

# OPHTHALMIC LENS PROPERTIES WHO KNEW?

Jackie O'Keefe, LDO

Technical Level II

Opticon @ Vision  
Expo West



# Lenses Before Frames Please



# RX ANALYSIS

- Evaluate Prior Pairs
- What do you like?
- What do you not like?

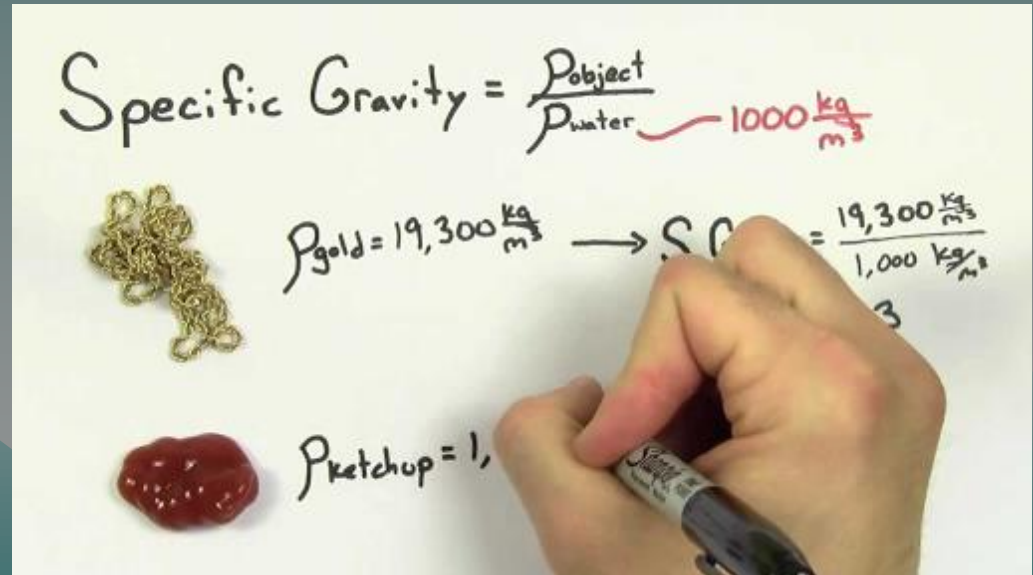


# PROPERTIES OF LENSES

- Index of Refraction
- Specific Gravity
- Impact Resistance
- Tensile Strength
- Flexural Strength
- Light Transmittance
- Pitch
- Clarity/Abbe Value.



