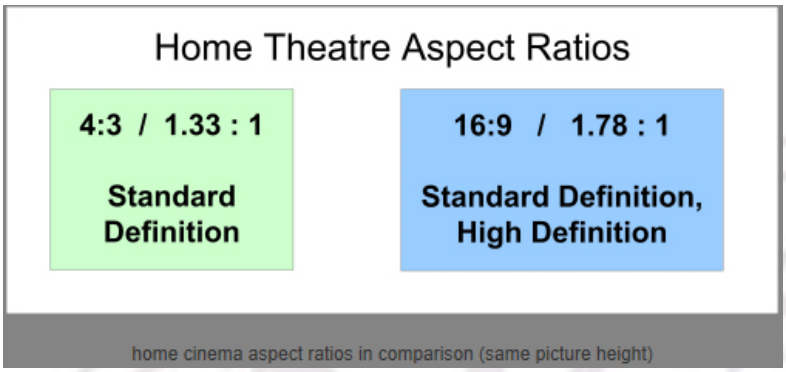
Aspect Ratios

Format	Aspect Ratio	Aperture		X : Y
		mm	inch	
16 mm Film	1.33	7.21 x 9.65	0.284 x 0.380	4 : 3
35 mm Film (before 1953)	1.37	15.2 x 21	0.600 x 0.825	4 : 2.92
35 mm Film (USA)	1.85	11.3 x 21	0.446 x 0.825	1.85 : 1
35 mm Film (Europe)	1.65	12.7 x 21	0.500 x 0.825	1.65 : 1
35 mm Film (Anamorphic)	2.35	17.8 x 21	0.702 x 0.825	2.35 : 1
70 mm Film	2.21	22 x 48.6	0.868 x 1.913	2.21 : 1
35 mm Slide (Horizontal)	1.48	22.9 x 34	0.902 x 1.340	4 : 2.7
35 mm Slide (Vertical)	0.68	34 x 22.9	1.340 x 0.902	2.7 : 4
A4 Paper	1.41	210 x 297		4 : 2.83
'8 1/2 x 11' Paper	1.30	215.7 x 279.4		8.5 : 11
Format	**Aspect Ratio**	**Aperture/Resolution**		**X : Y**
		mm	pixel	
NTSC Video	1.33		720 × 480	4 : 3
PAL Video	1.33			4 : 3
HDTV 720	1.78		1280 × 720	16 : 9
HDTV 1080	1.78		1920 × 1080	16 : 9
PAL Wide	1.78		1024 × 576	16 : 9
Letterbox Video	1.85			1.85 : 1
"Widescreen"	1.85			1.85 : 1
Cinemascope	2.35			2.35 : 1
HDV-1	1.77		1280 x 720	16:9
HDV-2	1.77		1440 x 1080	16:9

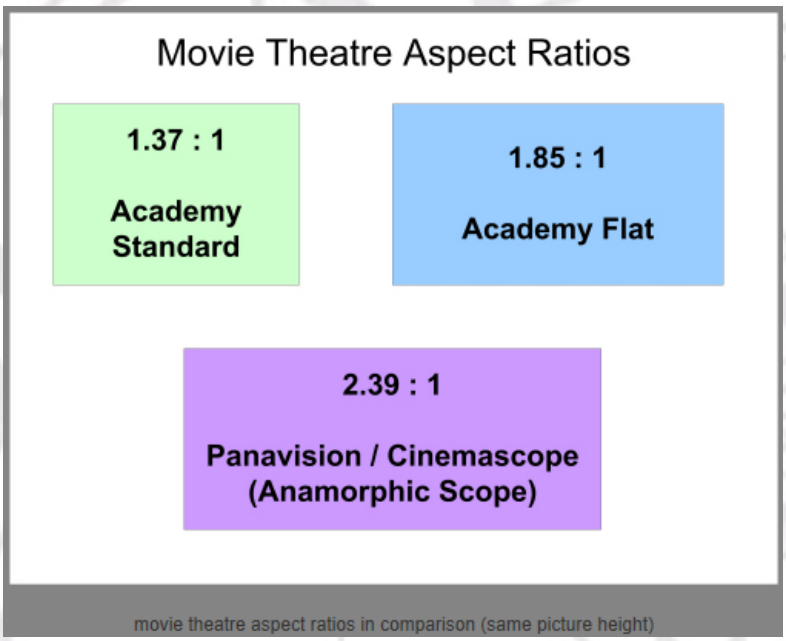
4K and 2 K Formats

4K Resolution for Digital Cinema			
Cinema Formats	Horizontal Resolution	Aspect Ratio	Megapixels Per Frame
Academy Standard	3626 x 2664	1.37:1	9.7
Academy Flat	3996 x 2160	1.85:1	8.6
Anamorphic Scope	4096 x 1714	2.39:1	7.0
2K Resolution for Digital Cinema			
Academy Standard	1828 x 1332	1.37:1	2.4
Academy Flat	1998 x 1080	1.85:1	2.2
Anamorphic Scope	2048 x 858	2.39:1	1.8

