Vehicles Mirrors

PLANAR, CONVEX, ASPHERIC

In the U.S. and Canada, the U.S. National Highway Traffic Safety Administration's Federal Motor Vehicle Safety Standard 111 and the Canada Motor Vehicle Safety Standard 111 require the driver side mirror to provide "unit magnification", i.e., an undistorted 1:1 reflection achieved with a flat mirror.

However, unit magnification limits the field of view that can be provided by a mirror of size compatible with the vehicle body.

The ECE regulations in use throughout most of the world except North America permit the driver side mirror to have a planar, convex, or aspheric surface; an aspheric section is often combined with a larger convex section, and the two sections are separated by a visible line to alert the driver to the two sections' different perspective shifts.

Because of the distance from the driver's eye to the *passenger* side mirror, a useful field of view can be achieved only with a convex or aspheric mirror (sometimes known as Euro style).

However, the convexity also minifies the objects shown.
Since such objects seem farther away than they actually are, a driver might make a maneuver such as a lane change assuming an adjacent vehicle is a safe distance behind, when in fact it is quite a bit closer.

In the United States, Canada, India, Korea non-planar mirrors are etched or printed with the warning legend *OBJECTS IN THE MIRROR ARE CLOSER THAN THEY APPEAR*.

In Canada, this warning is often supplemented by a transparent decal on the passenger side window.
U.S. Federal Motor Vehicle Safety Standard 111 requires that convex side view mirrors must have a curvature radius of between 889 mm and 1651 mm. Canada Motor Vehicle Safety Standard 111 stipulates a range of between 890 mm and 1800 mm.

Neither the U.S. nor the Canadian standard allows for aspheric mirrors.

The European ECE Regulation 46 used throughout most of the world permits planar, convex, and/or aspheric mirrors on either side of the vehicle.
American research suggests non-planar driver side mirrors may help reduce crashes.
It is all about the shape

The reason objects are closer than they appear in the passenger side view mirror is simple, the mirror is slightly curved (it is convex, or bowed outward in the center, and curves back on the sides).

2.

The driver side mirror is not shaped the same way – it is flat. Why the difference?

The shape of the passenger mirror is intentional, and it is done to achieve two goals.

First, automakers must overcome the problem of greater distance between the driver and the passenger side mirror than the driver and the driver side mirror.

Second, the angle of the view is different, which means that a flat mirror would not be usable in this position.

Finally, the mirror is curved to eliminate blind spots for the driver, making it safer and easier to view cars or other objects on the right side of your vehicle.

You can see the same effect on aftermarket blind spot mirrors.

They are usually round, but they share the convex shape of your stock passenger side mirror.

Hold one up and you will notice that the objects reflected in the surface truly are closer than they appear.

The warning on your mirror is exactly that – it is intended to make you aware that the perceived distance between you and another car or object is less than you think.

Aspherical exterior **mirrors** have a dual, partially curved (convex) **mirror** surface. This increases the viewing area of the rear-facing **mirror**. When using **aspherical mirrors**, properly adjust the exterior **mirror** to fit your driving position to eliminate the blind spot almost completely.