On behalf of Vision Expo, we sincerely thank you for being with us this year.

Vision Expo Has Gone Green!

We have eliminated all paper session evaluation forms. Please be sure to complete your electronic session evaluations online when you login to request your CE Letter for each course you attended! Your feedback is important to us as our Education Planning Committee considers content and speakers for future meetings to provide you with the best education possible.

VISION EXPO

ABO Basic Exam Review

Domain III: Ophthalmic Products
Domain V: Dispensing Procedures

National Federation of Opticianry Schools

Formal Opticianry Education…. We teach the Why

Presented by Tracy E Bennett, LDO, ABO-AC, NCLEC

Content Outline

ABO Test Content Outline	Weight	Approximate number of questions
III. Ophthalmic Products	23%	27
A. Frames		8
B. Lenses		9
C. Applying produce Knowledge		5
D. Recognizing specific product availability with regard to patient's needs and wants		3
E. Verifying frame and lens parameters and other physical characteristics		2
V. Dispensing Procedure	15%	17
A. Visual needs for lifestyle and occupational activities		3
B. Fitting , adjusting, measuring, and verification		7
C. Patient Interaction		7

ABO Domain III
Ophthalmic Products

Domain III – Ophthalmic Products

- Ophthalmic Products Comprise 23% of the ABO Basic Exam
- Topics:
  - Knowledge of Ophthalmic Products
    - Frames
    - Lenses
    - Preassembled Eyewear (optical aides)
      - Reading Glasses, Hand held Magnifiers
  - Skill in Ophthalmic Products
    - Rx Analysis
    - Lens Types, Materials and Products
    - Frame Types and Characteristics

Knowledge of Ophthalmic Products

- Frames
  - Availability
  - Uses, Limitations, Liabilities
  - Frame Measurement
    - Boxing System

Frame Materials

- Greatly expand your patient's options for a new look.
- Feature a variety of colors, range of durability, and lightness, designer labels, hypoallergenic materials, and unique designs.
- Choosing the right frame material is important, because each type has its own unique strengths.

Zyl Frames (Plastic) - Cellulose Acetate

- Cost-effective and Easily Manufactured - a creative option for eyewear, Waste is a major problem in manufacturing
- Hinges can loosen if heated too much
- Rainbow Colors - Particularly popular right now are laminated zyl frames that have layered colors
- Lightweight compared to most Metal or some other Plastics

Tip - Look for light colors on the interior side of frame, which can make eyewear "disappear" from the visual field when worn. A frame with a dark inside-faced color will be visible at all times and may have a more noticeable (closed-in) effect

Nylon Frames

- Eyeglasses made of **Nylon** first were introduced in the late 1940s.
- Nylon is also a premier material for sports and performance frames and are very resistant to hot and cold and are more flexible, yet also stiff. Lightweight and hypoallergenic
- Nylon also is easily molded into today's popular wraparound styles, as well as other shapes that are difficult to produce.
- Difficult to adjust and dries out and must be soaked in water periodically

Cellulose Acetate Propionate

- Nylon-based and Hypoallergenic
- Lightweight and has more transparency and gloss than other plastics. Can become brittle and must use low heat to adjust
- If your patient's main reason for selecting a plastic frame is lightness, then definitely consider propionate frames.

Polyamide/Copolyamide

- Cold Insert
- Shrinks if entire frame is heated
- Stretches if you heat half the frame but difficult to insert over sized lenses
- Lighter and thinner than cellulose acetate
- Hypoallergenic
- Can be made opaque or translucent
- Resistant to solvents

Kevlar

- Mixed with Nylon
- Stable over large temperature range
- Pliable with heat – will not shrink or stretch
- Difficult to adjust

Optyl

- Cast- molded plastic, from the EPOXY family
- Thermosetting Plastic – More difficult to adjust
- Hypo-allergenic - Ideal for patients with nickel sensitivity.
- Stays in shape until it is exposed to high temperature (about 83°c)
- Must be heated to at least 83°c to adjust, where it will soften and can be re-shaped for adjustment.
- Once an Optyl frame is adjusted properly, cooling down the frame will "fix" the adjustment
- It will then keep its' shape indefinitely or until it is exposed to temperatures that exceed 83°c once more.

Carbon Fiber

- Carbon fiber eyeglasses and carbon fiber sunglasses are popular among the exclusive eyewear designers.
- Properties of carbon fiber: Rigidity, High Strength, Low Weight and High Chemical Resistance. This makes carbon fiber very popular in Military and Driving Glasses.
- Difficult to adjust, will not shrink or stretch and available in darker colors

Plastic Frame Wrap Up

- Plastic frames do have some drawbacks. They can be easier to break than metal frames, they can burn if heated to long
- Aging and exposure to sunlight can dry out Plastic and decrease it’s strength. Color may fade over time, depending on what materials were used.
- Plastic frames most commonly have “fixed” bridges (no nose pad guard arms) so adjusting the lenses up or down has to be done with the temples only. Initial fit must be more exact.

Monel (Metal)

Monel — a mixture of any of a broad range of metals — is the most widely used material in the manufacture of eyeglass frames. Its malleability and corrosion resistance are pluses. still, it is not 100 percent corrosion-resistant: for some people, monel can react with their skin chemistry. But this is preventable if the right kind of plating, such as palladium or other nickel-free options, is used.

Titanium Frames

- **T**itanium is a silver-gray metal that's lightweight, durable, strong and corrosion-resistant. It has been used for everything from the space programs to medical implants such as heart valves.
- Titanium eyewear can be produced in a variety of colors for a clean, modern look with a hint of color. And they're **hypoallergenic.**
- Some titanium frames are made from an alloy that is a combination of titanium and other metals, such as nickel or copper. In general, titanium alloy frames cost less than 100 percent titanium frames.

Flexon Frames (Memory Metal)

- **Flexon** is a titanium-based alloy. This unique and popular material, originated by the eyeglass manufacturer Marchon, is called a "memory metal": frames made of Flexon come back into shape even after twisting, bending and crushing. Flexon frames are lightweight, hypoallergenic and corrosion-resistant.
- Marchon company officials describe the frame as about 25 percent lighter in weight than standard metals, giving your patient a much lighter feel on his or her face.

Stainless Steel Frames

- **Stainless steel** frames and surgical stainless are another alternative to titanium. Qualities of stainless steel frames include light weight, low toxicity and strength; many stainless steel frames also are nickel-free and thus hypoallergenic.
- **Stainless steel** is readily available and reasonably priced. It's an alloy of steel and chromium, and may also contain another element. Most stainless steels contain anywhere from 10 to 30 percent chromium, which provides excellent resistance to corrosion, abrasion and heat.

Beryllium Frames

- **Beryllium**, a steel-gray metal, is a lower-cost alternative to titanium eyewear. It resists corrosion and tarnish, making it an excellent choice for wearers who have high skin acidity or spend a good amount of time in or around salt water.
- Beryllium is also lightweight, very strong, very flexible (making it easy to adjust) and is available in a wide range of colors.

Aluminum

- Lightweight and Highly Corrosion-Resistant
- Used primarily by high-end eyewear designers because of the unique look it creates. Aluminum is a material that always looks modern.
- In its elemental state it is a bright gray or silver color, but it can be anodized to protect the surface from corrosion and then dyed.
- World's most abundant metal. Pure aluminum is actually soft and weak, but commercial aluminum with small amounts of silicon and iron is hard and strong.
- Aluminum is used in eyewear for the same reason it's used in airplanes: it's as strong as steel but weighs much less. Also, it's hypoallergenic and tends to keep its shape over time.

Metal/Plastic Allergy

- Certain frame or nose pad materials can irritate skin. We can help patients find eyeglasses they can wear more comfortably.
- If metal frames cause a reaction, nickel is usually to blame as most metal frames are made of a nickel alloy. Other metals used include aluminum, stainless steel, titanium, zinc, copper, beryllium, gold and silver
- Stainless, Titanium, and Gold are usually hypoallergenic as are most plastics.

Frame Styles

- Full or Standard Frame
  - Lenses are entirely enclosed by the eyewire. Frame may be metal, plastic or another material
- 2-Piece Chassis and Top Bar
  - Usually metal full frame with an additional top piece attached –made of either plastic or metal materials
- Semi-Rimless Grooved, Mounted and/or Drilled
  - Half the frame is either metal or plastic and the other half is either drilled, suspended or has a nylon cord designed to hold a grooved lens
- Rimless Three-Piece Drilled
  - Frame front is made up of pieces that attach to drilled lenses with screws, nuts and bolts or design specific attachments

Knowledge of Ophthalmic Products

- Lenses
  - Availability
  - Uses, Limitations, Liabilities
  - Magnifiers

Single Vision Lenses

- Used for only one distance or purpose.
- NVO – Reading Glasses
- DVO – Distance Glasses
- Intermediate - Computer, Arms Length Work

Calculate Reading Only from RX

-2.00 -1.00 x 180 Add ou

-1.50 -1.25 x 161 +2.00

- Add the Sph and the Add Power Together
- Keep Cylinder the Same

Reading Rx

- Plano -1.00 x 180
- +0.50 -1.25 x 161

+1.00 -1.50 x 110 Add ou

+1.50 -1.00 x 104 +2.75

- Add the Sph and the Add Power Together
- Keep Cylinder the Same

Reading Rx

- +3.75 -1.50 x 110
- +4.25 -1.00 x 104

Calculating Intermediate Distance

-2.00 -1.00 x 180 Add ou

-1.50 -1.25 x 161 +2.00

- Take half the add power and add to sph
- Keep Cylinder the Same

Intermediate Rx

- -1.00 -1.00 x 180
- -0.50 -1.25 x 161
- For Computer Glasses +1.00 add

+1.00 -1.50 x 110 Add ou

+1.50 -1.00 x 104 +2.50

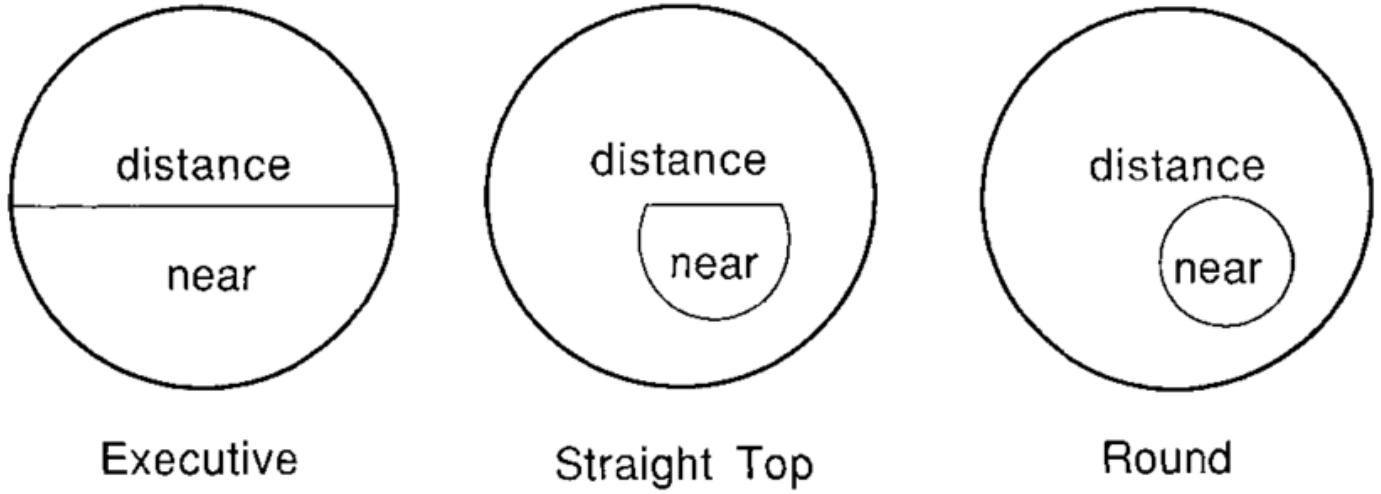
- Take half the add power and add to sph
- Keep Cylinder the Same

Intermediate Rx

- +2.25 -1.50 x 110
- +2.75 -1.00 x 104
- For Computer Glasses +1.25 add

Bifocal Lenses

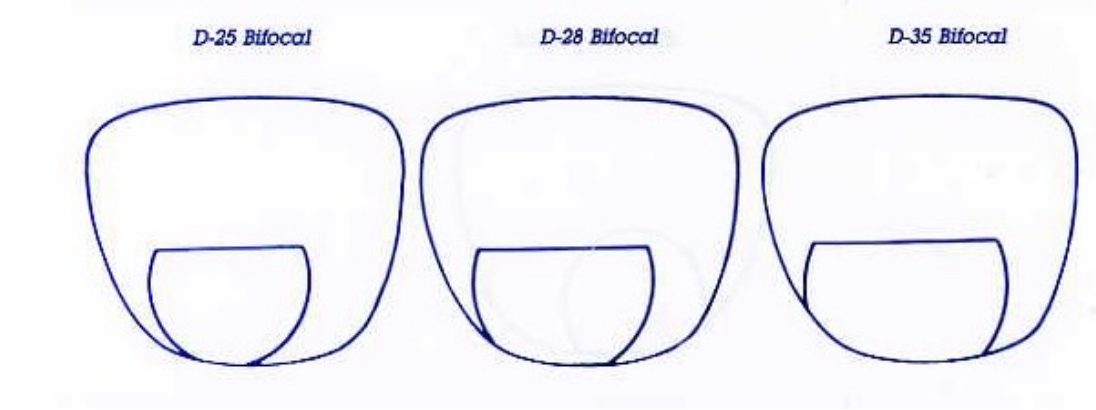
- Bifocals are designed to give presbyopes both distance and near vision in a single lens. The top of the lens is for far range and the segment is for up close viewing.
- As patient's move their eyes down into the lens, they experience an "image jump" as they cross over into the seg.
- Bifocals have two different power areas on the lens.
- Bifocals have visible lines that show on the surface of the lens.



