Slide 1

Welcome to the ABO Advance Certification Review

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Slide 2

ABO Advanced Exam Review
Domain I Part 1

NFOS presentation

Slide 3

Conflict of interest

The speaker, Thomas Neff LDO, ABO-AC, NCLE-AC, has not conflicts of interest to disclose.

Slide 4

NFOS

National Federation of Opticianry Schools

Who is NFOS?

Formal Opticianry Education...
We Teach The Why

Slide 5

Review Course Topics

ABO-AC Blueprint (Domain and Task)
1. Analyze & Interpret Prescription
2. Design, Fit & Dispense Eyewear and Other Ophthalmic Devices
3. Use Ophthalmic Instrumentation

Slide 6

Exam Makeup

125 Multiple Choice Questions
Analyze & Interpret Prescription (38%)
Design, Sell, Fit & Dispense (39%)
Use Ophthalmic Equipment (23%)

Three Hours to Complete

Slide 7

ABO Masters Program

The ABO Master in Ophthalmic Optics designation demonstrates to the public and colleagues that an individual has attained a superior level in ophthalmic dispensing.

Any Optician who is currently Advanced Certified by the American Board of Opticianry for at least one complete three-year renewal cycle and satisfies one of two additional qualifications is eligible to apply for this designation.

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ABO Masters Program

Have written two published ABO-approved Advanced Level III articles

OR

An ABO-approved speaker with two ABO-approved Advanced Level III Courses, or

OR

Have one published ABO-approved Advanced Level III article AND one ABO- approved Advanced Level III Course for which you are the ABO-approved Speaker.

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Analyze and Interpret Visual Assessment

Part 1

Slide 10

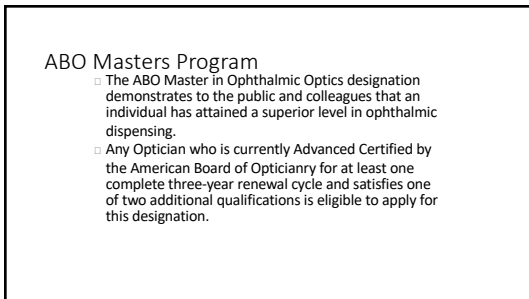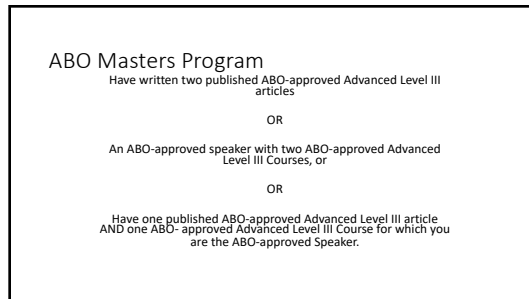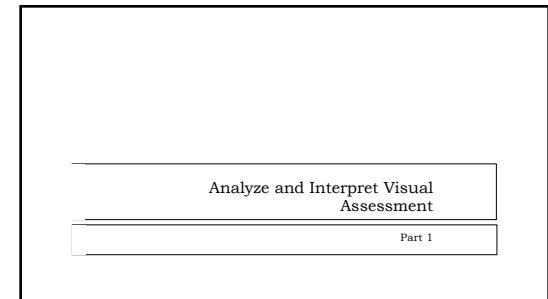**Domain 1 Tasks**

- Analyze customer's/patient's prescription
- Recognize limitations of the prescription
- Assess medical abnormalities of the customer's/patient's vision

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Slide 11

Prescription Analysis

O.D., F.A.A.O.
Board Certified

Phone: 754-3593   Plant City, FL 33563

Name: _____ Date: _____

Address: _____

R -4.25 -25 X 130   20/20
L -6.00 -.5 X 30

OK OU

Exp. Date 10/10
REFILLS: 1 - 2 - 3 - 4 - 5

O.D., F.A.A.O.

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Refractive Errors

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Slide 13

Refractive Errors

- No refractive error
- Light focuses on the retina with no help

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Slide 14

Refractive Errors

Myopia
- Near-Sightedness
- Eyeball to Long / Cornea too steep
- Images focus in the Vitreous
- Corrected with Minus Lenses

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Slide 15

Refractive Errors

Hyperopia
- Far-Sightedness
- Eyeball to Short / Cornea is to flat
- Images Focus past the Retina
- Correct with Plus Lenses

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Refractive Errors

| Emmetropia |
| Myopia |

- Pseudomyopia - caused by an involuntary contraction of the ciliary muscle. The unintended accommodation will blur distance objects. This accommodative spasm may be caused by excessive near work

| Hyperopia |

- Latent Hyperopia - refers to when a portion or all of the hyperopia is being compensated for through accommodation. A cycloplegic refraction is need to measure the amount of hyperopia particularly in a young patient.

| Astigmatism |
| Presbyopia |

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Types of Astigmatism

- 3 Types:
  - Simple
  - Compound
  - Mixed

- 5 Total Versions
  - Simple Myopia
  - Simple Hyperopia
  - Compound Myopia
  - Compound Hyperopia
  - Mixed Astigmatism

Simple myopic   Compound myopic   Mixed

Simple hyperopic   Compound hyperopic

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Types of Astigmatism

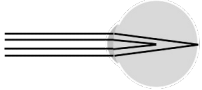Simple Hyperopic:
One meridian is falling on Plano while the other is falling beyond the Retina.

