
Understanding Your Eyeglass Prescription for Astigmatism

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Eyesight astigmatism is one of the most baffling vision errors for the layperson to understand. Although common nearsightedness (myopia) and farsightedness (hyperopia) intuitively describe the state of the eye's focus error, clearly the word "*astigmatism*" does not. Astigmatism originates from the Greek language, meaning without ("a") a point ("stigma"). Whereas eyes that have simple and near-and-farsightedness can achieve a point focus through either eye-refocusing or moving the subject to the proper distance for sharpness, eyes that have an astigmatism defect actually manifest a defocus error in two different planes, or meridians. Think of a "plus" (+) sign placed in front of your eye. In this example, the vertical meridian would have one focal power, and the horizontal meridian (90° away) would have a different focal power. In eyeglasses and contact lenses, it is the *difference* in power between these two principal meridians that is referred to as the astigmatism power. For example:

The Vertical meridian has a dioptric power of 2.00D

The Horizontal meridian has a dioptric power of 2.50D

The Astigmatism would be the difference between these two powers (2.50D – 2.00D) = 0.50D.

This eye would then said to have an astigmatism of ½ diopter (0.50D).

When an eye's astigmatism has its principal meridians placed at 90° and 180°, it is said to be *orthogonal* astigmatism. When the principal meridians line up at orientations other than 90° and 180° (say, 45° and 135°), the astigmatism is said to be *oblique*.

The system that has been developed to describe the orientation of an astigmatism's principal meridians is a simple degree circle. Imagine a common protractor centered in front of your eye, with the "0" degree marking placed at the left-side of each eye's field of view. This "degree" reference is what is used in eyeglass and contact lens prescriptions to describe the orientation of the principal meridians of an astigmatism correction. However, an additional term has also been defined and is used to describe the orientation of an eye's astigmatism. This is called the *axis*, and is defined as the meridian in an astigmatic eye that has the *least* power. In the above example, the vertical meridian has the lowest power (2.00D vs. 2.50D), and would be defined as this eye's astigmatism axis. In this case, the axis would be "90°."

Remembering that eyeglass astigmatism is really the *difference* in powers between the principal focal meridians, you will also encounter the term *cylinder* power on a standard eyeglass Rx. The *cylinder* power (often abbreviated "cyl") is the actual *difference* in power for a particular eye, and is also interchangeable with the term *astigmatism* power.

The reason that eyesight astigmatism is described as "cylinder" power relates to the shape of a simple cylinder. For this discussion, let's think of a can of hairspray as the physical example of a cylinder. The shape of the can could be described a having two meridians. The "vertical" meridian is the height dimension of the can, and its shape is absolutely straight, or flat. This meridian would be said to have "0" (zero) power. The horizontal meridian, 90° away from the height, is the can's width. It is this meridian that possesses the most shape curvature, or power. The difference between these two meridians (from flat to sharply curved) would be a description of the object's "astigmatism." Since, in this hairspray-can example, this "cylinder" has its flattest (lowest power) meridian oriented vertically, the "axis" of this "cylinder" would be 90°.

It is not hard to imagine that a person looking through an astigmatic eyeglass lens (with its variable surface power) may experience perceptual side effects. This is especially true for the first-time wearer of an astigmatic correction. Even though vision testing can show that the introduction of a small-to-moderate amount of astigmatism correction would significantly improve acuity, the accompanying unpleasant perceptual side effects that often make it unwearable for many people. This is particularly true if the eyeglasses are not worn regularly. This is often the case with prescriptions given for driving and/or night-driving. Because of these perceptual side effects, doctors often employ *professional discretion*, and remove small (and sometimes even moderate) amounts of astigmatism in their prescriptions.

It is for this reason that no observer should confidently conclude that the lack of a written correction for astigmatism means that they have none. Astigmatism correction really may be warranted, waiting for Tele Vue DIOPTRX to deliver you sharper viewing.