Flat-top Bifocal Lens Styles

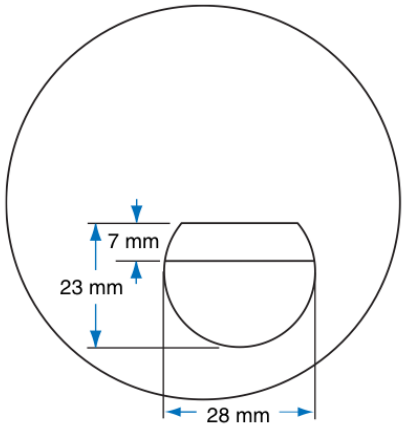
Flat-top (FT) bifocals can be referred as straight-top (ST) or D seg.

- Segments are measured at their widest horizontal point.
- Flat-top comes in 25mm, 28mm, and 35mm widths.
- As the seg width increases, the ledge thickness increases.
- Bifocals are fit at the lower lid or limbal margin to ensure the reading area is aligned with the eye's convergence when viewing near objects.

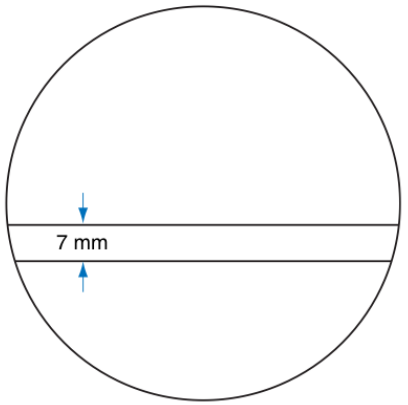


Trifocal Lenses

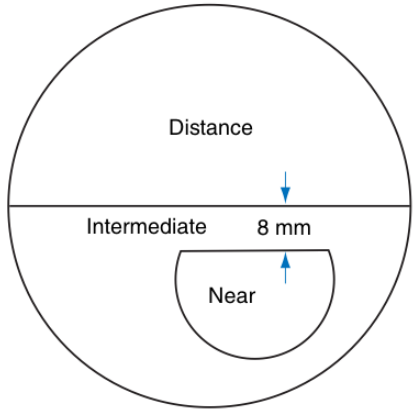
- Trifocals are designed to give the presbyopic wearer distance, intermediate, and near vision. The top of the lens is for far range, the top part of the seg is for arm's length, and the bottom seg is for up close viewing.
- Just like bifocals, as patient's move their eyes down into the lens, they experience an "image jump" as they cross into the intermediate and again when the near segment. Trifocals have visible lines that show on the front of the lens.
- Trifocals may be a consideration when the ADD power is above +1.50D.
- With the advance of progressive lenses, trifocals are considered "old technology" and are used less frequently in today's market.



A Flat top trifocal



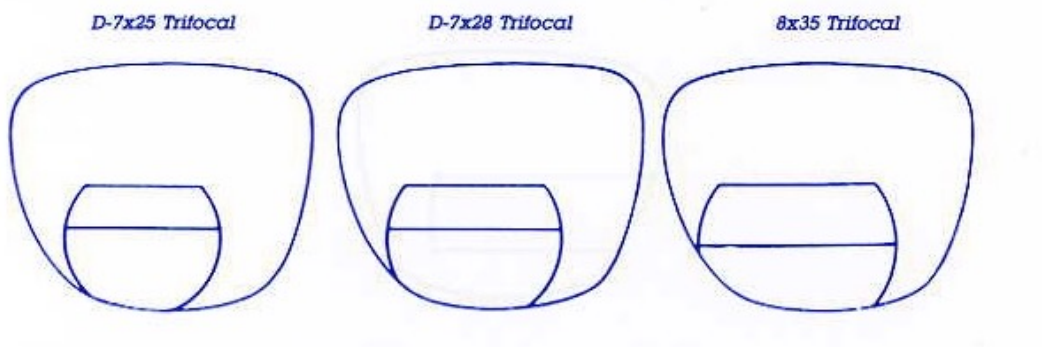
Franklin style (executive) trifocal B



C E/D trifocal

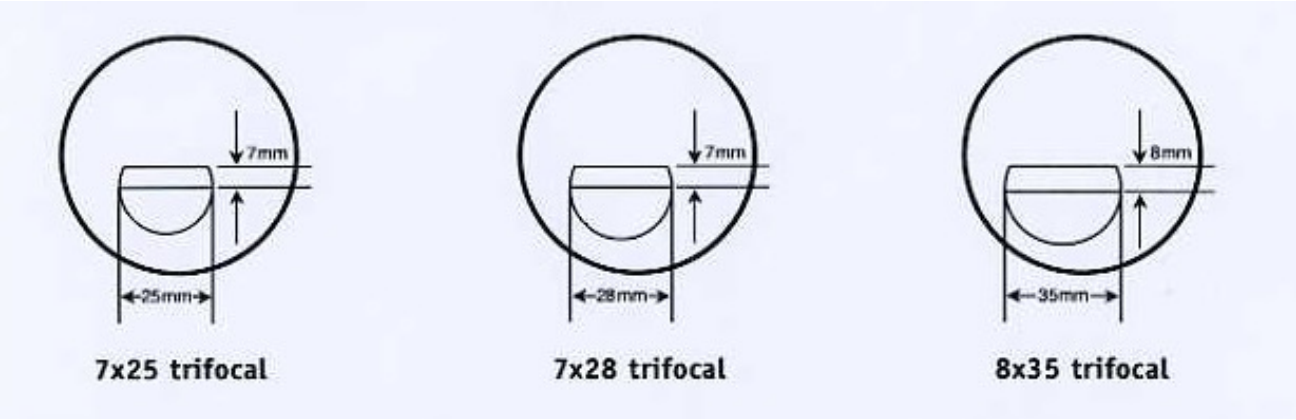
Trifocal Lenses

- Trifocal styles are similar to other bifocal styles except they have the extra intermediate portion no present on bifocals.
- The most common are FT trifocals.
- The seg name explains the style. FT 7x28 means the depth of the intermediate seg is 7mm and the width of the seg is 28mm.
- Trifocals are fit at the lower pupil margin.

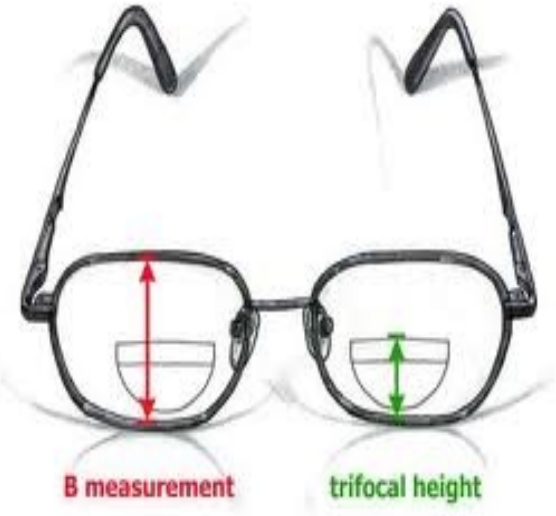


Measuring Trifocal Lenses

Measure Trifocals from the top of the segment to the middle line for the height and across the top of the lower segment for width



Trifocals have 3 viewing areas

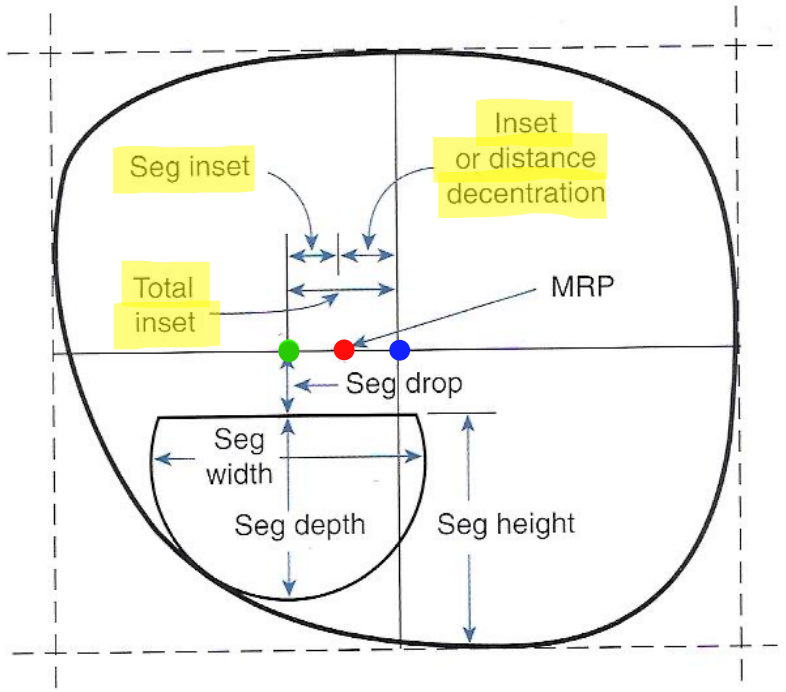


Seg Inset

- The near viewing area needs to be inset to align with the wearer's PD when viewing near objects. We call this seg inset.
- The distance OC needs to align with the wearer's distance PD when viewing distant objects. We call this inset or distance decentration.
- The near segment OC needs to align with the wearer's near PD when viewing near objects.
- When the eyes move from distance to reading, they converge.
- The difference between the distance PD and the near PD is the convergence amount and it will be equal to the seg inset.

Inset + Seg Inset = Total Inset

- **Inset** (distance decentration) is the horizontal distance from the boxing center to the MRP (usually the OC). [Horizontally from the blue dot to the red dot.]
- **Seg inset** is the horizontal distance from the MRP (OC) to the middle of the seg. [Horizontally from the red dot to the green dot.]
- **Total inset** is the horizontal distance from the boxing center to the middle of the seg. [Horizontally from the blue dot to the green dot.]

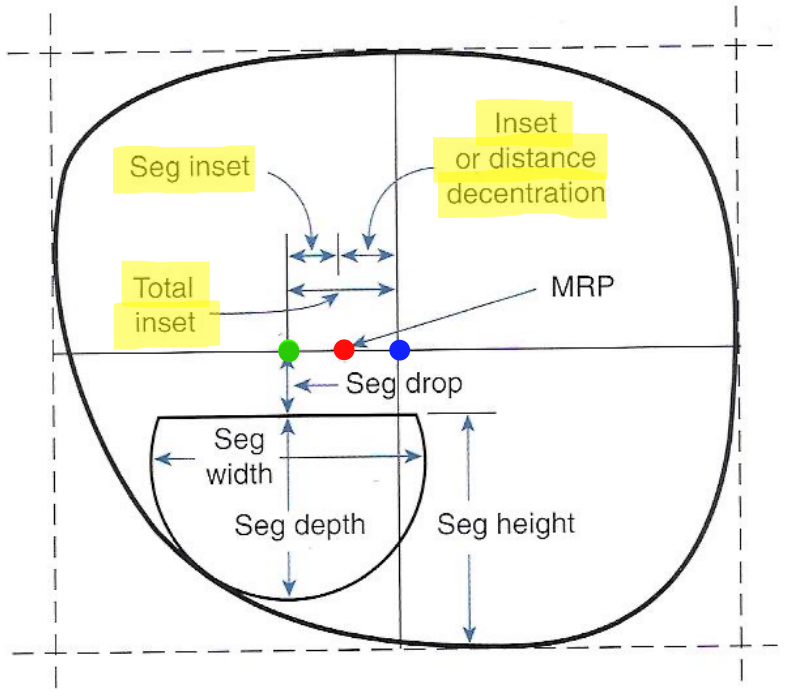


Inset Calculations

- **Inset** (distance decentration) [blue to red dot]
  (Frame PD – Binocular Distance PD) / 2 = Inset

- **Seg inset** [red to green dot]
  (Binocular Distance PD – Binocular Near PD) / 2 = Seg Inset

- **Total inset** [blue to green dot]
  (Frame PD – Binocular Near PD) / 2 = Total Inset



