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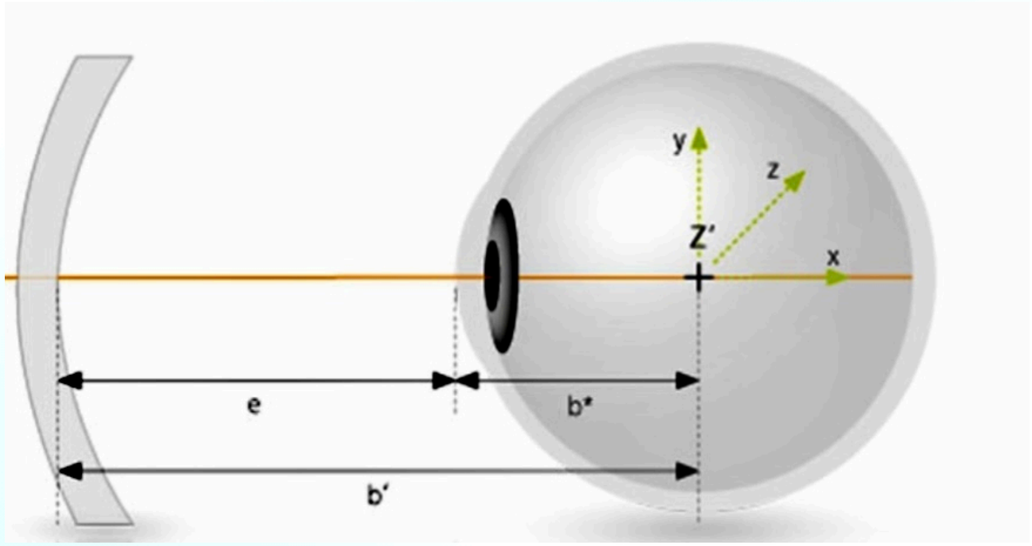
Object Spectacle

Lecture 5

Rotation of the Lenses & Aberration

جامعة المستقبل
كلية التقنيات الطبية و الصحية
قسم التقنيات البصرية



Z = Eye's Center of rotation

e = corneal back vertex distance

b' = vertex-Center of rotation distance

b* = Cornea-Center of rotation distance

What is the eye's centre of rotation?

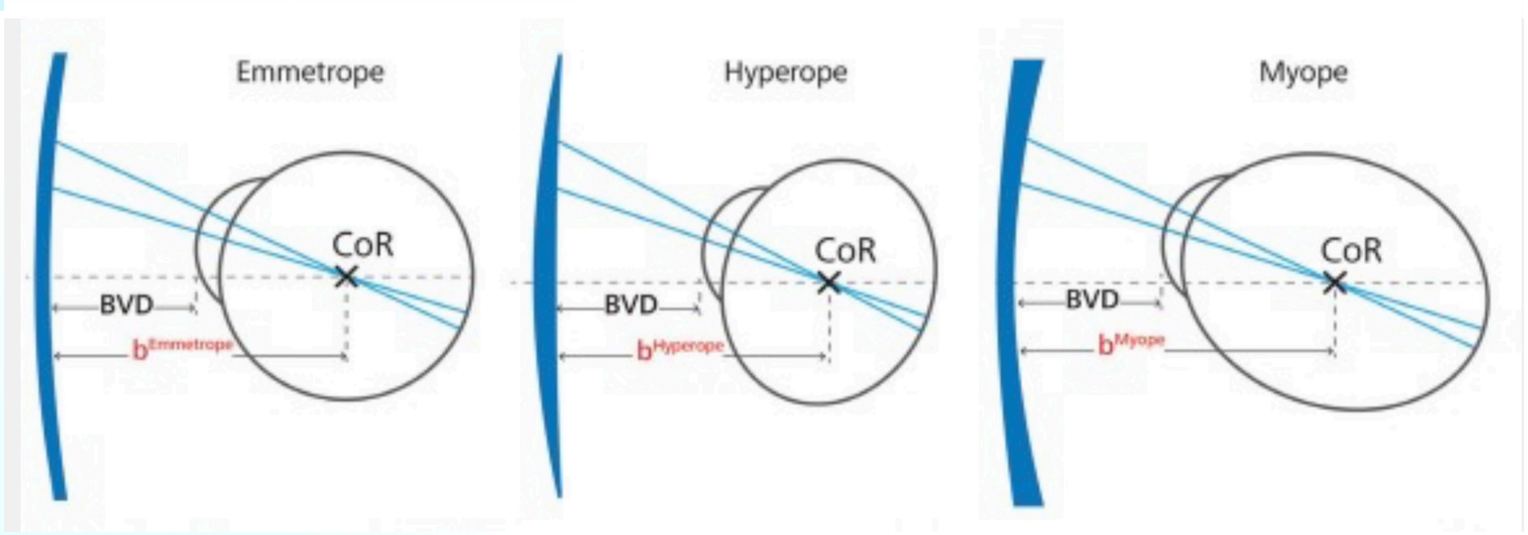
All movements or rotations of the eyeball are performed around a centre of rotation (COR) that is located inside the globe, behind the posterior pole of the lens and. close to the posterior nodal distance.

