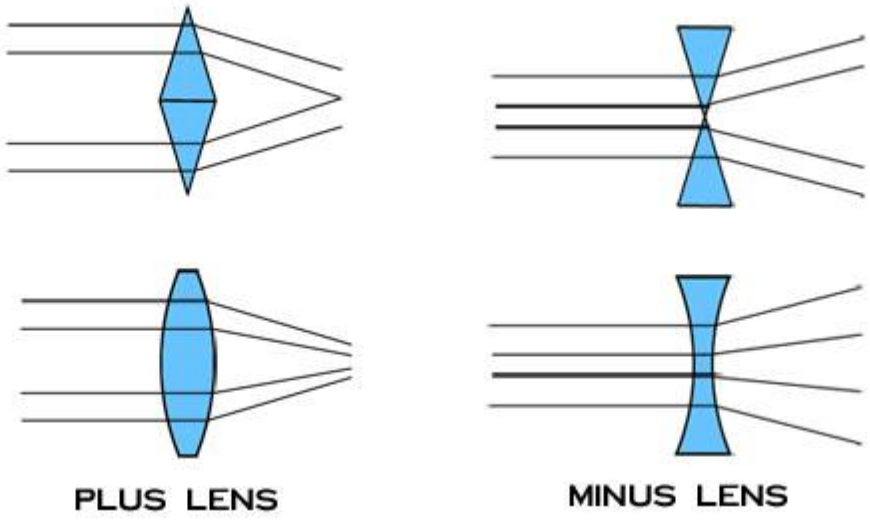
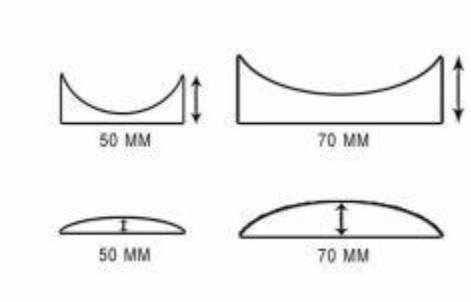
Lenses

It can be helpful to think of very basic lens forms in terms of prisms. As light passes through a prism it is refracted toward the prism base. Minus lenses therefore resemble two prisms apex to apex spreading light rays outward as they pass through the lens, while plus lenses resemble two prisms base to base converging light rays as they pass through the lens.



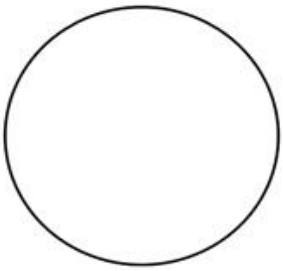
In plus lenses the larger the eye wire (or the more decentration you have) the thicker the lens will be and in minus lenses, the larger the eye wire opening, the thicker the edge will be. You always want to put your patient in the smallest possible frame that fits correctly. It is an absolute rule that the smaller the eyewear or eye wire opening, the lighter and thinner the glasses will be. The below example shows 2 lenses of the same power however because one lens is bigger the overall thickness is greater making for a thicker lens in the patients glasses. So in some cases the proper frame selection with the patient's eyes in the center of the glasses can affect the lenses thickness as much as the overall power of the lens.



As lens size increases, lens thickness proportionally increases therefore the larger the lens, the greater the thickness. The greater the thickness, the more material you have. The more material you have, the heavier the lens will be.

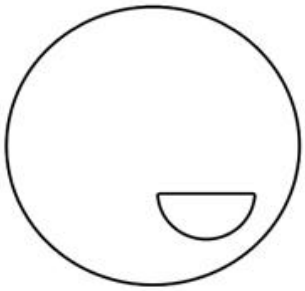
Lens Types

Single Vision



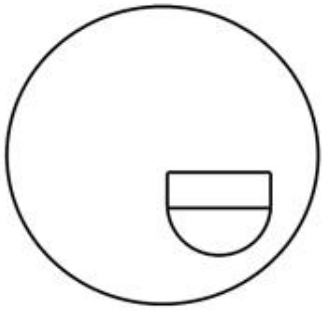
Single vision lenses are lenses designed to correct only one refractive error. Any lens that includes an add power for the correction of presbyopia will be a variation of a multi-focal lens.