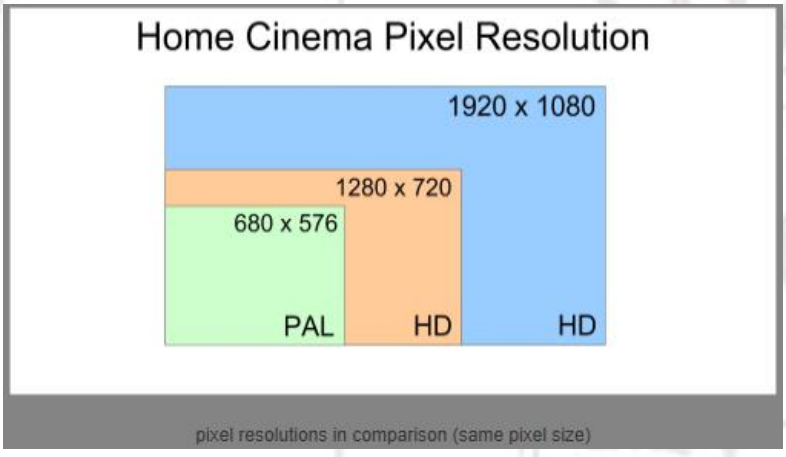
Home Cinema Formats



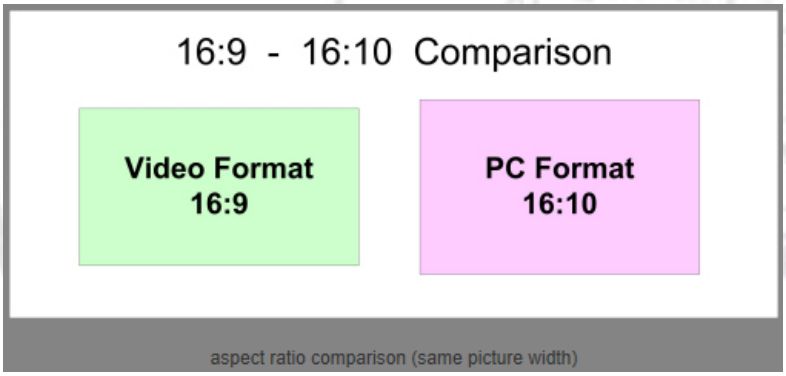
home cinema aspect ratios in comparison (same picture height)



movie theatre aspect ratios in comparison (same picture height)

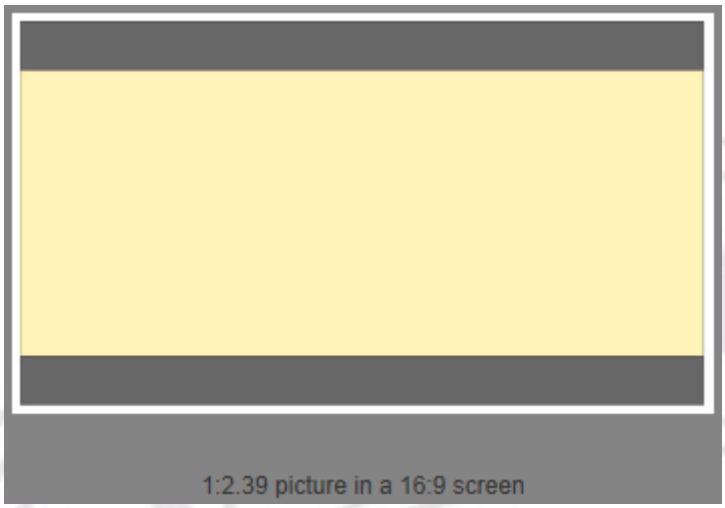


pixel resolutions in comparison (same pixel size)

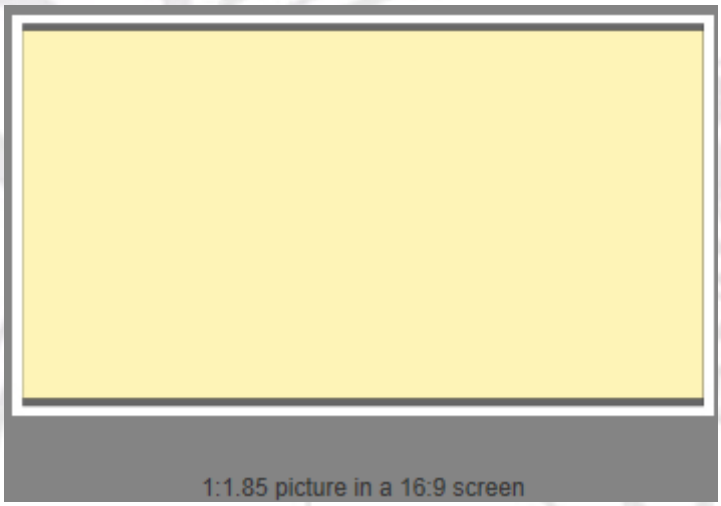


aspect ratio comparison (same picture width)

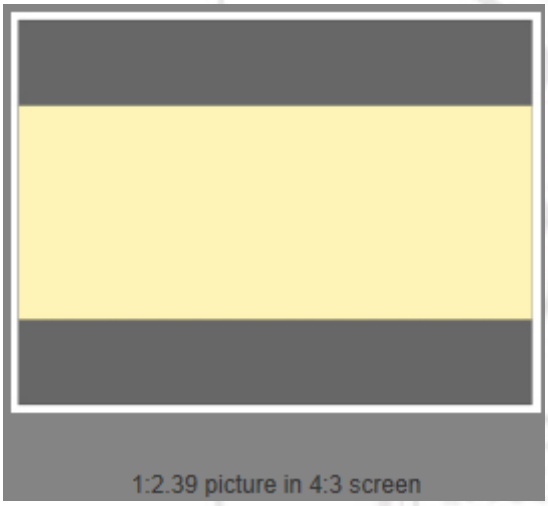
Letter Box Format



1:2.39 picture in a 16:9 screen



1:1.85 picture in a 16:9 screen



1:2.39 picture in 4:3 screen