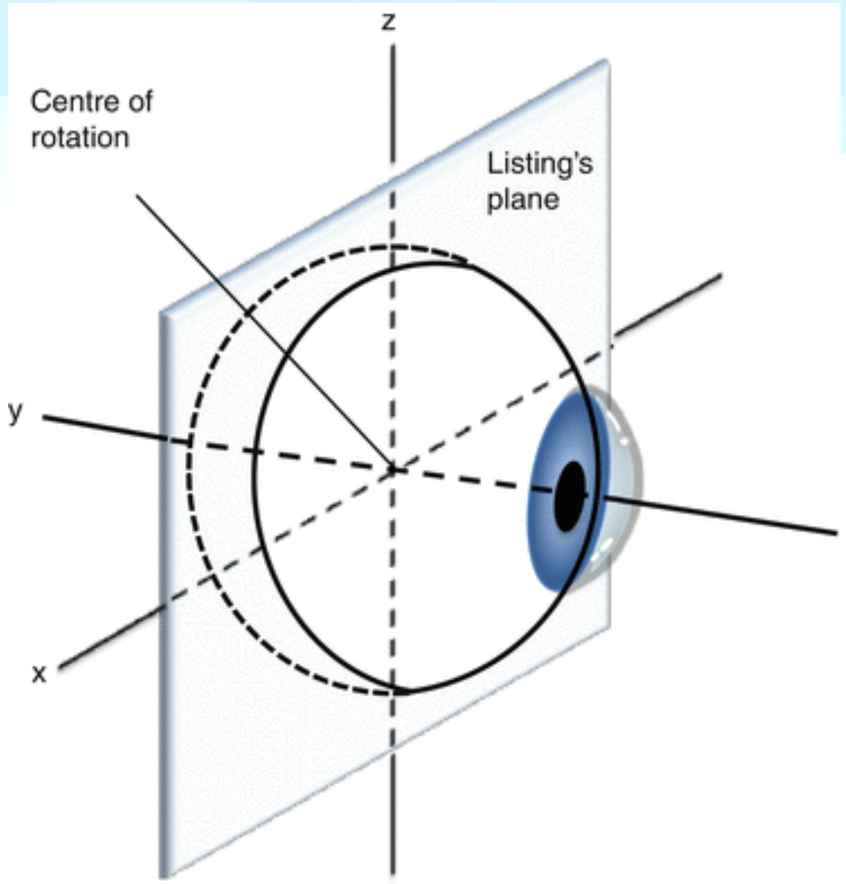
Further that we should put the geometric Center point of the lens Opposite to the eye Center and rotate the lens in frame to

And make sure the axis’s directions of the lens according to the axis’s directions of the eye

What is the center of rotation condition?