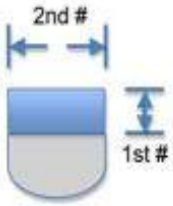
Lined Bi-Focal



This lens is used to correct distance refractive errors plus the condition of presbyopia. These lenses will have two (bi) distinct areas of clear vision. Bi-focal widths can be 28mm, 35mm 45mm. The power in the segment allows them to read and view objects at approximately 16 inches or "at near".

Lined tri-focals





These lenses will have three (tri) distinct areas of clear vision. One for distance, one for intermediate at approximately 30 – 40 inches and one for the near vision. Trifocal sizes include, ST 7 X 28 , or ST 8 X 35, ST stands for Straight Top, the first number 7 or 8 indicates the height of the intermediate zone and the second number 28 or 35 indicates the width of the segment.

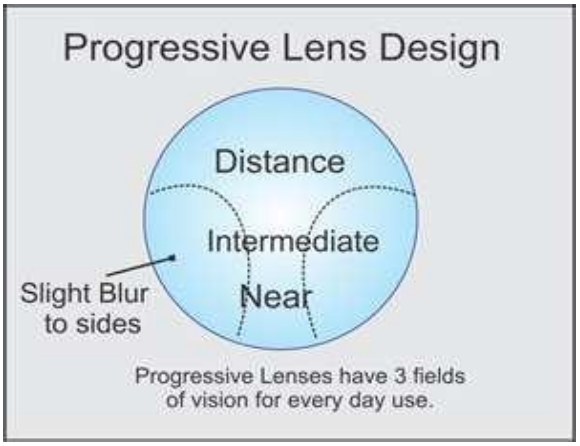
Use lined style multi-focals (bi-focals and tri-focals) when:

- The patient is already wearing them. If your patient has worn a lined style multi-focal for more than five years, then simply leave them in that style. Avoid trying to switch your well established older lined multi-focal wearer to a progressive unless it is the patients desire to do so.
- You have the rare instance where a patient cannot get used to progressive lenses, your only choice, other than providing two pairs of glasses, is a lined style multi-focal.

- Cost is a factor. Lined style multi-focals are generally less expensive than progressives. Be careful on making generalizations about cost. A basic plastic ST 28 will cost less than a basic plastic progressive. However our package one special can get the patient a progressive for less than a lined bifocal at a competitor.

Bi-focal such as executives, blended, and round segments are all dated designs. Be careful when selling dated styles, even when you think you are doing the best you can for customer service. Many of these designs will become unavailable or grow more expensive as their availability shrinks. It is better to wean a patient into a more modern and readily available lens now than to try to do it down the road. When it comes time to change only one lens for the patient because of loss, damage, or surgery, the patient will be much better off in a design that is readily available. STOP using out-dated designs!

Progressives Lenses



You will often hear progressive lenses being sold as no-line bifocals. This is an inaccurate representation and a poor marketing strategy, and should be avoided. A progressive lens has a variable range of focus that allows the wearer a wide range of viewing, not just two distinct distances.

Progressive lenses are used to correct distance vision plus the condition of presbyopia. These lenses have a distinct distance area and a variable non-specific power corridor that provides a wide range of viewing areas from near or 16 inches to intermediate approximately 30-40 inches, to anything within 20 feet of the eye.

The transitional zones of a progressive are invisible to the naked eye. Prior to cutting the lenses to fit a specific frame, the temporary markings shown in the above picture are actually painted on the lens. There are also permanent (laser or etched) markings on each lens. These markings tell you all about the lens. By using the progressive lens ID catalog or matching manufacturer lens chart you can tell, lens material, lens style, manufacturer, and add power.

NOTE: *There are other lens types such as Safety and occupational lenses, reading lenses, medical lenses such as occluded lenses, and aphakic lenses. These lens types are for specific patient needs and are not part of the normal dispensing you will encounter on a daily basis.*

Lens materials and designs.

Glass

Abbe value 59
The lower the power the better.
Not used as much and not recommended due to weight issues. Optics and scratch resistance are good however the weight is about twice that of plastic.
Can get in clear and photogray (the current photogray does not get as dark as the older models),
Limited tint colors and can be AR coated.

