

Televisions are designed to be viewed from a certain distance and angle for the best optimum picture quality. The information below is intended to help users determine what size of HDTV to purchase for a particular room, and what viewing distance is ideal in front of a particular television.

Optimum Viewing Distance for a Home Theater Experience

The vast majority of film and video is recorded on 35mm film with a 50mm focal length (or its digital equivalent). This produces a perspective that is roughly equivalent to the human eye, and a field of view of 40°. The optimum distance from the TV would be that which puts your head in the apparent position of the camera, and has the TV taking up a 40° area of your view. This distance is easy to calculate if you know the diagonal measurement of your TV. Use the formula $ds \times 1.2 = d$, where ds is the diagonal measurement of your TV screen in inches, and d is how far away you should be, also in inches. Break out your tape measure and enjoy the movie the way the director intended it to be.

Commercial Application

We understand that might be unrealistic to achieve in a commercial setting. That is the science behind a home theater experience. As a commercial property that is not what you are expected to replicate. That's fine, let's find another, farther away distance to sit. We must be careful though. If you sit too far away, you will miss some of the exquisite details that your HDTV has to offer. Let us use a different formula that might be more realistic for your commercial setting. Which we have done for you below.

$$VD = \frac{DS}{\sqrt{\left(\frac{NHR}{NVR}\right)^2 + 1} \cdot CVR \cdot \tan \frac{1}{60}}$$

VD: Viewing distance (in inches)
 DS: Display's diagonal size (in inches)
 NHR: Display's native horizontal resolution (in pixels)
 NVR: Display's native vertical resolution (in pixels)
 CVR: Vertical resolution of the video being displayed (in pixels)

Results

The following chart lists a number of distances calculated using the formulas above. Everything except the "Optimum" column is calculated to be the greatest distance you can be from your TV while still perceiving all of the detail at the specified video resolution. Ratios of screen size to viewing distance are also provided, in case you have a less common screen size. As you notice the higher the resolution output, the closer a viewer need to sit in order to notice the increase in detail. That is one of the reasons 1080p resolution is typically not used in a commercial setting and is not nearly as prominent as you find it to be in consumer use.

Use the formula $ds \times r = d$, where ds is the diagonal measurement of your TV screen in inches, r is the ratio, and d is how far away you should be, in inches.

		Distance from TV			
		Optimum	1080p	720p	480p
Screen Size	22"	26.4"	34.3"	51.5"	87.4"
	26"	31.2"	40.6"	60.8"	103.2"
	32"	38.4"	49.9"	74.9"	127.1"
	42"	50.4"	65.5"	98.3"	166.8"

Video Resolution	Ratio
Optimum Distance	1.2
1080p (Full HD)	1.56
720p (Broadcast HD)	2.34
480p (DVD Quality)	3.97