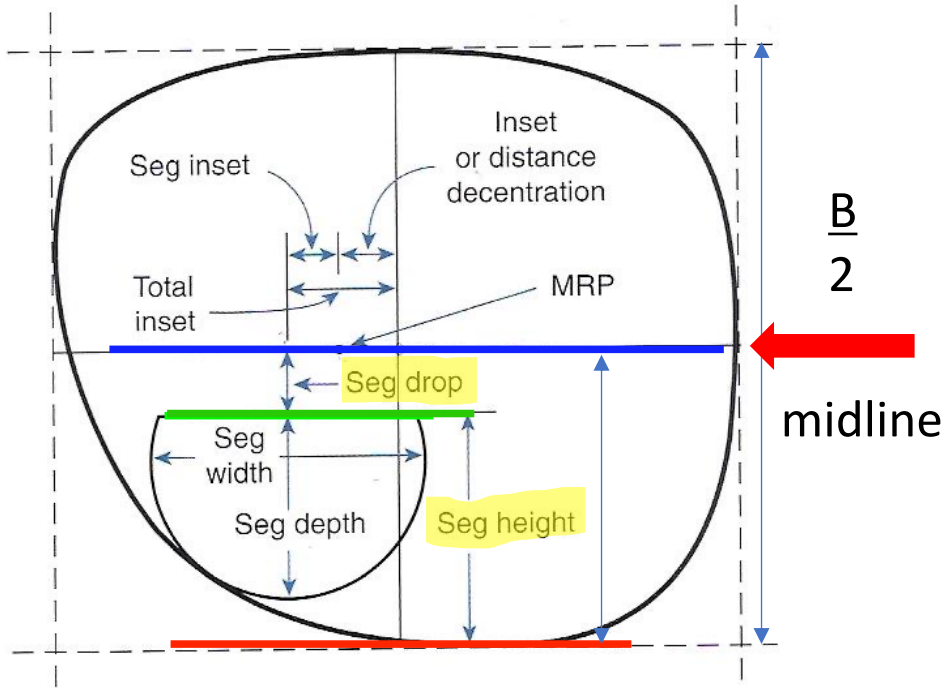
Note:

- Frame PD = A + DBL
- Binocular patient measurements are used to maintain symmetrical appearance.

Drop or Raise Calculations

- Drop or raise is used to determine how far below the midline the seg top is placed.
- To find the midline → divide the B in half. [Midline height is from blue line to red line.]
- To find the drop or raise → subtract the midline from the seg height. [Seg drop is from blue line to green line.]
- **Formula**

  seg height - (B/2) = seg drop



Binocular Inset – How much the bifocal has to be moved in for Near Vision

- Is the difference between the Distance PD and the Near PD
  - The Near PD is usually the Distance PD – 4 mm

- Binocular PD for Distance = 65
- Near PD = 61 mm
- Total = 4 mm
- Divide by 2 and the Inset for each eye would be 2 mm in each eye

Example # 1

- A patient is being fit for Flat Top bifocals

  Rx - 3.00 – .50 x 180

  - 3.00 - .75 x 180

  Add + 1.50 OU

"A" = 55, "DBL" = 15, "FPD" = 70 "B" = 42

DPD = 65, NPD = 61 Bifocal Height = 17

What is the distance PD, Inset, and seg drop measurement?

Answer

- Figure out Distance decentration first!
  - FPD = 70 – DPD = 65 – Decentration = 2.5 mm in for the distance for each eye. Total distance decentration for both eyes is 5 mm.
  - Inset = DPD – NPD = 65 – 61 = 4 Inset = 2 mm in each eye
  - Below measurement = “B” = 42 – Bifocal Height = 17 ½ “B” = 21 – 17 = 4 below
  - Total decentration = DPD + Inset = 2.5 + 2 = 4.5 mm for each eye and 4 below

Monocular Inset

- FPD = 70 (35/35)
- DPD =[65] (31/34)
- NPD = 61 (29/32)
  - First, what is the monocular DPD?
  - O.D. 35 – 31 = 4 mm
  - O.S. 35 – 34 = 1 mm
  - Second, what is the monocular NPD?
  - O.D. 31 – 29 = 2 mm
  - O.S. 34 – 32 = 2 mm
  - Total O.D. decentration (DPD + Inset = 6 mm)

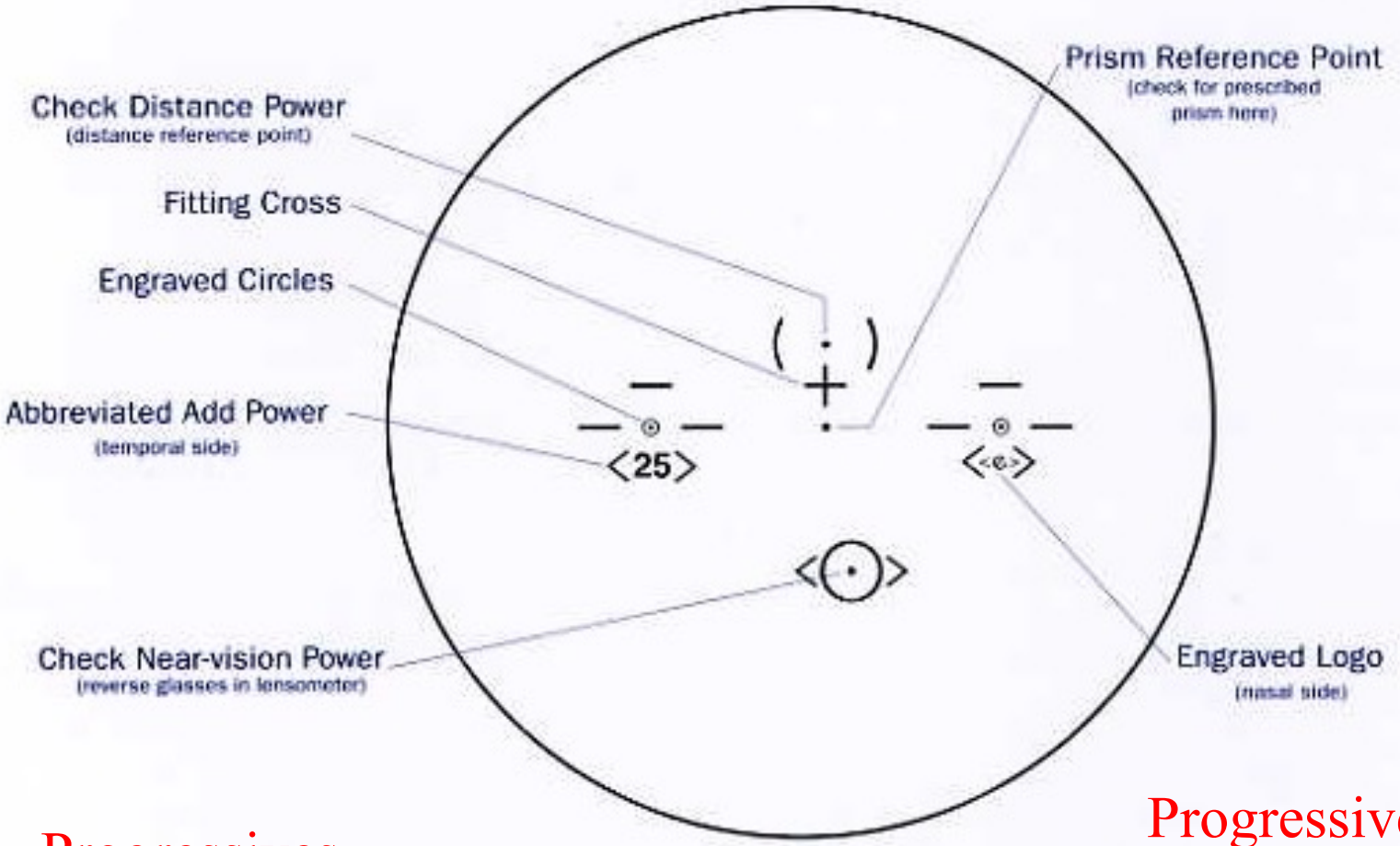
    4mm + 2 mm = 6mm
  - Total O.S. decentration (DPD + Inset = 3 mm)

    1 mm + 2 mm = 3 mm

Progressive Lenses

Progressive Lenses were designed many years ago to give the presbyopic wearer continuous vision from distance and intermediate to near vision with no lines or image jump. The top of the lens is for far range… and as the patient moves his or her eyes down into the lens they smoothly move into the intermediate range and then settle into the near focus very much like their natural vision. Progressive Lenses have a multitude of powers and no image “jump”.

With the advancement of technology, Progressive Lenses have become the lens of choice for presbyopes of all ages.



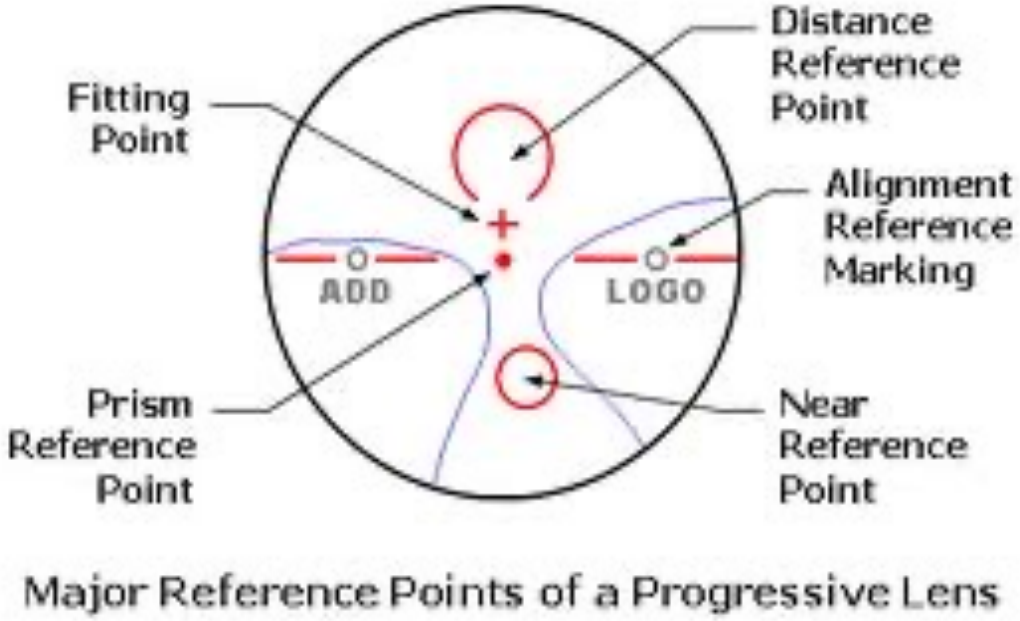
Progressives are fit at center pupil - See fitting cross

Engraving Identifiers

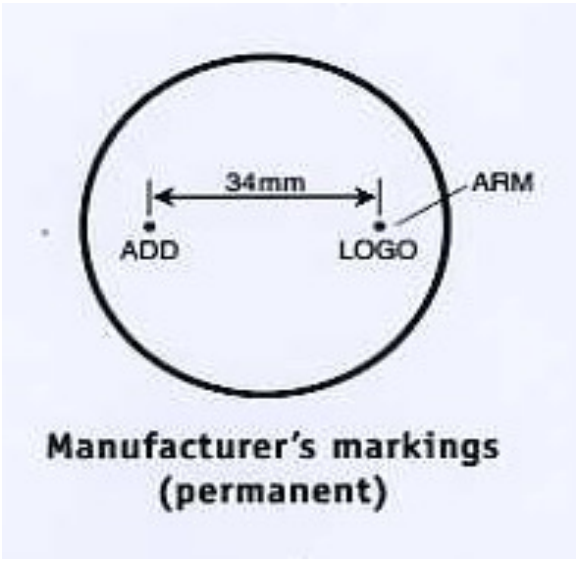
- **Varilux® Panamic®**
- **Varilux Comfort®**
- π = Thin & Lite® 1.67 High-index Plastic
- 6 = Thin & Lite 1.60 High-index Plastic
- X = Ormex® Transitions®; Ormex
- P = Airwear®

Progressives Lens Designs have unique markings that help us fit and neutralize lenses

Progressive Lenses



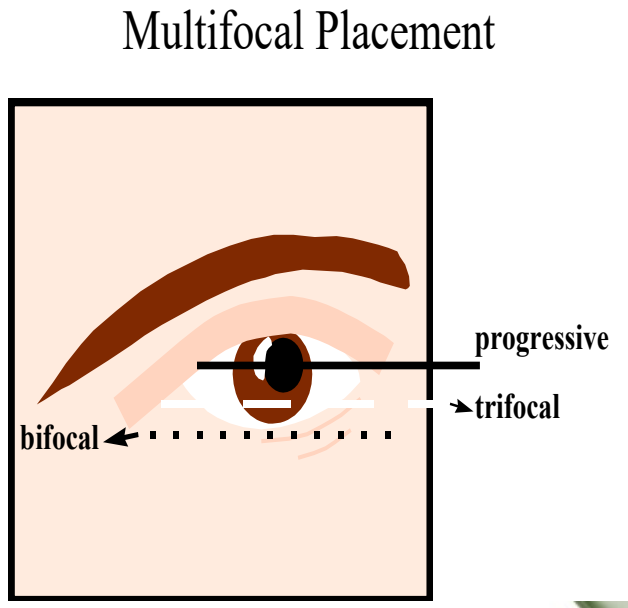
Major Reference Points of a Progressive Lens