At the point where the visual axis intersects the optical centre (back vertex) of the lens and pole of the aspheric surface(s), it must coincide with the optical axis. Monocular interpupillary distances are obligatory for all powers and the face form angle should be close to zero.





The boxed lens (boxing) system

The system used for the measurement and description of frames internationally is the boxed lens (boxing) system which uses rectangles that contain each lens shape to determine the dimensions of the front of the frame (figure 1).

Figure 1 The box system of measuring spectacle fronts.

Key

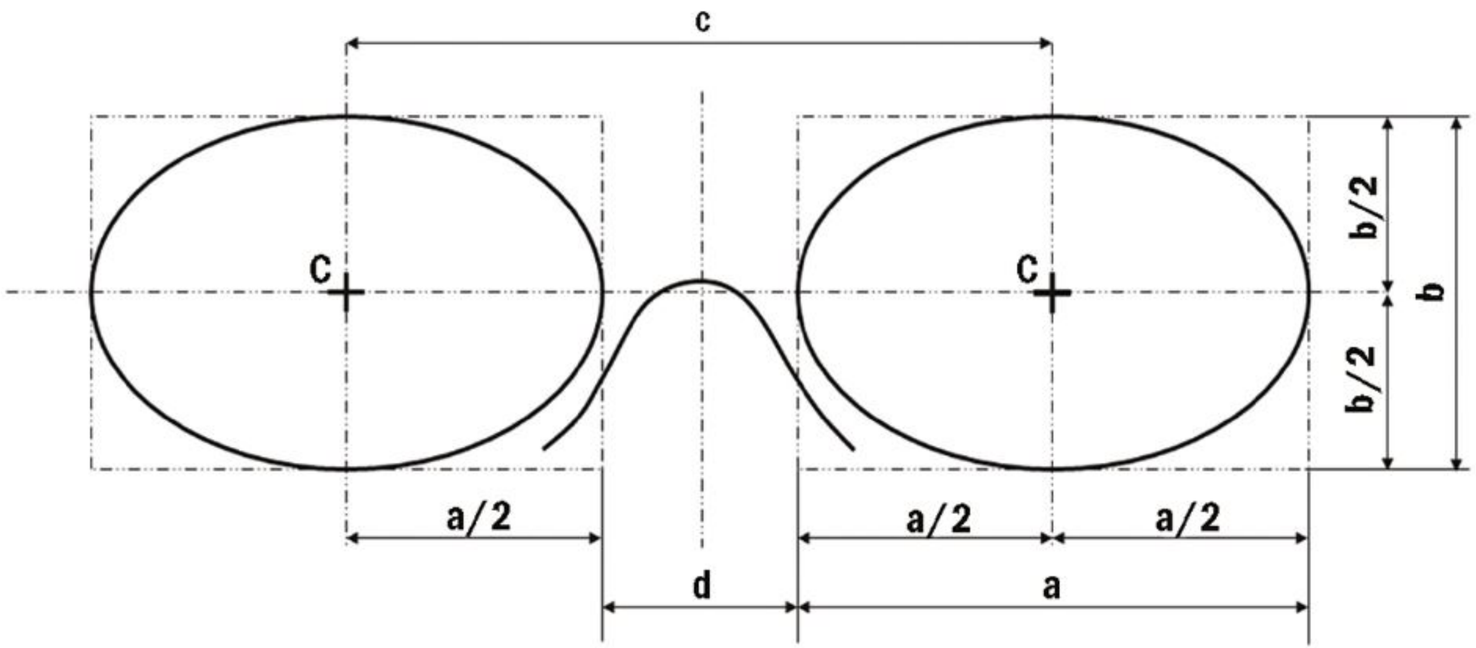
C boxed centre

a horizontal lens size

b vertical lens size

c boxed centre distance (BCD)

d distance between lenses (DBL)