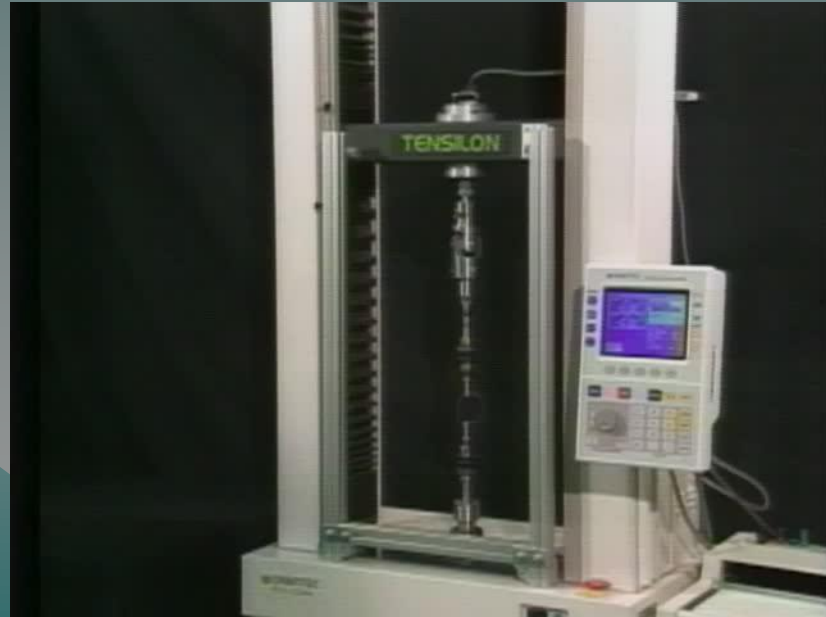
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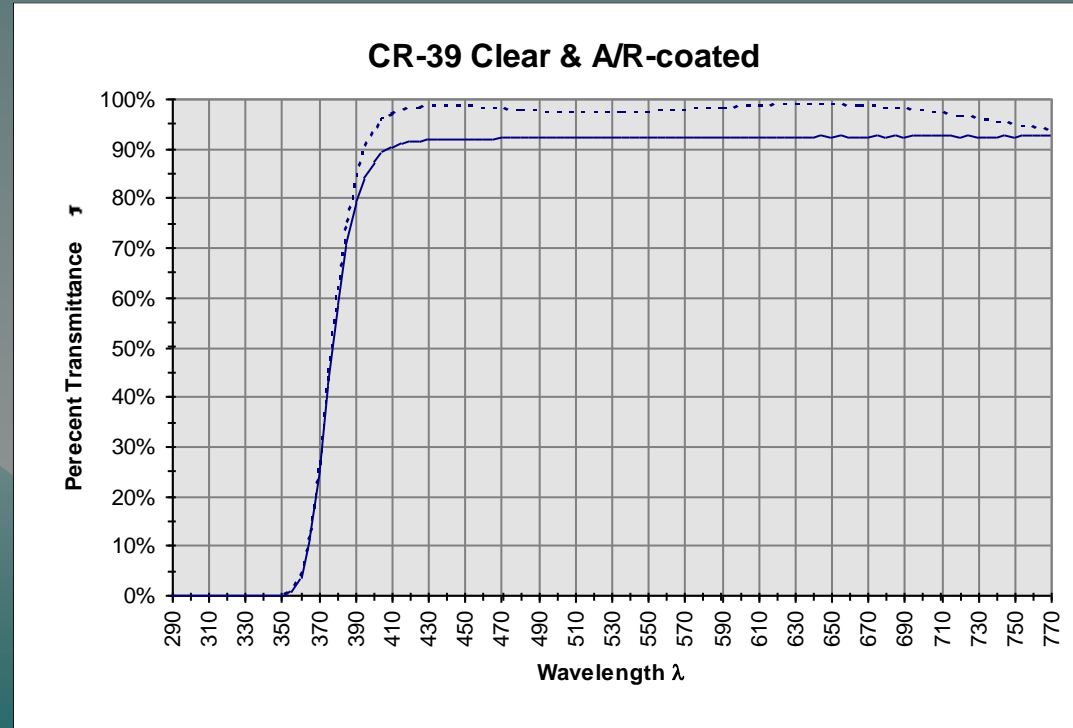


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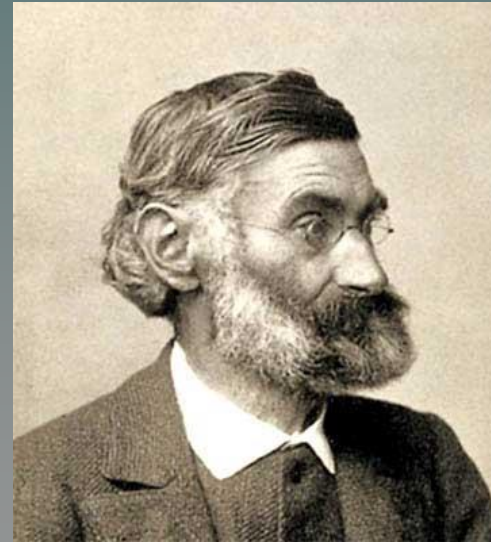
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# Lens Material Choices?