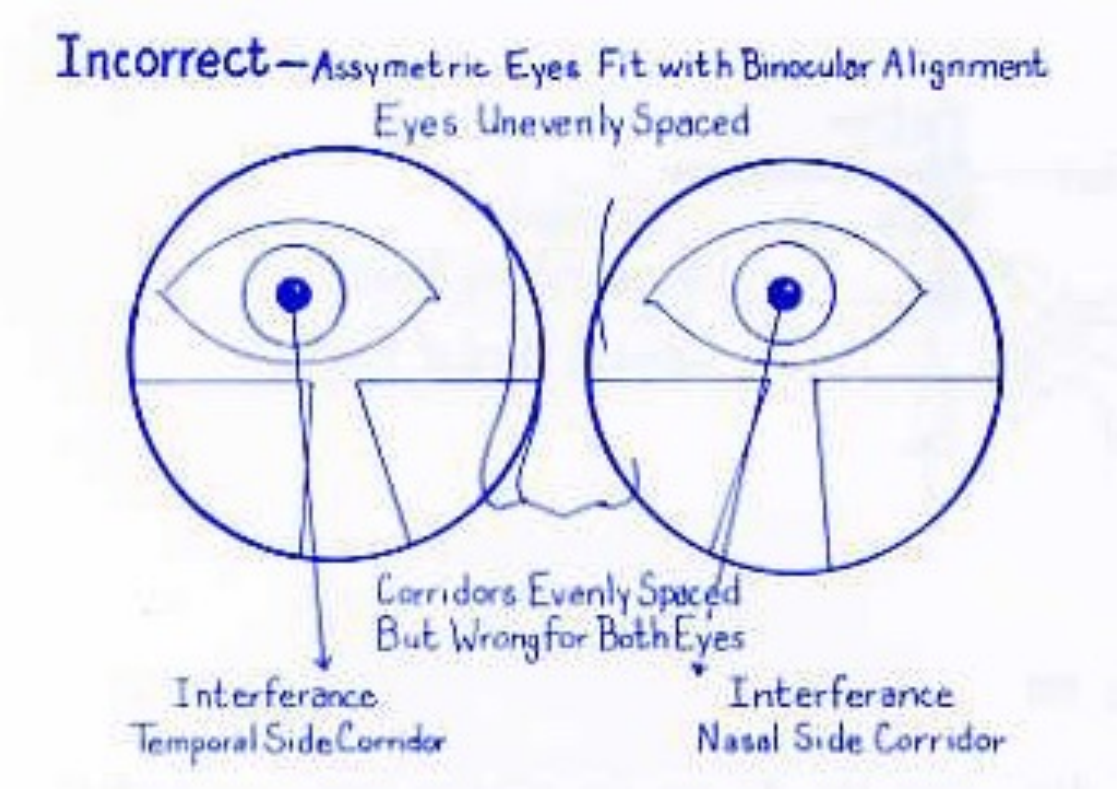
Manufacturer's markings (permanent)

MULTI-FOCAL MEASUREMENTS

- **PHYSIOLOGICAL LANDMARKS**
- **ADJUSTMENTS TO STANDARD**
  - **SLOUCHING – raise heights**
  - **ERECT – lower heights**
  - **HEAD POSITION**
  - **VERTEX DISTANCE**
- **VERIFICATION OF ADD POWER**



Progressive Lens Measurements



Example # 2

- A patient is being fit for Progressive lenses

  Rx - 3.00 – .50 x 180

  - 3.00 - .75 x 180

  Add + 1.50 OU

"A" = 55, "DBL" = 15, "FPD" = 70 "B" = 42

DPD = 65, (31/34) NPD = 61(29/32)

What is the distance PD and Inset measurement using monocular PD's?

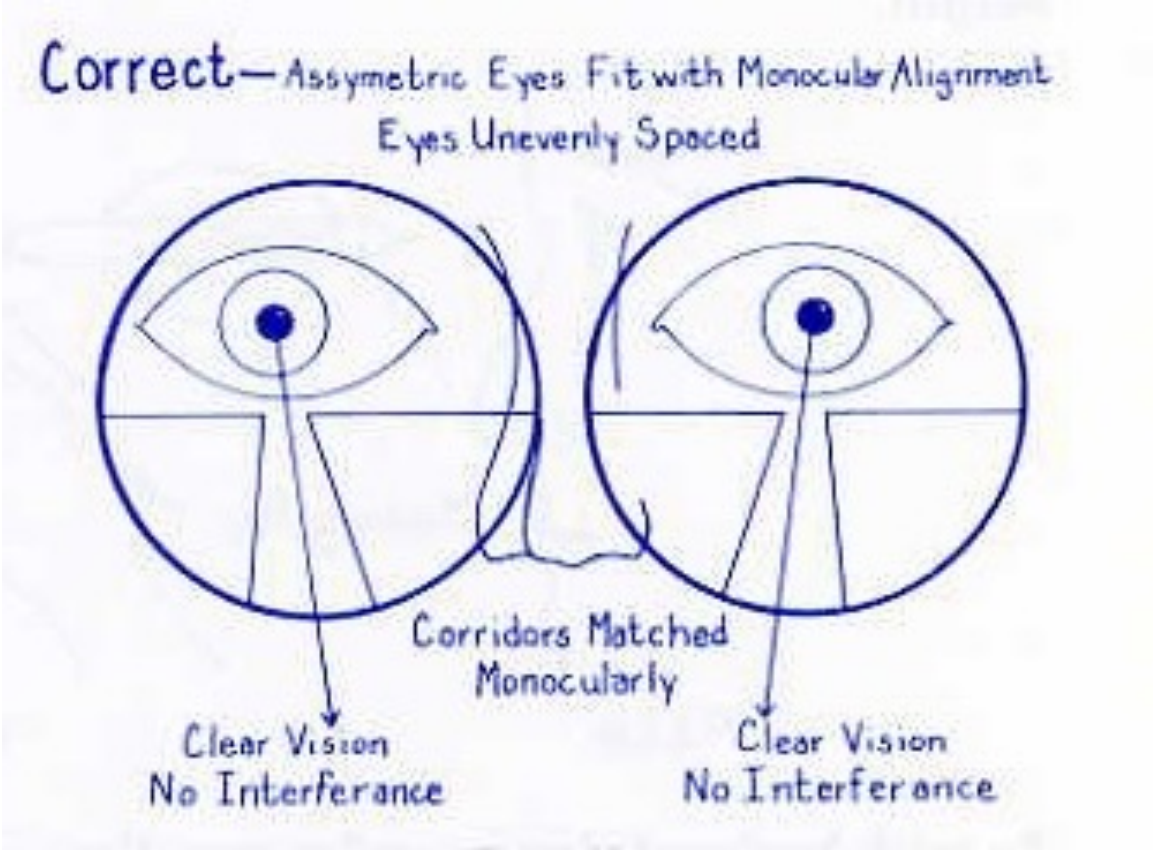
Monocular Inset

- FPD = 70 (35/35)
- DPD =[65] (31/34)
- NPD = 61 (29/32)
  - First, what is the monocular DPD?
  - O.D. 35 – 31 = 4 mm
  - O.S. 35 – 34 = 1 mm
  - Second, what is the monocular NPD?
  - O.D. 31 – 29 = 2 mm
  - O.S. 34 – 32 = 2 mm
  - Total O.D. decentration (DPD + Inset = 6 mm)

    4mm + 2 mm = 6mm
  - Total O.S. decentration (DPD + Inset = 3 mm)

    1 mm + 2 mm = 3 mm

Progressive Lens Measurements



General Eyewear Categories

- Dress Eyewear – is eyewear that is designed for everyday wear
- Safety Eyewear – is eyewear designed to meet higher standards of impact resistance since it will be worn in situations that could be potentially hazardous to the eyes
- Sports Eyewear – is designed to protect the eyes and or enhance vision is specific sports situations.

Knowledge of Ophthalmic Products

- Pre-Assembled Eyewear (optical aides)
  - Over the Counter -Reading Glasses
  - Hand held Magnifiers

CR-39 Plastic

Developed by PPG during WWII, CR-39, also known as plastic or hard resin, serves as a much lighter lens material (approximately 50% lighter) than glass. CR-39, however, is far less scratch resistant and often must be coated to improve its scratch resistant characteristics.

- **Lowest Index Lens 1.498**
- **Abbe Value 58 Specific Gravity 1.32**
- **Optics are Great**
- **Does not come with UV and Scratch Protection**
- **Takes Tints Well**
- **Will produce a thicker lens than most other materials**
- **Recommended for low prescriptions and non-active use.**
- **Basic Lens Material and Cost is low**

Crown Glass

Glass has historically been the material of choice for ophthalmic lenses. Glass is most stable, scratch-resistant, and provides the best optical quality of all lens materials. However, since glass is more brittle than most materials, lenses made of glass must be tempered or heat-treated to give them more strength and make them safer to wear.

- **Lower to Mid Index Lens 1.523**
- **Abbe Value 59 Specific Gravity 2.54 (Crown) – 3.66 (High Index Glass)**
- **Great Optics - used in plano sunwear (Maui Jim, Rayban)**
- **Inherent Scratch Resistance**
- **Heavier than all other Materials**
- **Not a Good Choice for most Patients**

Trivex

Developed in 2001 by PPG, Trivex combines impact resistance of polycarbonate, exceptional optical clarity, and a specific gravity of 1.11 (the lightest available). Trivex's tensile strength makes it ideal for drill mount frames. Trivex is available from Younger as Trilogy and available from Hoya as Phoenix.

- **Mid Index Lens 1.53**
- **Abbe Value 43-45 Specific Gravity 1.11**
- **Comes with UV and Scratch Protection**
- **Thinner and Lighter than Cr-39**
- **Impact Resistant – Excellent Tensile Strength**
- **Great for Children, Sports and Adult Eye Safety**
- **Optics are Great (Better than Polycarbonate)**

Polycarbonate

While its optical characteristics are less than ideal, polycarbonate, the same material used for bullet-proof glass, is an impact resistant lens material. Along with Trivex, polycarbonate is the material of choice for safety and children's eyewear. With an index of 1.586, polycarbonate also produces thinner, lighter lenses than glass or plastic.

- **Mid Index Lens 1.586**
- **Abbe Value 29-31 Specific Gravity 1.20**
- **Comes with UV and Scratch Coatings**
- **Thinner and Lighter than CR-39 and Glass**
- **Impact Resistant – Great Tensile Strength**
- **Good for Children, Sports and Adult Eye Safety**
- **May Craze if mounted too tight in frame**
- **Does not absorb Tint well**

High Index (1.60, 1.67, 1.71, and 1.74)

High index lenses typically refer to products with an index higher than 1.58. High index lenses require flatter curves than their lower index counterparts, resulting in thinner and lighter lenses. Furthermore, aspheric curves come standard in many high index products, particularly 1.67 and 1.70 products, and are available in 1.60. Asphericity reduces spatial distortion, reduces magnification/minification, and further creates a thin and flat lens profile

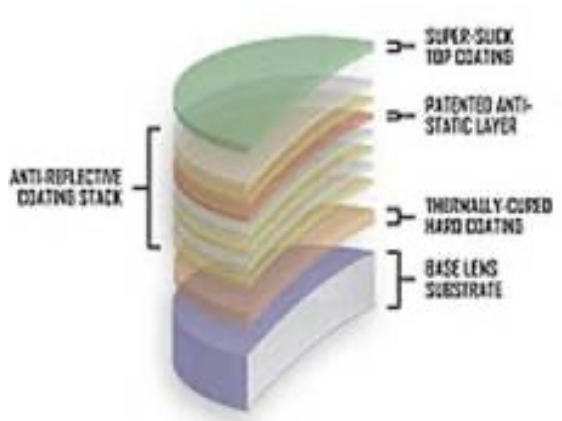
- **High Index Lenses 1.60 – 1.74**
- **Abbe Value Range 32-36 Specific Gravity 1.30 – 1.47**
- **Comes with UV and Scratch Resistant Coating**
- **Thinner and Lighter than Poly and Cr-39 – Thinner than Trivex**
- **Aspherically flatter curves that produce a thinner, lighter lens - Great for high minus and plus lenses**
- **Works best with an A/R treatment applied**