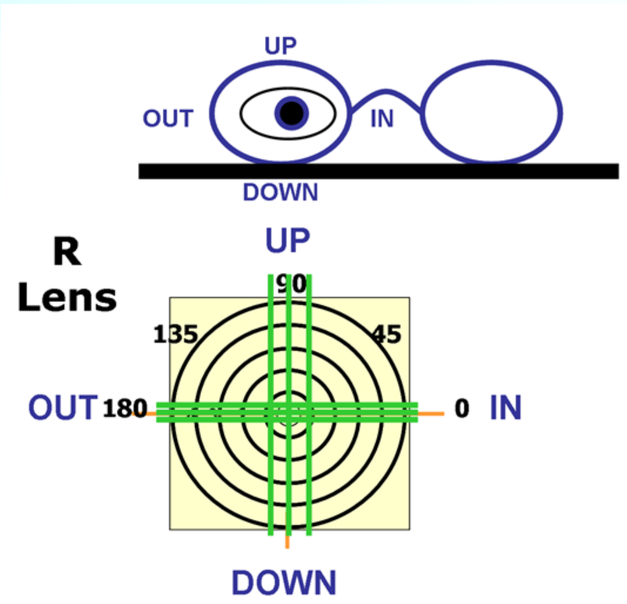


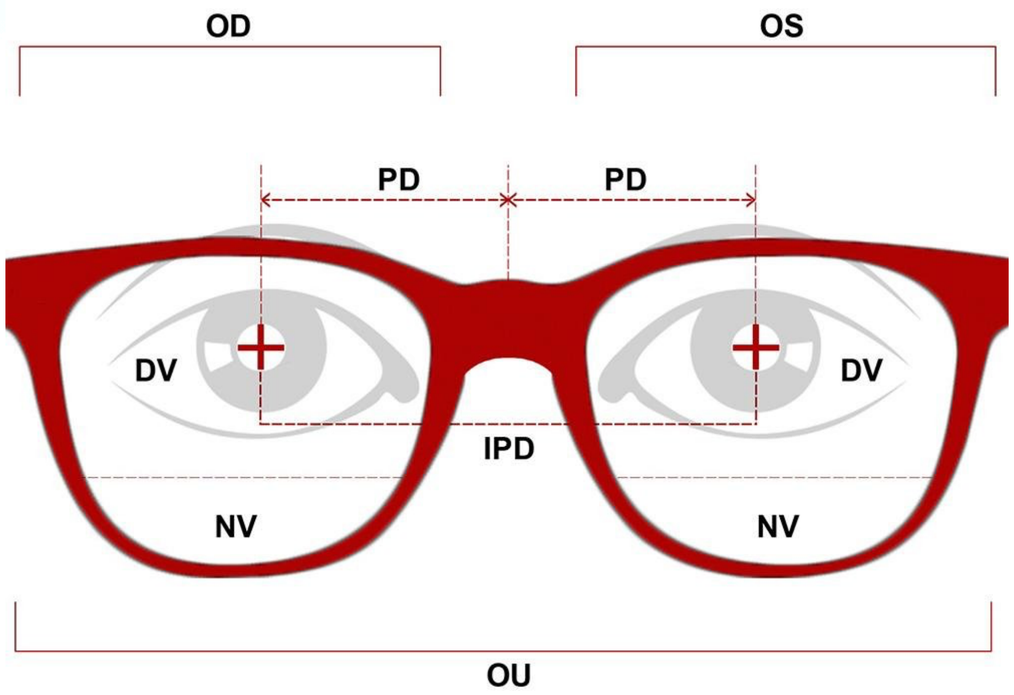
The Frame PD

The box centre distance (BCD) is also commonly known as the frame PD and it can be seen from the diagram in figure 1 that:

BCD, c = a/2 + d + a/2 = a + d

Alternatively: Frame PD = Eye Size + DBL





Decentration

Decentration (dec) is defined as the ‘displacement, horizontal and/or vertical, of the centration point from the standard optical centre position to be placed at the boxed centre

we have two Center

1. Geometric Centre for spectacle 2. Optical Centre for eye

We should make these two Center opposites to each other , if these centres not opposites we should do the decentre for the lens according to the formula