- Glass
  - 59 ABBE
  - 1<sup>st</sup> Photochromic
  - Heavy
  - Cracks
  - Unsafe
  - Not The 1st Consideration.



# Lens Material Choices?

- CR39®

aka Plastic

- Index = 1.49
- SG = 1.32
- Abbe = 58
- Tensile = 15.6 kgf
- Transmittance = 91.6%
- More Brittle.



# Lens Material Choices?

- Trivex

aka Mid Index

- Index = 1.53
- SG = 1.11
- Abbe = 43-45
- Tensile = 61.2 kgf
- Transmittance = 89.4% - 91.3%
- Equipment/Labor Intensive
- Tri = Light, Safe, Great Optics.



# Lens Material Choices?

- Polycarbonate

aka Poly

- Index = 1.59
- SG = 1.22
- Abbe = 29
- Tensile = 44.9 kgf
- High Flexural = Safer
- Transmittance = 89.7%
- Birefringence
- Bisphenol A (BPA).



POSITIONING  
SAFER  
LENS  
MATERIALS



“I want an official M4, carbine action, thirty shot range model rifle, with a holographic sight and a six-position telescoping stock!”

*Don't shoot your eye out.*



# Lens Material Choices?

- 1.60

aka High Index

- Index = 1.60
- SG = 1.31
- Abbe = 42
- Tensile = 80.5 kgf
- Transmittance = 89.7%
- Thinner.



# Lens Material Choices?

- 1.67

aka Higher Index

- Index = 1.67
- SG = 1.36
- Abbe = 32
- Tensile = 67.3 kgf
- Transmittance = 87.7%
- Even Thinner.



# Lens Material Choices?

- 1.70

aka Ultra Higher Index

- Index = 1.70
- SG = 1.41
- Abbe = 36
- Tensile = 52.9 kgf
- Transmittance = 86.6%
- Even Thinner.



# Lens Material Choices?

- 1.74

aka Ultra Higher Index

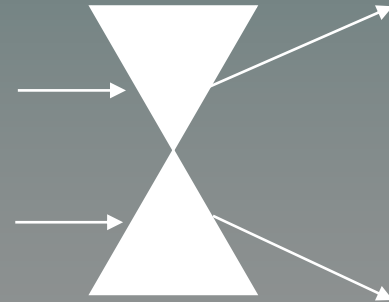
- Index = 1.74
- SG = 1.47
- Abbe = 33
- Tensile = 31.6 kgf
- Transmittance = 85.6%
- Even Thinner.



# Ophthalmic Lenses

## Simply Speaking

- Minus Lenses
- Apex To Apex Prisms
- Light Diverges



# Minus Lenses (Concave)

Prescribed for *Myopia*

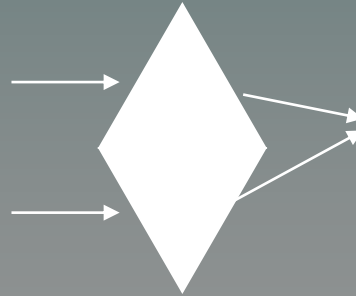
- Thickness
- Centration
- Motion
- Minification
- Divergence.



# Ophthalmic Lenses

## Simply Speaking

- Plus Lenses
- Base To Base Prism
- Light Converges



# Plus Lenses (Convex)

Prescribed for *Hyperopia*

- Thickness
- Centration
- Motion
- Magnification
- Convergence.