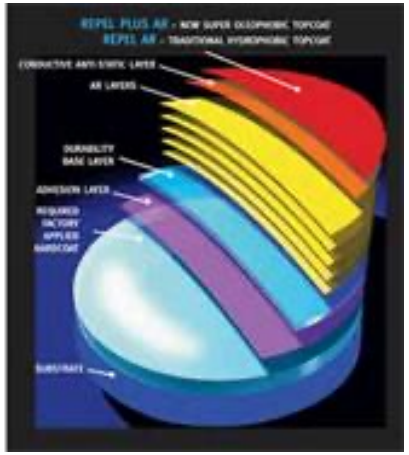
Lens Coatings, Finishes and Treatments

- **Anti Reflective (Basic and Premium)**
- **Photo-Chromic/Variable Tint (Transitions)**
- **Tints (Solid, Gradient and Double Gradient)**
- **Ultraviolet Protection**
- **Scratch Coating**
- **Polarization**
- **Mirror and Flash Coating**
- **Edge Polish**

Features and Benefits of A/R

- Clear Coating
- Allows More Transmission of Light through Lens
- Reduces Reflective Glare:
  - Night Driving/Rain
  - Computer/TV Screens
  - Overhead Florescent Lights
  - Front and Back Lens Surface
  - High Index Lenses
- Helps Patients:
  - See Blackboard
  - Read in Low Light
  - Clear Eye Contact





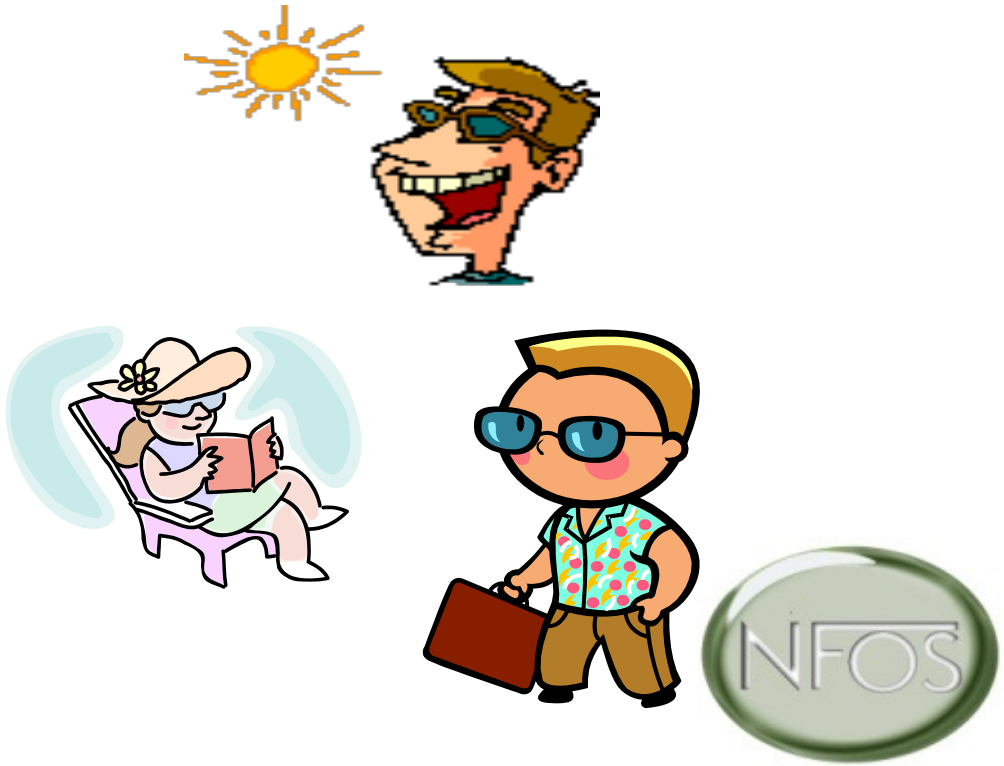
Photochromic Lenses

- Photochromic lenses are lenses that darken on exposure to specific types of light, most commonly ultraviolet (UV) radiation. Once the light source is removed (for example by walking indoors), the lenses will gradually return to their clear state. Photochromic lenses may be made in Cr-39, Glass, Trivex, Polycarbonate and High Index lens materials.
- The glass version of these lenses achieve their photochromic properties through the embedding of microcrystalline silver halides- usually silver chloride, or molecules in a glass substrate.

Features and Benefits of Photochromic Lenses

- Activated by UV
- Changes from clear to dark as UV increases
- One pair of glasses can be useful for travel and convenience
- Great for Active Lifestyles
- Practical for Children and Young Adults
- Select Gray or Brown Tint
- Will Not Activate in behind UV treated car window.

Comfortable both indoors and outdoors



Lens Tints

- Fashion Colors for Indoor Use - 15% Brown Gradient
- Sunglass Colors combined with UV for Outdoor Use -Gray 70% Solid
- Lenses are Dyed in Tint Unit Pots Temperature is set at 200°
- Solid Tint – Covers Entire Lens
- Gradient Tint – Lens darker at top and fades to clear at bottom
- Double Gradient – Lens is one color on top and another on bottom
- Tints are ordered by matching tint sample or percentage of color. Ex: or

Ultraviolet Protection

- Eyes are affected by exposure to ultraviolet radiation
- Overexposure to UV light contributes to the development of cataracts, retinal damage and other eye problems
- Experts report that as much as 80% of UV damage to our eyes occurs before the age 18
- Wavelengths of UV Radiation include UV-A, UV-B and UV-C
  - UV-C (100 to 280 nanometers) (absorbed by the ozone)
  - UV-B (280 to 325 nm) is the most harmful wavelength to the eye
  - UV-A (315 to 380 nm) is the lowest energy level, but it still carries the potential to harm the eyes.

Ultraviolet Protection

- It is therefore strongly advised to protect our eyes from the harmful affects of UV radiation. Just as we protect our skin with sunscreen, we must also protect our eyes. The ultraviolet protective coating is simple and quick to apply to most plastic eyeglass lenses and it does not change the appearance of the lenses. For this reason, UV protection can be applied to both clear and sunglass lenses.
- Sunglass and fashion eyewear standards for ultraviolet coatings are voluntary for manufacturers and UV protection can vary among manufacturers. It is therefore important to choose sunglasses that are labeled with a UVA/UVB rating of 100% to provide the most UV protection.

Scratch Resistant Coating

- All eyeglass lens materials are susceptible to scratching. The development of scratch resistant coatings first came about with the advent of plastic lenses. Since plastic lenses scratch more easily than glass, it was important to create not only a safer and lighter lens, but a lens that would withstand normal wear and tear.
- Plastic lenses are more resistant to scratching when they are treated on both the front and back surfaces with a clear, hard coating. While most types of plastic lenses have built-in scratch resistance, CR-39 does not have this protection and it must be added to the lens.

Polarized Lenses

- Block Horizontal (Blinding) Glare
- Gray and Brown Tints are Most Common
- Back A/R can be applied to further reduce glare
- Outside Daytime Use Only
  - Daytime Driving
  - Fishing/Boating
  - Skiing/Snow Sports
  - Beach/Water Sports

Photochromic Polarized Lenses

Drivewear Lenses

• Sensing and react to varying light conditions both outside and behind the windshield of the car. From bright sunlight and intense, blinding glare, to overcast inclement conditions, Drivewear lenses provide the wearer with the appropriate visual solution.

Transitions Vantage

- The only everyday lenses with variable polarization
- Polarization adjusts to match the level of outdoor glare
- Block 100% of UVA & UVB rays
- Designed to work with most prescriptions and frames
- Do not work well in car

Lens Edge Treatments

- Edge coatings were developed for people who require prescriptions with moderate to significant edge thickness. Edge coatings are the answer to make the lens less noticeable, in the frames, and more cosmetically appealing.
- For thicker lenses, rolling and polishing the edges of the lenses is very helpful. Rolling removes the sharp edge of the lens after it is cut, and then the edge is polished to make it smooth and shiny. Thicker lenses and lenses in semi-rimless and rimless frames should have their edges polished because the edge of the lens is exposed.

Round and Oval

- A round face has curved lines with the width and length in the same proportions and no angles. To make a round face appear thinner and longer, try angular narrow eyeglass frames to lengthen the face, a clear bridge that widens the eyes, and frames that are wider than they are deep, such as a rectangular shape.

- An oval face is considered to be the ideal shape because of its balanced proportions. To keep the oval's natural balance, look for eyeglass frames that are as wide as (or wider than) the broadest part of the face, or walnut-shaped frames that are not too deep or too narrow.

Oblong and Base Down Triangle

- An oblong face is longer than it is wide and has a long straight cheek line and sometimes a longish nose. To make an oblong face appear shorter and more balanced, try frames that have more depth than width, decorative or contrasting temples that add width to the face, or a low bridge to shorten the nose.

- A base-down triangular face has a narrow forehead and widens at the cheek and chin areas. To add width and emphasize the narrow upper third of the face, try frames that are heavily accented with color and detailing on the top half or cat-eye shapes.

Base Up Triangle and Diamond

- Base up Triangle (or heart-shape) faces have a wider forehead and small chin. To minimize the width of the top of the face, try frames that are wider at the bottom, very light colors and material and 3-piece mount rimless frame styles (which have a light, airy effect).

- Diamond-shaped faces are narrow at the eye line and jaw line, and have broad cheekbones that may be high and dramatic. This is the rarest face shape. To highlight the eyes and soften the cheekbones, try frames that have detailing or distinctive brow lines, or try rimless frames or oval and cat-eye shapes.

Square and Rectangle

- A square face has a strong jaw line and a broad forehead, plus the width and length are in the same proportions. To make a square face look longer and soften the angles, try narrow frame styles, frames that have more width than depth, and narrow ovals.

- A rectangular face is long like the oblong shape, but has both a strong jaw line and broad forehead. To enhance a rectangular face, make sure frames fit the width of the eye line and select a frame that has more depth to balance the bone structure. 3-piece mounts work well if it fits the width of the face and has depth.

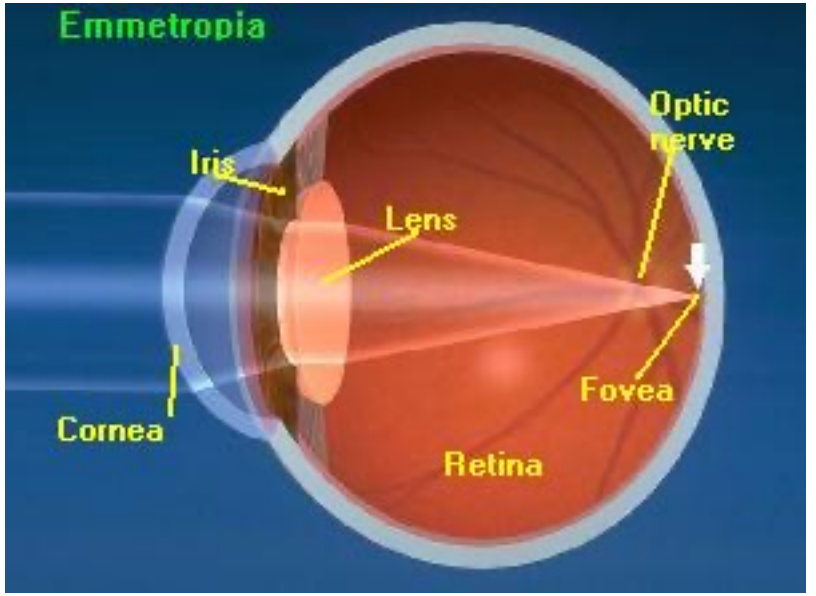
ABO Domain V
Dispensing Procedures

- Refractive Errors
- Prism Imbalance
- Muscle Imbalance
- Magnification
- Patient History
- Fitting, Adjusting, Measuring, Verification
- Patient Interaction

Refractive Errors

Emmetropia

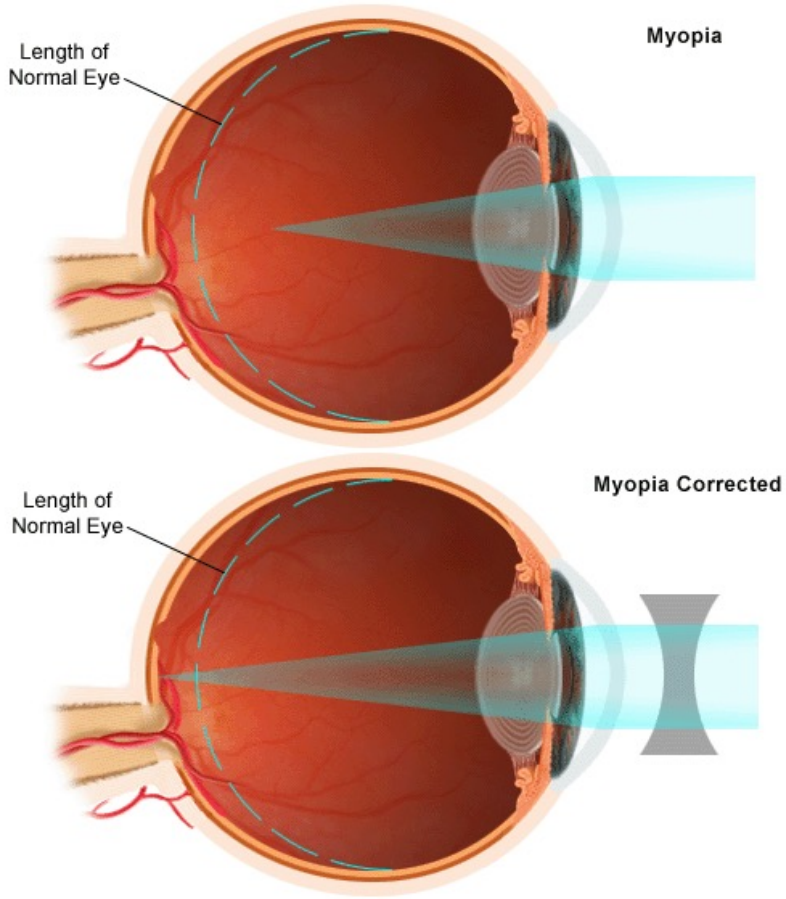
- (Normal eye) is a condition were light is focused at a point on the retina.
- State of vision where an object at infinity is in sharp focus with the eye lens in a neutral or relaxed state.
- This condition of the normal eye is achieved when the refractive power of the cornea and the axial length of the eye balance out, which focuses rays exactly on the retina, resulting in perfect vision.
- An eye in a state of emmetropia requires no correction.