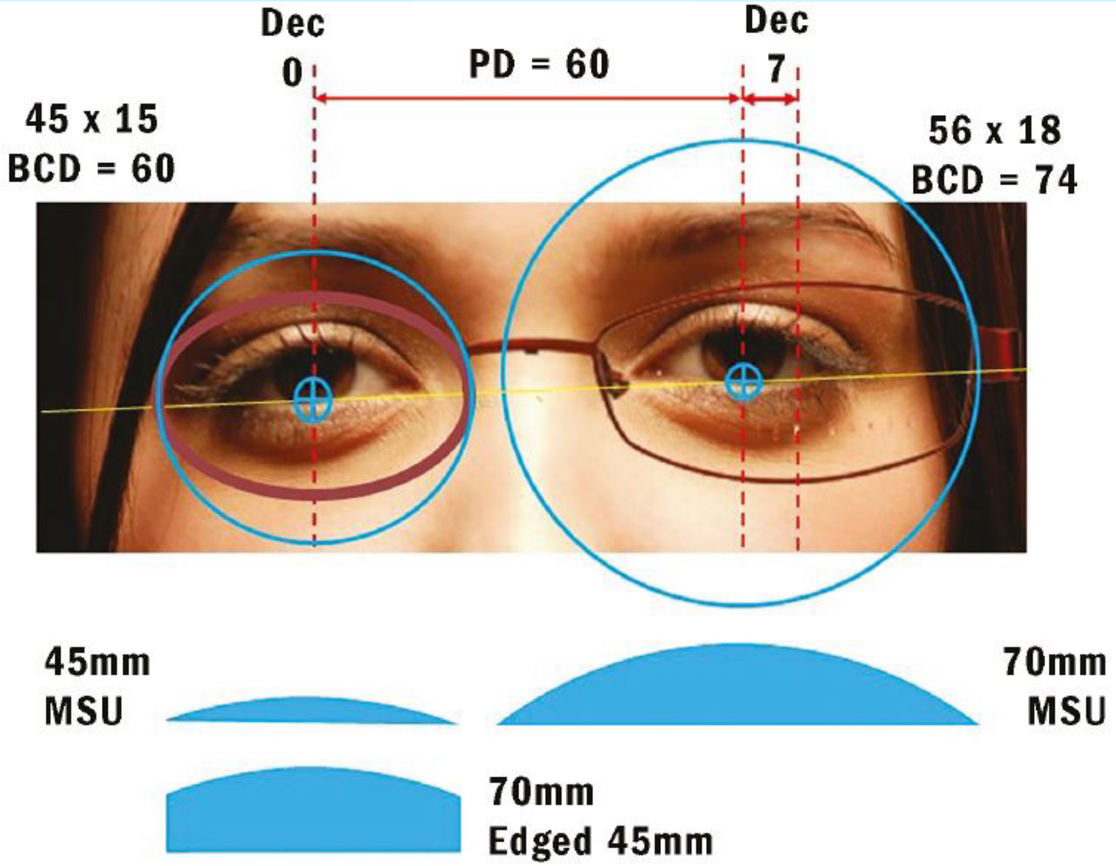
Frame size - IPD = decentration

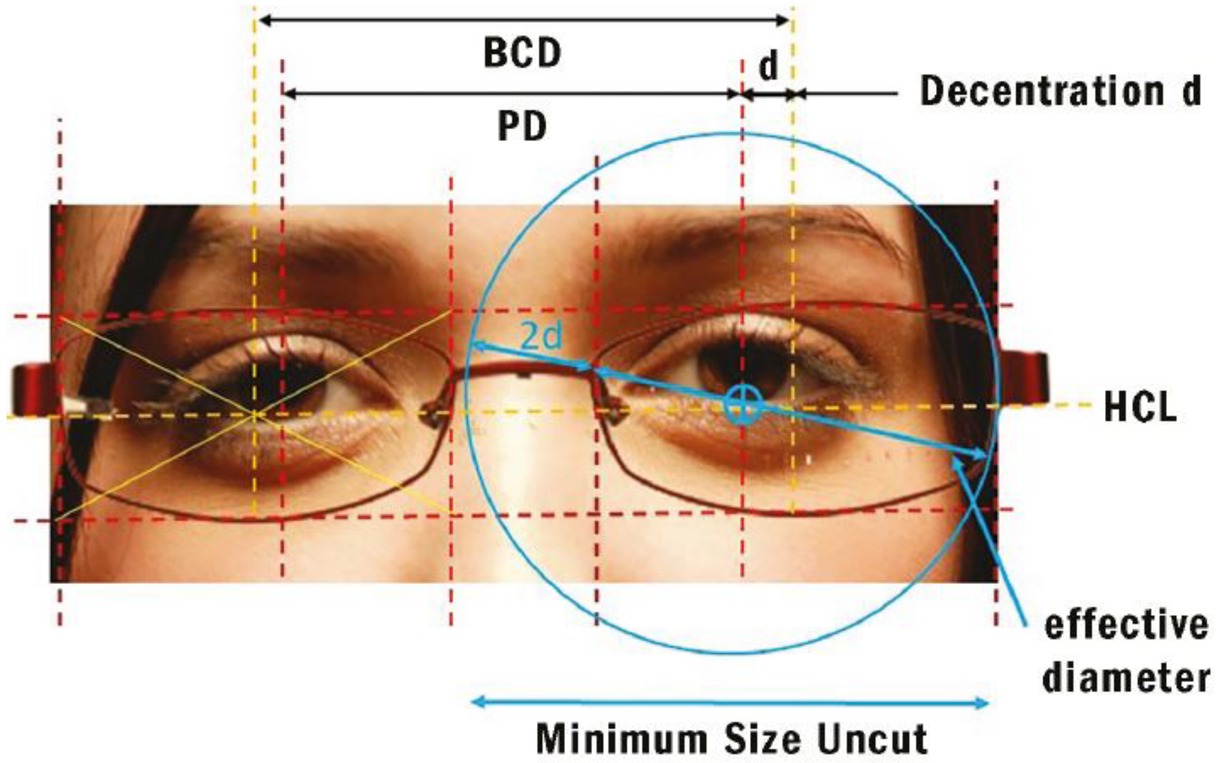
If FZ > IPD the decentration for in

Minimum Sized Uncut

Minimum sized uncut (MSU) can be calculated simply From the formula.

MSU = Effective Diameter + 2xDecentration + 2mm