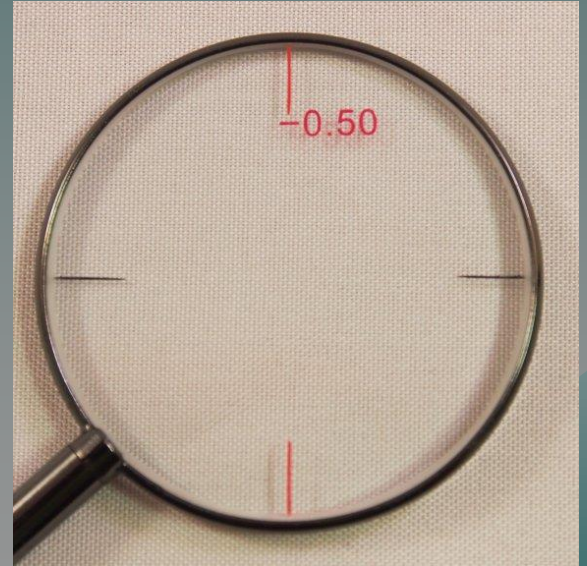




# Cylinder Lenses

Prescribed for *Astigmatism*

- Thickness
- Centration
- Motion



# Lens Design

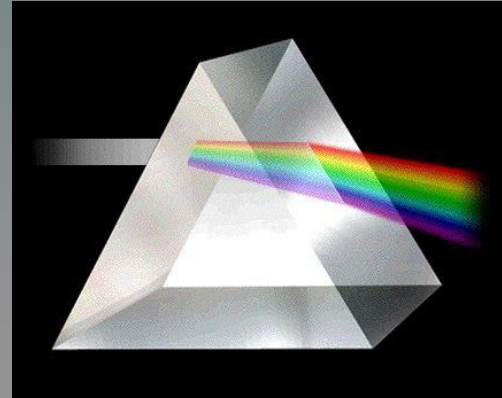
- Asphericity
- Less Bulbous
- Less Magnification
- Less Minification
- Reduced Specific Gravity
- Reduced Concentric Ring



# Prism Lenses

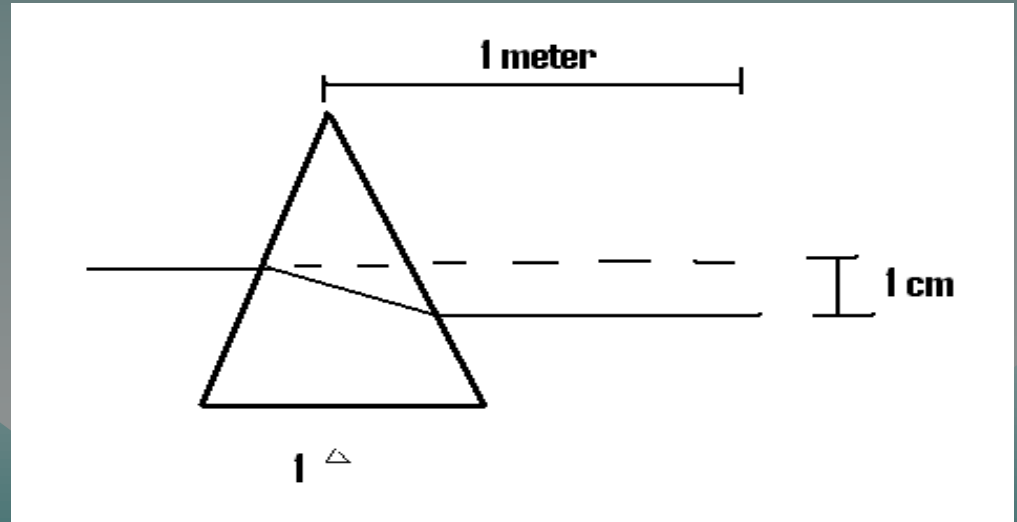
Prescribed for *Medically Necessary Conditions*

- Thickness
  - Up, Down, In, Out, Combined
- Split
- Motion
- OD 1Δ BU
- OS 1Δ BD



# Prism Lenses

## Prism Defined



A prism is defined by a prism diopter which is different than a diopter of power. The prism diopter is defined as 1 centimeter of displacement over the length of 1 meter.

# Prism Eyewear

*Read while lying flat; prism turns page 90°.*



# Prism Eyewear