Plastic (CR-39)

Abbe value 58
Good for lower powers Plano to +/- 2.50
Scratch resistance ok, can add TD2 scratch coat for extra $50
Can get in clear or Transitions Gray or Brown.
All tints are available, Polarized and AR coatings.

Polycarb

Abbe value 32
Good for powers +/-2.50 to 5.00
Scratch resistance ok, can add TD2 scratch coat for extra $50
Can get in clear or Transitions Gray or Extra active Gray.
Polycarb CAN NOT be tinted.(the material does not hold a dip tint so you end up tinting the scratch coat which can peel over time)
Polarized and AR coatings are available. (the tint on the polarized lens is in the filter NOT the polycarb lens material)
Used in safety glasses because the material is less likely to shatter on impact.
Lighter than plastic because the material is denser, lower abbe value than plastic so be sure to sell with AR coating.
Has UV protection built into the lens.

Trivex

Good for powers +/-2.50 to 5.00
Abbe value 45
Has the same benefits as polycarb with better optics. Is also a lighter lens than polycarb.
This lens can be tinted in all available tints, lighter tints are better for darker tints consider polarized.
AR coatings and Transitions Grey and Brown are available.
Better for use in drill mount frames than polycarb.
Has UV protection built into the lens.

Hi-index 1.60

Abbe value 36
Good for powers +/-5.00 and over
Scratch resistance ok, can add TD2 scratch coat for extra $50
AR coatings and Transitions Grey and Brown are available.(but not in a flat top)
Thinner than polycarb or Trivex
Can use for drill mount frames.
Has UV protection built into the lens.

Hi-index 1.67

Abbe value 33
Good for powers +/-7.00 and over
AR coatings and Transitions Grey and Brown are available. .(but not in a flat top)
Thinnest lens available.
Great for higher powers.
Has UV protection built into the lens.

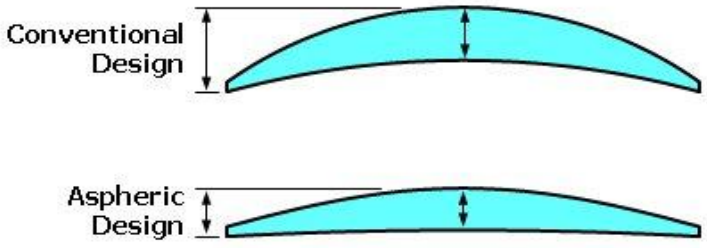
You CAN use these lenses outside the power guidelines listed.
The higher the Abbe value the less color fringe and peripheral distortion.

Aspheric lenses

Aspheric lens designs provide a flatten and thinner lens form in order to improve cosmetics, without sacrificing optical performance. While aspheric lenses do *not* provide *better* vision than standard form lenses, they do provide equivalent vision in a flatter, thinner, and lighter lens.

It is important to note that aspheric surfaces produce flatter and thinner lenses for two reasons:

- Aspheric lenses generally use flatter front curves, which reduce the *center* thickness in *plus* lenses and the *edge* thickness in *minus* lenses.
- The geometry of an aspheric surface also provides additional thickness reduction. Some aspheric lenses are even designed solely for cosmetics.



Conventional Versus Aspheric Lens Designs

As with the base curve of a standard form lens, the amount or degree of asphericity will depend upon the focal power of the lens. Additionally, the surface (that is, front or back) upon which the asphericity has been applied will also make a difference:

- **Plus lenses.** If asphericity is applied to the *front* surface of a plus lens, the surface will become *flatter* away from the center. If it is applied to the *back* surface, the surface will become *steeper* away from the center.
- **Minus lenses.** If asphericity is applied to the *front* surface of a minus lens, the surface will become *steeper* away from the center. If it is applied to the *back* surface, the surface will become *flatter* away from the center.

In a plus lens situation of a prescription of over say a plus 3.00, the curve of the lens in a standard design may be too curved to be a good fit in a plastic frame. Too steep a curve can cause the top of the lens to pop out of the frame or not stay in the frame. This flatter design can be a better fit and keep the lenses in the frame.