Pantoscopic Angle

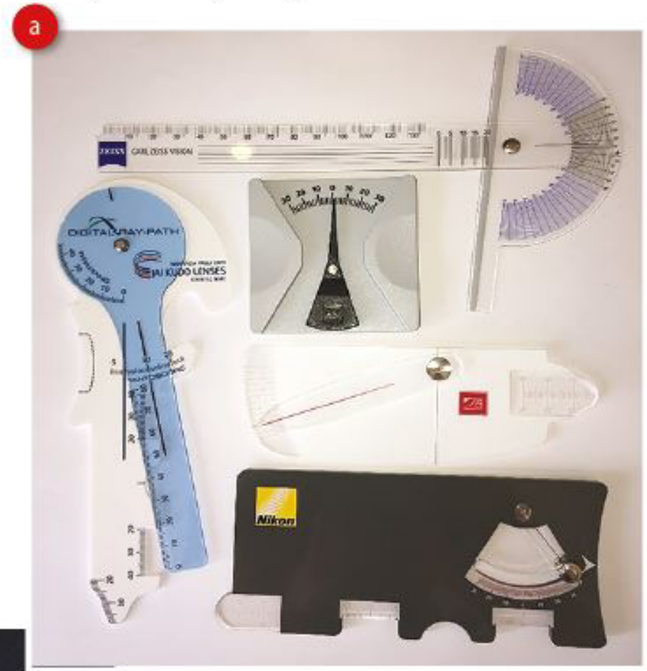
- The angle between the optical axis of a lens and the visual axis of the eye in the primary position usually taken to be the horizontal.
- The angle between the spectacle lens as worn and the vertical plane.