Refractive Errors

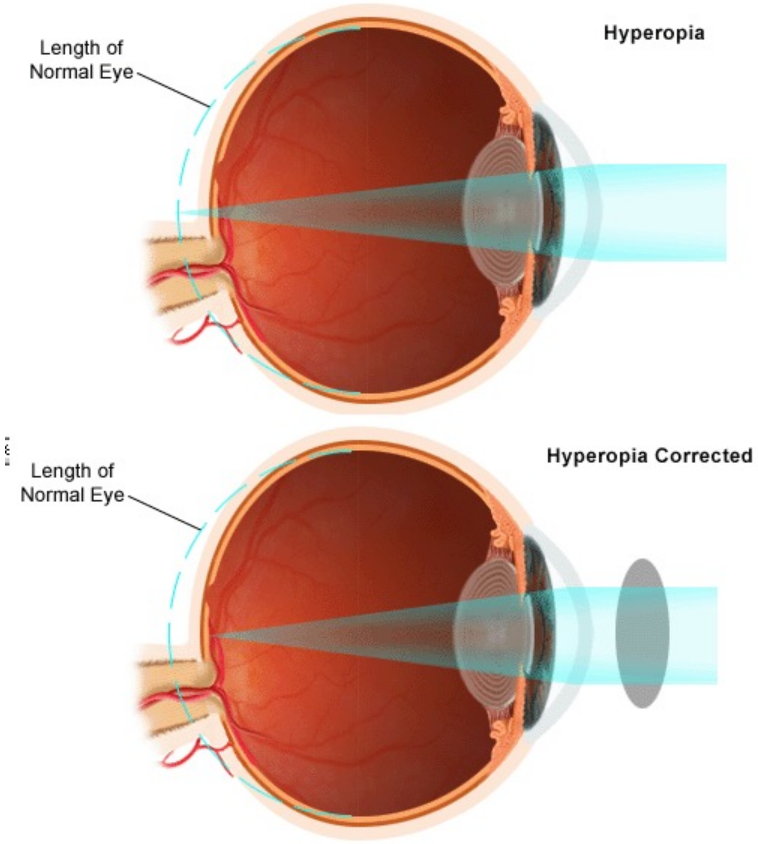
Myopia –

(Nearsightness) is a condition in which an image of a distant object becomes focused in front of the retina, either because the eyeball axis is too long or because the refractive power of the object is too strong



Refractive Errors

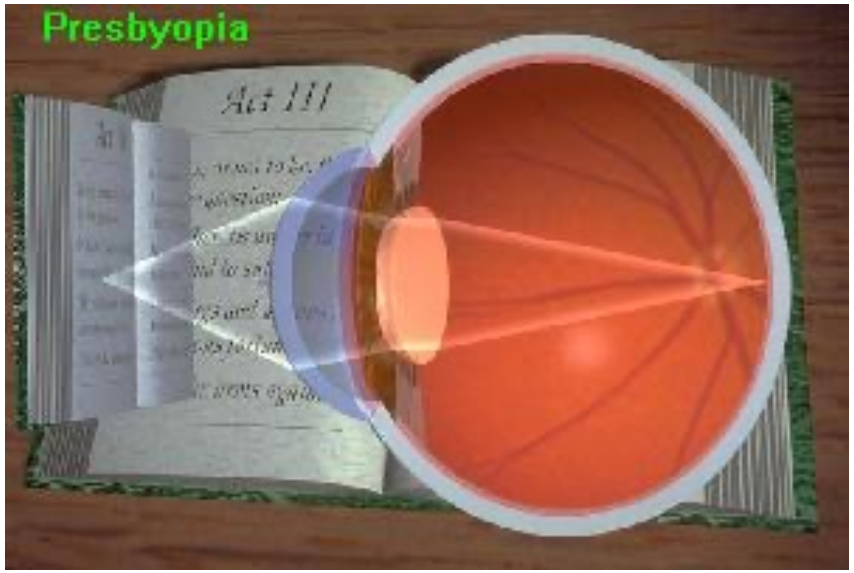
Hyperopia – (Farsightedness) is a refractive error in which an image of a distant object becomes focused behind the retina, either because the eyeball axis is too short, or because the the refractive power of the object is too weak.



Refractive Error

Presbyopia –

Is a common refractive error that occurs to most people some time after the age of 40. The crystalline lens isn't as stretchy or adaptable and the ability to focus at near objects diminishes



Presbyopia

- Presbyopia, also known as the “short arm syndrome,” is a term used to describe an eye in which the natural lens can no longer control the eye’s way of changing its focusing distance
- The lens thickens, increasing its inability to focus close-up. At about the age of 40, the lens becomes less flexible and accommodation is gradually lost. It’s a normal process that everyone eventually experiences.

Signs and Symptoms of Presbyopia

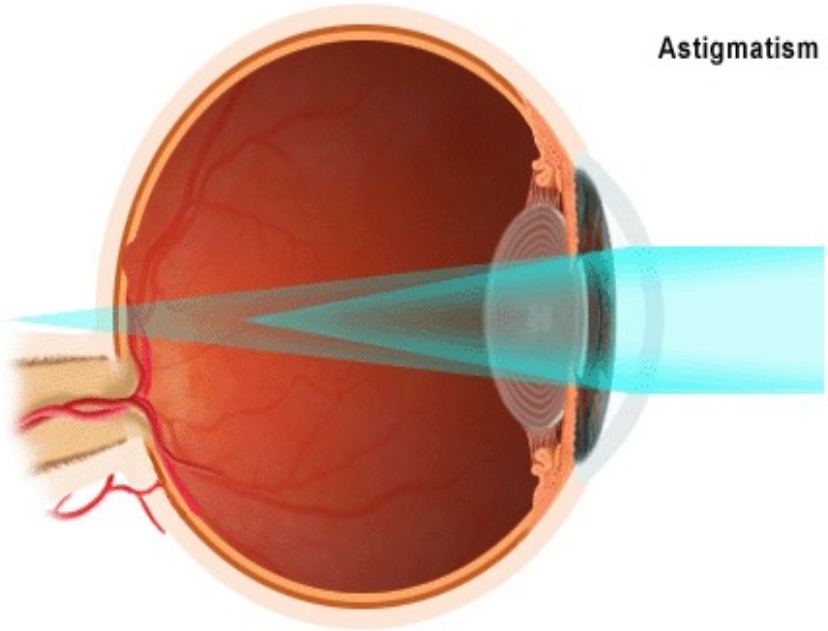
- Difficulty seeing clearly for close work
- Print seems to have less contrast
- Brighter, more direct light required for reading
- Reading material must be held further away to see (for some)
- Fatigue and eyestrain when reading

Refractive Errors

(Types of astigmatism will be covered in Domain II)

Astigmatism –

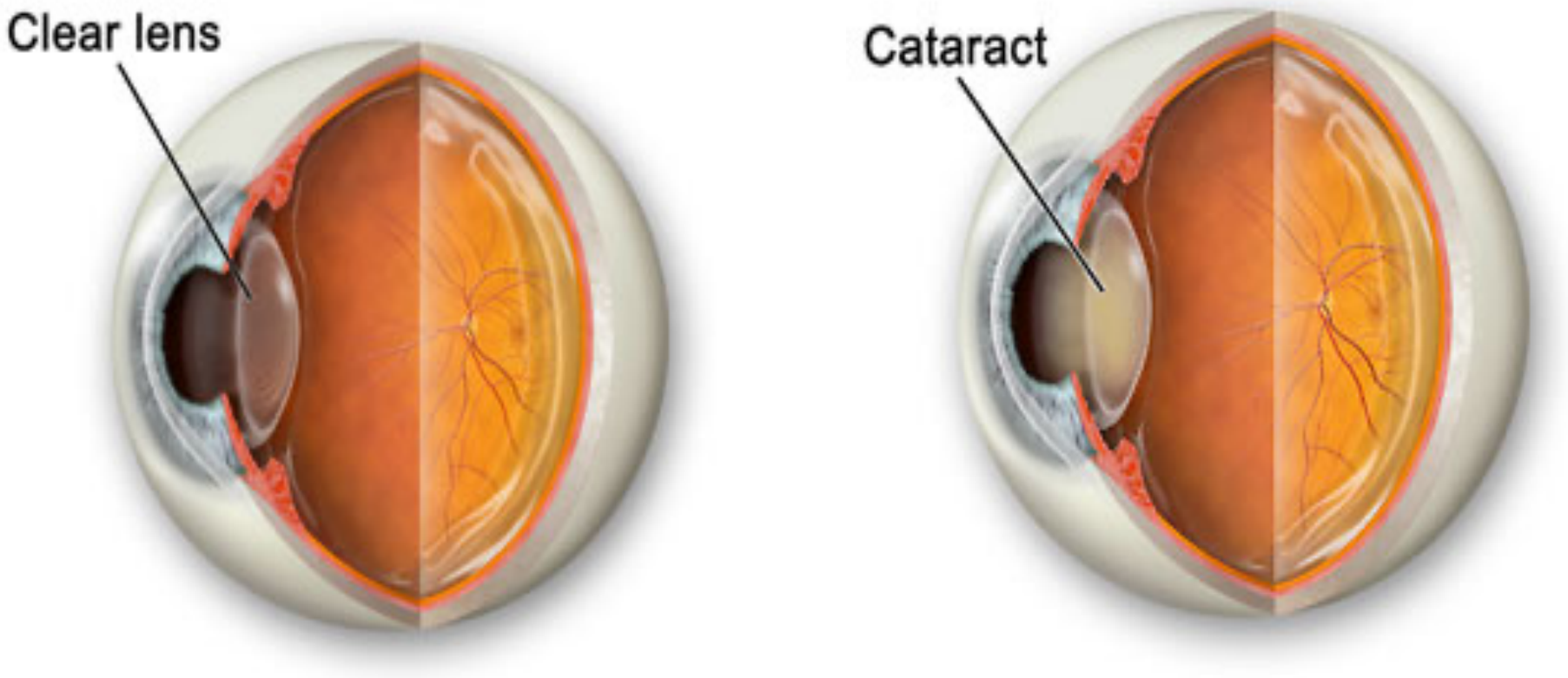
is a condition in which the curvature of the cornea can cause two focal points to fall in two different locations making objects up close and at a distance appear blurry.



Cataract/Pseudophakia

- A cataract is a clouding of the natural lens, the part of the eye responsible for focusing light and producing clear, sharp images. The lens is contained in a sealed bag or capsule. As old cells die they become trapped within the capsule. Over time, the cells accumulate causing the lens to cloud, making images look blurred or fuzzy. For most people, cataracts are a natural result of aging.

Cataracts



Cataract Surgery

- Involves removing *most* or *all* of the lens of the eye and replacing it with an artificial lens replacement. (pseudophakia)

Normal vision

Vision through a cataract

Present Day Cataract Procedure

- Extracapsular Extraction is the routine type of cataract removal today
- *Phacoemulsification* – The cataract is dissolved into tiny pieces and then vacuumed out. The lens cortex is sucked out, leaving the lens capsule.
- The artificial lens implant is then inserted (pseudophakia)

Aphakia

- Absence or loss of the eye's natural crystalline lens, as after cataract removal

Pseudophakia

- An eye in which the natural lens is replaced with an intraocular lens.

Muscle Imbalance/Use of Prisms

- Prisms are commonly prescribed by eye doctors in conjunction with lens prescriptions to alleviate the symptoms which occur in muscle imbalance
- Prisms are routinely used during eye examinations to dissociate the eyes in order to temporarily interrupt fusion

Strabismus (Heterotropia)

- Is when one eye is not aligned with the other eye causing the other eye to look in a different direction.
- Result: Diplopia or Double Vision – since two objects are imaged onto the maculas of both eyes.
- In order to see, the person's brain learns to "suppress" the image in the turned eye.

