

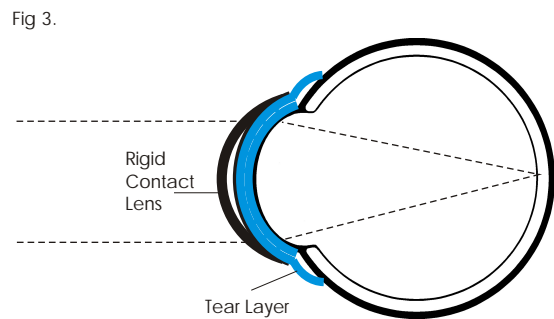
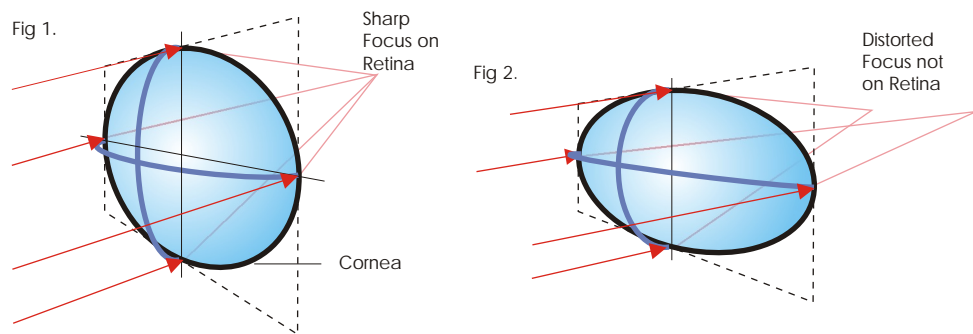
# Astigmatism

The cornea is the primary light focussing structure of the eye.

Ideally the corneal shape should be a regular spherical surface which brings light to a point focus at the retina. Figure 1 shows a regular spherical surface (ignoring aberrations) bringing light to a perfect point focus.

Astigmatism results when the corneal surface is steeper in one meridian than the other. The shape is often likened to a rugby ball, with the steepest and flattest curves 90 degrees to each other. So the cornea actually has maximum power in one meridian and minimum power 90 degrees to this, with a gradual variation inbetween (Fig 2).

Astigmatism tends to affect both distance and near vision. Depending on how much astigmatism is present spectacle wear may range from infrequently for TV, driving or reading to constant wear.



# Spectacles and Astigmatism

Spectacle lenses for astigmatism need to have different powers in different meridians and be aligned correctly in the frame to compensate for the corneal curves.

Astigmatic corrections often feel quite strange when new or changed. All lenses cause some distortion peripherally but astigmatic lenses cause more in one direction than the other. The brain becomes quite comfortable with the vision it receives, whether correct or not, and a change in astigmatic correction alters the distortion effects received by the brain. New glasses often make straight surfaces appear curved, doorways can look bowed and the ground can seem to slope up or down as you walk. If the optometrist feels there has been a big enough change in the prescription to cause these effects then you should be advised appropriately. Usually the brain accepts the new perspective within a few days. Occasionally however, if the change is too great, the patient may be unable to tolerate the spectacles. In this situation the power may need to be downgraded to something closer to the old powers to make them tolerable.

# Contact Lenses and Astigmatism

A very good way of correcting astigmatism with contact lenses is to use rigid lenses. Rigid lenses do not mould to the corneal shape as soft lenses do. These lenses maintain a spherical shape, tears pool behind the lenses and the corneal curves are optically neutralised (Fig 3). Rigid lenses give excellent vision quality, are healthy, durable and cost effective. Unfortunately the initial comfort is poor and so these lenses are not popular with patients.

There are now excellent disposable soft lenses, monthly, fortnightly and daily to correct astigmatism. Soft lenses correcting astigmatism are termed 'toric'. Like spectacle lenses these contacts have different powers in different directions to compensate for the corneal powers. Spectacle lenses however, are fixed within a frame and so are unable to rotate. If a soft toric lens rotates the vision will be poor. These lenses have to be stabilised on the eye so while they move up and down on blinking they must not rotate.

# Irregular Astigmatism

Certain ocular conditions and trauma can cause irregular astigmatism. A notable example is Keratoconus. In this condition the cornea is cone shaped and the corneal curves are so irregular spectacles can't compensate for the power curves. Corneal surgery, including refractive surgery, trauma and other ocular pathologies, can also cause irregular distortion of the cornea. Irregular astigmatism is very rare but usually has to be managed with rigid contact lenses which neutralise the corneal surface by maintaining the spherical shape as in Figure 3. No matter how distorted a cornea may be, as long as there is no corneal scarring, it is usually possible to fit some form of rigid lens to correct vision.