

## The NOT-SO-EXCITING LIVES OF NEGATIVE LENSES AND CONVEX MIRRORS

The images that are formed by both of these optics are virtual images. No matter where the object is placed in front of the lens or mirror, its image is smaller than the real object, and the image distance is smaller than actual object distance. The big difference between the lens and the mirror is that the virtual image is on the same side of the lens as the object, while the virtual image in a convex mirror is on the opposite side of the object. Neither of them is capable of projecting real images on their own, only when used in combination with another optic.

Since everything in their field of view is minified, they are used for expanding the angle of view.

They do have their uses:

Negative Lens: Fresnel in vans, myopia correction, not in overheads. The eyepiece of Galilean or Terrestrial telescopes, one of the elements in a cemented achromat, the last element in a telephoto lens, the front element in a retrofocus wide angle lens.

Convex mirror Anti-shoplifting, rear view mirrors on passenger side of cars, both on motorcycle. Used in conjunction with a concave reflector in a *reflex* telephoto lens design. Most famous convex mirror is in the painting, The Marriage of Arnolfini.