Amblyopia (Lazy Eye)

- When an eye is suppressed (turned off) for too long, the visual acuity in the "Lazy eye" is no longer good. Due to the lack of use, the lazy eye shuts down and decreases the patient vision in that eye.
- The Angle of Deviation of strabismus is measured in "prism diopters"
- Strabismus occurs in about 2% of children
- Esophoria or Exophoria – tendency for the eye to turn
- Esotropia or Exotropia – a fixed turning of the eye

Most Common Types of Strabismus

- Esotropia (inward deviation)
- Exotropia (outward deviation)
- Vision Therapy maybe indicated where complete suppression has not occurred. (Use of prism and eye patching)
- Surgical Correction is the other alternative
- Surgery corrects the deviation, however binocular vision will not usually result

Diplopia

- A condition in which a single object appears as two objects. Also known as double vision.

Patient Reaction to Excessive Prism

- The human eye sensitive to prismatic effects and even a small amount of excessive or undesirable prism will cause discomfort to the patient

Examples of Patient Statements to Undesirable Prism

- **Excessive Base Down Prism**
  - Causes the floor or other horizontal expanse to seem concave, and the patient feels as though they are standing in the bottom of a bowl
  - Makes people and vertical objects seem taller than they are
  - Makes the patient feel like they are walking uphill

- **Excessive Base Up Prism**
  - Causes the floor or other horizontal expanse to seem convex, and the patient feels as if they were standing on a mound or ridge
  - It makes people and vertical objects seem shorter than they are
  - Makes the patient feel as through they were walking downhill

- **Excessive Base Out or Base In Prism**
  - Causes the patient to see horizontal objects, such as a table, as too high on one end and too low on the other end
  - The high side will be toward the base of the prism

Convergence

- The movement of two objects toward a common point, such as the turning of the eyes inward to see an object close to the face

Fusion

- The combining of images from the two eyes to form a single visual perception

ANISOMETROPIA & ANTIMETROPIA

The condition in which the two eyes have unequal refractive power. One eye may be markedly stronger than the other anisometropia or One eye may be myopic and the other hyperopic which is considered antimetropia

Anisometropia O.D. –2.00 O.S. –6.00

Antimetropia O.D. +1.00 O.S. –4.00

Anisometropia is a serious concern in newborns and young children because it can lead to amblyopia (impaired vision in one eye). With a major degree of anisometropia, the brain cannot reconcile the difference in images coming from the two eyes. It develops a preference for the image coming from one eye and suppresses the image from the other eye and, in time, the brain loses the ability to "see" the image from the suppressed eye.

Aniseikonia

- A condition in the lens of one eye that results in its seeing an image that differs in size or shape from the image seen by the other eye

Patient Greeting

First impressions are crucial:

1. Stand up and Smile!
2. Greet your patient by name and introduce yourself
3. Invite your patient to sit across from you and assist if necessary
4. Show appreciating for their visit
5. Obtain Patient Information
6. Take a moment to examine the patient's new prescription and begin. - Remember to Smile!

Review of New (and Old) Rx

- Note the type of correction and any comments from the Doctor
- Ask what the patient is currently wearing **or** Is this a **first-time** Rx?
- Ask to see the patient's old glasses - neutralize if necessary. (First time Rx's **will not** have an old pair)
- Observe the type of lens, lens material, coatings, seg heights, base curve and wearing vertex
- Compare how much the Rx has changed

The Prescription

Distance Vision (DV)

The first number on the prescription is the **sphere power**

The second number is the **cylinder power**

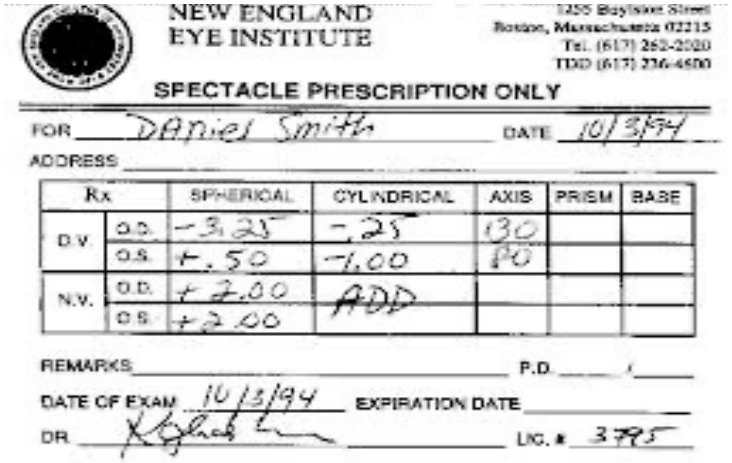
The third number is the **axis** **OD -3.25 -0.25 x 130**

Note: many O.D.s write cylinder power as a minus (-) number while M.D.s write cylinder power as a plus (+) number

Near Vision (NV) – ADD Power

+2.00 ou

- OD right eye
- OS left eye
- OU both eyes



NEW ENGLAND EYE INSTITUTE

1255 Boylston Street
Boston, Massachusetts 02215
Tel. (617) 262-2020
TDD (617) 236-6600

SPECTACLE PRESCRIPTION ONLY

FOR Daniel Smith DATE 10/3/94

ADDRESS

Rx		SPHERICAL	CYLINDRICAL	AXIS	PRISM	BASE
D.V.	O.D.	-3.25	-.25	130		
	O.S.	+.50	-1.00	80		
N.V.	O.D.	+2.00	ADD			
	O.S.	+2.00				

REMARKS P.D. ____/____

DATE OF EXAM 10/3/94 EXPIRATION DATE

DR [signature] LIC. # 3795

Patient Interview

- Once you have reviewed the Rx and determined a starting point, then begin the patient analysis interview.
- Ask questions engaging your patient in discussion of likes and dislikes, occupation, hobbies and interests and fill out the form as you go.
- As you engage your patient, try to suggest or reinforce products that might help them to obtain optimum vision, comfort and protection for their lifestyle
- While interviewing your patient, really LISTEN to the answers - try to ask more in-depth questions if they give simple answers

Presenting Features and Benefits of Lens and Lens Products

- Presenting features and benefits of lenses and lens products is a part of the interview process
- Listen for opportunities to recommend products that will help your patient to see better, protect or be more comfortable
- Ex. Patient has difficulty seeing with night driving
  - Discuss and recommend anti-reflective treatment
- Ex. Patient does not have sunglasses (or lost them)
  - Ask what he wears when he is outdoors, driving or at the beach.
  - Discuss UV, Photochromics, Polarization and Tints

Product Demonstration

As you recommend and discuss the features and the benefits of lens styles, products and treatments, use product demonstration tools to assist and support your discussion:

- A/R Presentation Samples and Sample Lenses
- Photochromic Activator and Lens Samples
- Polarized Interactive Glare Box and Sample Lenses
- Progressive Lens Samples
- Computerized Program
- Brochures and Pamphlets

- Use of demonstration tools will help you get more familiar with products and their benefits as well

Five Classes of People for Whom Safety Eyewear is of Great Importance

- Monocular Individuals
- Athletes
- Children
- People with occupations that put them at risk of ocular injury
- Individuals whose eyes have a reduced capacity too withstand ocular trauma including: aphakes, high myopes, pseudophakes and refractive surgery

Frame Selection

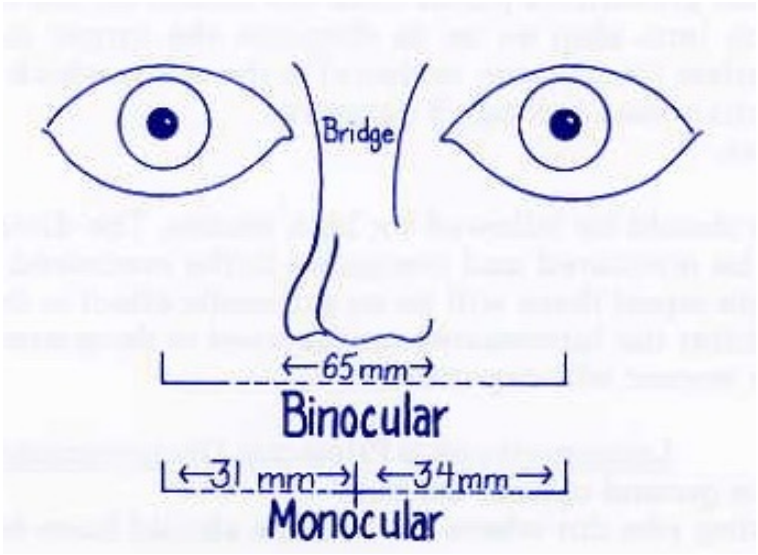
Frames come in a multitude of styles, colors, materials and brand names. How do you decide where to start?

- **Select frame *after* lens discussion and selection**
  - Possible restrictions of fit and size due to Prescription/Patient
  - Possible restrictions of fit and size due to Thickness and Weight
- **Fit is most important**
  - Will Patient's Rx work with Frame Size, Shape and Design
  - Does Frame Fit Width of Face
  - Does Frame Have enough Depth for Rx and Lens Choice
  - Does Frame Fit Bridge of Nose
  - Are the Temples the Proper Length for Comfortable
    - Temple End should be Approximately 1 inch over Mastoid Bend after adjustment is made

Pupilary Measurements (PD's)

- There are two types of pupilary measurements:
  - Binocular - Both Eyes Together
  - Monocular – One Eye at a time from Center Bridge Outward
- There are two main ways to take pupilary measurements:
  - With MM Ruler
  - With Corneal Reflex

    pupilometer



Patient PD Measurements

- Monocular PD

  It is best to use a monocular PD's because our faces are not symmetrical and it is optimal to place the lenses in the right position in order to see through and use the lenses correctly. Many people have one eye positioned a few millimeters different then the other and a binocular distance PD does not compensate for this!
- Explain and Use Corneal Reflex Pupilometer for most accurate measurement (may use Visio Office or other Software as well)

Corneal Reflex Pupilometer

- Device used to measure the corneal reflex
  - Can be set for varying distances of focus (Far and Near)
  - Takes both monocular and binocular readings

PD with Ruler

- Monocular pupilary measurements:
  - The sum of the two monocular measurements will add up to the total Binocular measurement
  - Line up your eyes level to your patient's
  - Match patients Right eye to your Left and measure from the "zero point" of Right eye to the patients center bridge and record the measurement
  - Then place the "zero point" of your ruler on the center of your patient's bridge and have your patient look into your Right eye with their Left eye.
  - Draw an imaginary line down from their Left center pupil to the ruler and record measurement

Binocular Inset

- Find the difference between the Distance PD and the Near PD
- The Near PD is usually the Distance PD – 3 or 4 mm
- If the Binocular PD for Distance = 67
- And the Near PD = 63 mm
- There is a Total = 4 mm
- Divide by 2 and the Inset for each eye would be 2 mm in - in each eye

Review Total Inset

- A patient is being fit for Flat Top 28 Bifocals

  Rx - 2.75 - 0.50 x 167

  - 3.50 - 0.75 x 102 Add + 1.50 OU

  "A" = 54 "DBL" = 17 "B" = 42

  DPD = 65 NPD = 61 Bifocal Height = 17

  What is the Inset and Above/Below measurement?