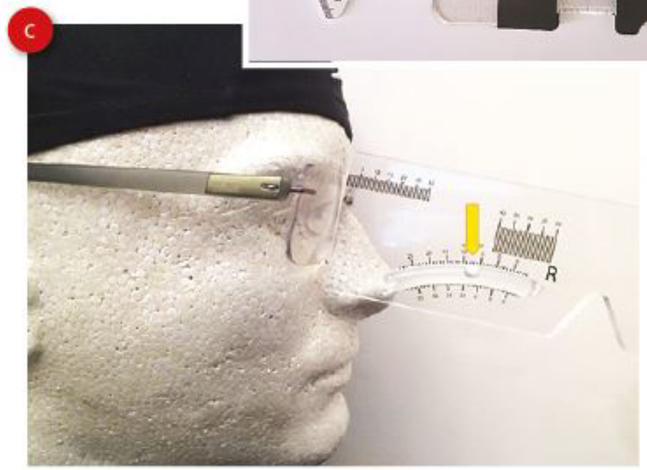
Pantoscopic angle is important because,

at the point where the visual axis (or the line of sight) passes through the optical centre of the lens, it must do so such that it coincides with the optical axis of the lens, passing through at right angles to the surfaces.

The practice way to measurement the angle of pantoscopic

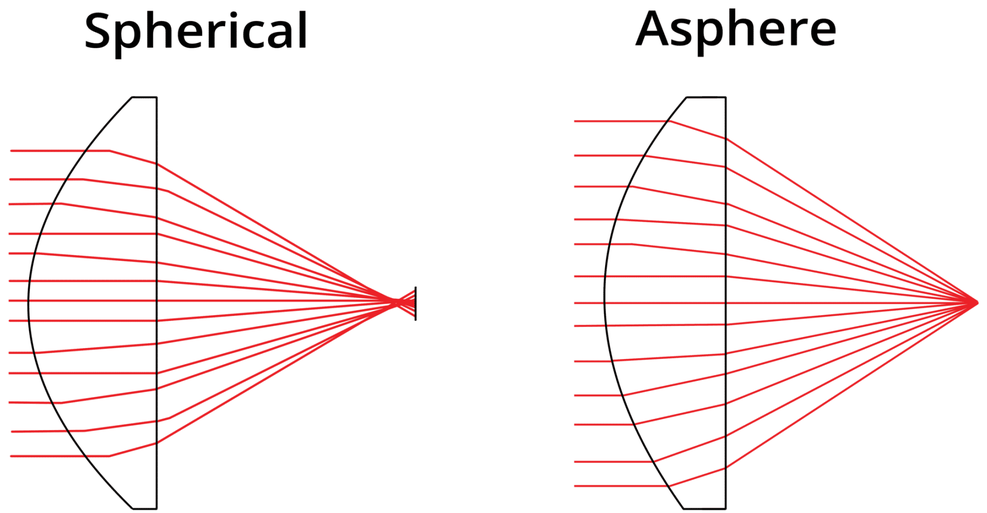
FIGURE 11 (a) Devices for measuring pantoscopic angle supplied free by manufacturers; (b and c) proprietary devices in use; (d) home made device in use; (e) free inclination app used by builders to measure roof pitch used to measure pantoscopic angle





What are the aberrations of spectacles ?

is a property of optical systems such as lenses that results in light being spread out over some region of space rather than being focused to a point.



Correcting spherical aberrations using aspherical lenses