  54 + 17 = 71 71 – 65 = 6/2 =3

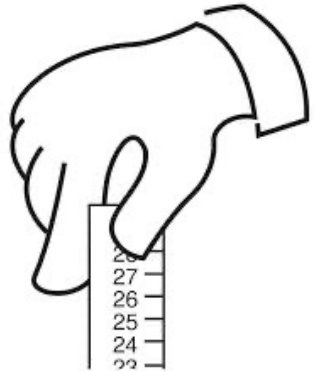
  DPD is 65 – 61 NPD = 4/2 =2 Total Dec = 5 in ou

  42/2 = 21 21 – 17 = 4 (17 is 4 below the half of 21, so the answer is 4 below)

- Total decentration = DPD - NPD + Inset = 3 + 2 = 5mm in for each eye

Patient Height Measurements

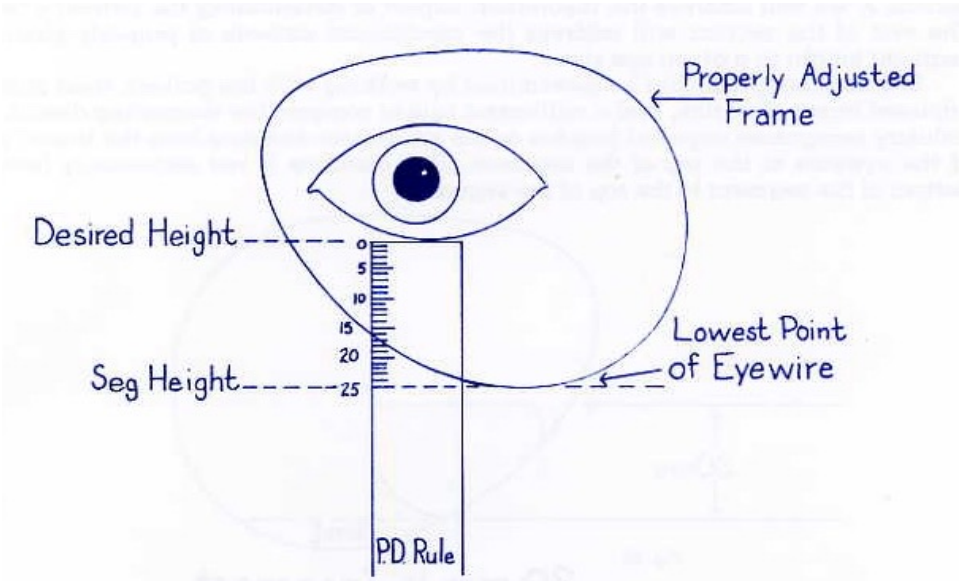
- First Step -Pre-Adjust the Frame to Proper Fit
- Position the Patient – Ask Patient to:
  - Sit Comfortably and Hold Head at Natural Level
  - Match your eye-level to your patient's
- Lens Design Height Positioning
  - Dot Center of Pupil for Progressives
  - Bottom of Pupil for Trifocals
  - Lower Lid Margin for Bifocals



- Review the patient's old glasses to compare wearing height and position - duplicate if Pt was happy with fit
- Notify a supervisor if there is great discrepancy in fit

Measuring Bifocal Segment Height

- Adjust Eyewear correctly on Face and Position Patient
- Use a PD Ruler and marking pen
- Sit across from patient at eye level at a distance of approximately 16 inches
- Have Patient look directly at your eyes
- Make a line on lens at Lower Lid Margin
- Remove Eyewear and measure from the line down to the deepest portion of the lens
- Check your work

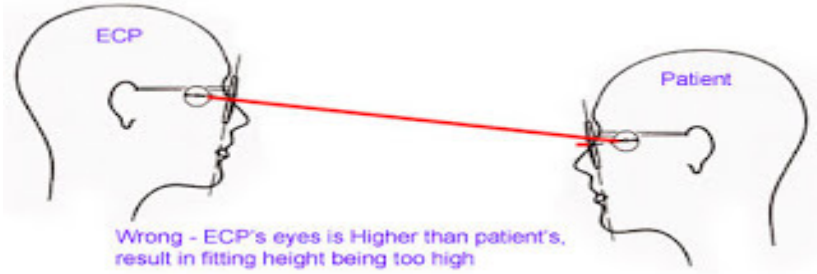


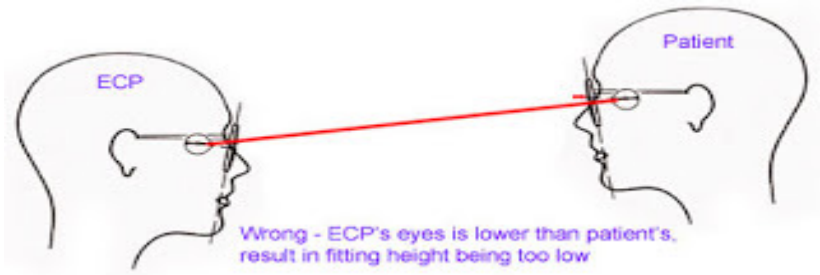
Measuring Trifocal Segment Height

- Adjust Eyewear correctly on Face and Position Patient
- Use a PD Ruler and marking Pen
- Sit across from patient at eye level at a distance of approximately 16 inches
- Have Patient look directly at your eyes
- Make a line on lens at the bottom of the pupil
- Remove Eyewear and measure from the line down to the deepest portion of the lens
- Check your work

Measuring Progressive Height

1. Pre-adjust Frame for Correct Fit
2. Position yourself at patient's eye level
3. Have patient sit naturally and hold their head as they would normally
4. Tell patient to look as though they are looking through your eyes
5. Dot the center of their pupil on the demo-lens
6. Have patient relax and look away for a minute
7. Ask patient to sit naturally and re-focus on your eye level
8. Check your dot for accuracy
9. Measure from bottom of deepest part of frame to the dot





Frame Fit and Adjustment

- Proper Fit of a frame is very important to the comfort and wear-ability of new eyewear. The bridge , nose-pads, front and temples must all be aligned, sculpted and fit to the features and dimensions of the patient's face.
- Learning to adjust and fit eyewear takes time and lots of practice. It is definitely the "Art" combined with the science of what we do as an optician.
- When a patient selects a new frame, it has to be fit prior to taking height measurements and then fit again- after it is received from the lab, when the patient comes back to pick up their glasses

Facial Plane and Angle

As an optician, it is important to understand how to tilt, bend and adjust eyewear to fit the patient's facial plane and make eyewear fit as comfortably as possible.

Frame angle can impact visual acuity and satisfaction, so we need to understand Pantoscopic Tilt and face form angle-especially higher-power prescriptions.

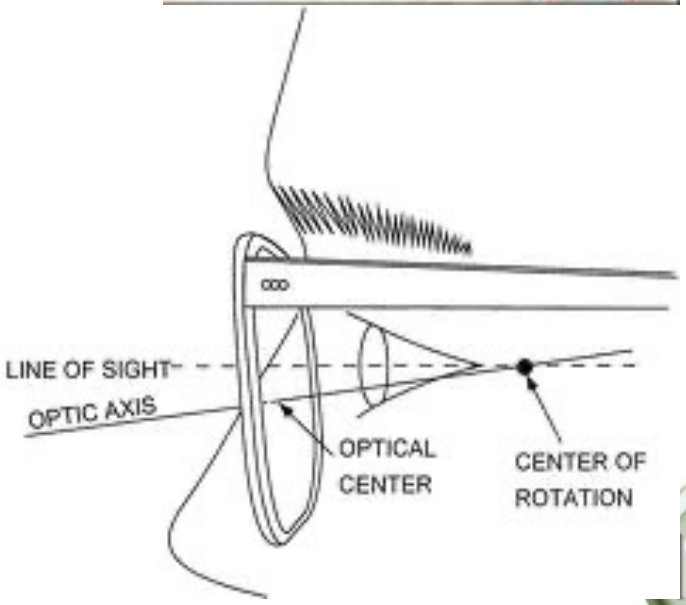
We also need to be able to compare the fitted Vertex Distance to the selected type of lens. For example: In fitting progressive lenses, opticians should increase the angle of Pantoscopic Tilt and try to fit the new eyewear closer to the eye. (Vertex Distance)

Positioning for Fit

Pantoscopic Tilt

Adding the correct amount of pantoscopic tilt brings the optical axis of the lens in line with the center of rotation of the eye—improving visual comfort for the patient

With no tilt, the lens optical center and optical axis will pass through the center of rotation of the eye only if the pupil is at the same height. However, the pupil is rarely vertically centered within the lens—it is generally positioned approximately 5mm above the datum line, or frame midline.

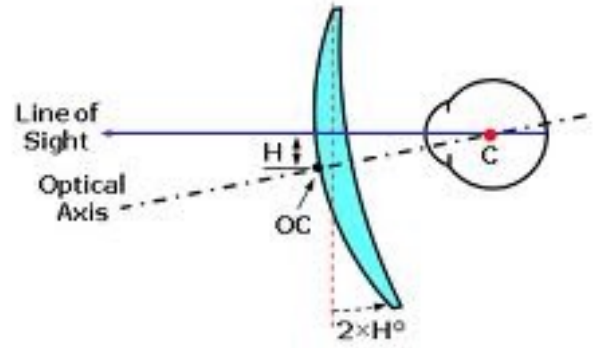


Positioning for Fit

Pantoscopic Tilt

If no tilt is applied to the frame, the wearer may experience some visual discomfort from lens aberrations induced by changes in sphere and cylinder powers due to the misalignment.

Glasses fit better and look better with an average of 7 to 10 degrees of pantoscopic tilt.

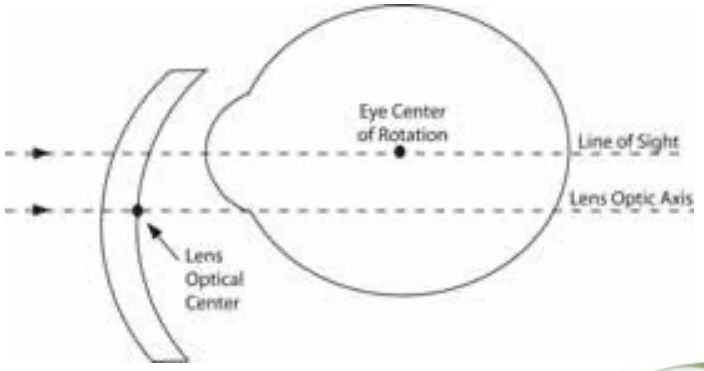


Minimizing Astigmatism Due to Lens Tilt

Positioning for Fit

Pantoscopic Tilt

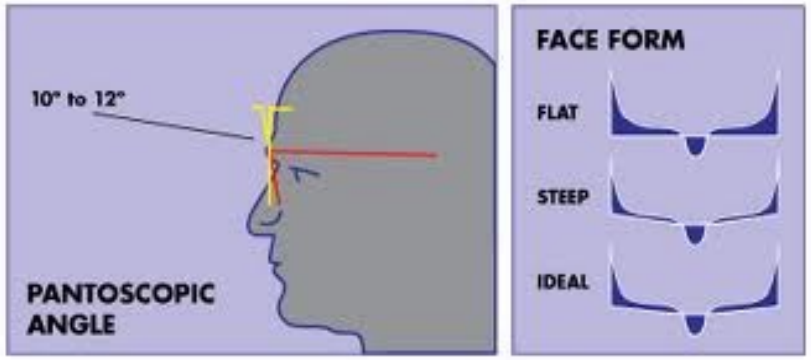
- Most eyes sit about 5mm above the frame mid-line, so it is important that the amount of pantoscopic tilt needed, usually 5 to 15 degrees, is applied to the frame prior to measurements being taken
- Patients' O.C. height must be assessed. If no O.C. height is specified, most labs will place it just above the datum line - assuming approximately 7 to 10 degrees of tilt. If the frame is not pre-fit, the relative placement of the segment, or O.C., will be misaligned with the line of sight of the eye in the finished lens

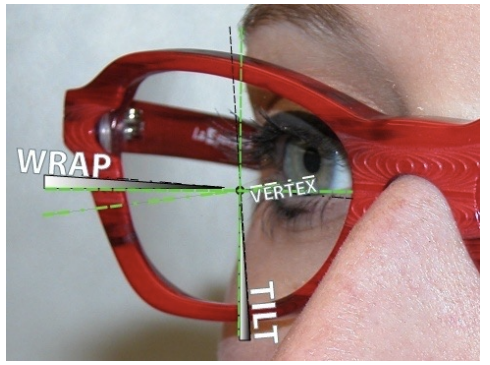


Positioning for Fit

Frame Wrap Angle

Also known as face form angle and panoramic angle, one can use a simple protractor or a dedicated frame wrap measuring device, such as the Shamir Panorameter. You can also obtain individual frame wrap values from the tables provided by some companies, such as Oakley and Luxottica. An important aspect of wrap fitting is eyelash clearance. When fitting a frame or sunglass with a thin plano lens, remember that thicker Rx lenses may require increasing the vertex distance to obtain lash clearance.





Frame Fit and Adjustment

Fitting of the Eyewear – Front, Bridge and Temples

Before checking visual acuity, adjust the frame and position the OC/Seg height to the comfort of patient

- Always Fit the Front First - Position so that:
  - Frame is level on the face and rests just under the brow line
  - Nose pads are level and flush against the sides of the nose
  - OC/Seg heights are in the proper place for optimum acuity
  - Frame has slight panto/tilt and not touching cheeks or brow
- Fit the Temples Second- Position so that:
  - The temples follow the Mastoid Bend and Skull contour - keep close but do not position too tight
  - Temples do not press on sides of face or extend out too far

  Note: You may pull gently from the front to see if slipping or too tight

Frame Fit and Adjustment

- Use your Hands and Tools to make the Adjustments:
  - Use Needle-Nose Plier to move the guard-arms and Splaying Plier to adjust nose pads
  - Use Finger-Piece Plier or Wide Jaw Angling Plier to raise and lower the temples at the End-piece
  - Use Nylon Pad Plier to move temples in or out
  - Heat Temple Tips to sculpt the temples with your fingers – lengthen and shorten temples as necessary
  - Always check your work and ask patient if the frame feels comfortable

Troubleshooting

- Patient has to lift chin way up to read with progressives
- Patient sees intermediate when looking straight ahead
- Frame position is too high on right side
- Frame position is too low on left side
- Frame sits too close on left side
- Lashes are touching lenses
- See Handout that will be sent to you

Minor Repairs

- Replace Screws
- Replace Nose Pads
- Re-String Nylon for Semi-Rimless
- Replace Temple Tips

- More Difficult/Involved Repairs
  - Broken Screw
  - Soldering
  - Hinge Repair

Thank You

Good Luck on the ABO

- For more information, contact the NFOS or visit our website at www.nfos.org

- Power-point by Professor Robert J. Russo –
Email: information@nfos.org