RX Example

Plano +1.00 @ 180
+1.00 -1.00 @ 90

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Types of Astigmatism

Simple Myopic
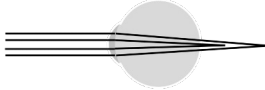One meridian is falling on Plano while the other is falling inside the Vitreous.

RX Example

Plano -1.00 @ 180
-1.00 -1.00 @ 90

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Types of Astigmatism

Compound Hyperopic
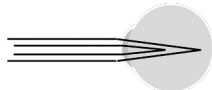Both meridians are falling beyond the Retina.

RX Example

+1.00 +1.00 @ 180
+2.00 -1.00 @ 90

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Slide 21

Types of Astigmatism
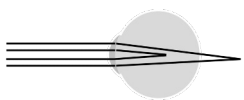
Compound Myopic
Both meridians are falling in the Vitreous.

RX Example

-1.00 -1.00 @ 180
-2.00 +1.00 @ 90

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Types of Astigmatism

Mixed Astigmatism
Where a meridian falls inside the Vitreous and one falls beyond the Retina.

RX Example

-1.00 +2.00 @ 180
+1.00 -2.00 @ 90

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Refractive Errors
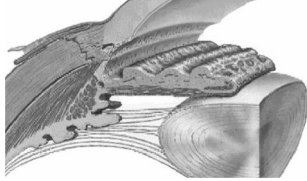
Spherical Rx:
- Simple Hyperopia
- Simple Myopia

Spherocylindrical:

Simple Hyperopic Astig	Plano / +
Simple Myopic Astig	Plano / -
Compound Hyperopic Astig	+ / +
Compound Myopic Astig	- / -
Mixed Astigmatism	+ / -

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Accommodation

- Amplitude of Accommodation
  - Age
  - Push-Up Method
- Accommodative Facility
- Accommodative Insufficiency
  - Flipper

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Accomadation

- amplitude of accommodation = is the max amt of accommodation in an eye

- The amplitude of accommodation declines with age
  - Approx 14 diopters at age 10
  - Approx 0.50 diopters at age 60.

- Push Up Test move 20/20 near chart until blurs

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Accommodation

- Accommodation in diopters is equal to the viewing distance in centimeters divided into 100.
- The uncorrected hyperope will need to accommodate more.
- The uncorrected myope will need less accommodation.
- Error + Accommodation required = Total Accommodation

| Age	Accommodation	Near Point	
10	14.00D	7cm	2.9in
20	10.00D	10cm	4.0in
30	7.00D	14cm	5.7in
40	4.50D	22cm	8.9in
50	2.50D	40cm	16.0in
60	1.00D	100cm	40.0in

$$D = \frac{100\ cm}{VD}$$

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Accomadation

- Accommodative facility is the eyes ability to focus on stimuli at various distances and in different sequences in a given period of time.

- The patient looks at a small target while a flipper with plus and minus lenses is alternated in front of the eyes.(for example, +2.00D lenses on one side and -2.00D lenses on the other side)

- Insufficient accommodation below age level may be caused by fatigue, stress, mTBI, systemic medications, ocular inflammation, thyroid disease or juvenile diabetes mellitus.

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Flipper

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Slide 29
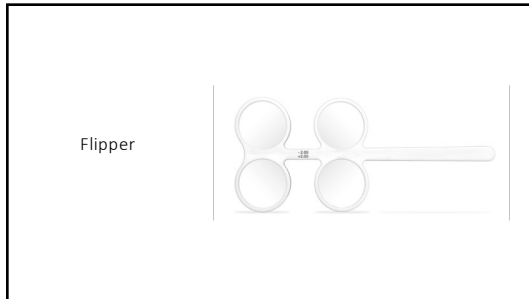
Convergence

- Near Point of Convergence (NPC)
- Light
- Break Point
- Greater then 7cm abnormal

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- **Focal Length**

$$D = \frac{1}{f \ meters}$$

- **Horizontal Decentration**

$$\frac{FPD}{2} - Mono \ PPD = HD$$

- **Vertical Decentration**

$$OC - \frac{B}{2} = VD$$

- **Minimum Blank Size**

$$MBS = ED + (2 \times Mono \ Dec)$$

- **Nominal Lens Power**

$$F_T = F_1 + F_2$$

- **Index Formula**

$$N = \frac{Speed \ of \ light \ in \ air \ (186,000mps)}{speed \ of \ light \ in \ medium}$$

- **Vertex Compensation**

$$Dc = \frac{dD^2}{1000}$$

- **Prentice Rule**

$$\Delta = \frac{dD}{10} \qquad d = \frac{\Delta x 10}{D} \qquad D = \frac{\Delta x 10}{d}$$

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- **Sagittal Formula For Thickness**

$$Sag = \frac{n-1}{D} - \sqrt{\left(\frac{n-1}{D}\right)^2 - \left(\frac{d}{2}\right)^2}$$

- **Sagittal Formula for Thickness Approximation**

$$Sag = \frac{(d/2)^2 x D}{2000 \ (n-1)}$$

- **Resolving Prism**

$$V = (P)(\sin a)$$
$$H = (P)(\cos a)$$

- **Resultant Prism**

$$P = \sqrt{H^2 + V^2}$$
$$a = \tan^{-1}\left(\frac{V}{H}\right)$$

- **Martins Lens Tilt**
  2 Degrees for every 1 mm is lowered

$$S' = S\left[1 + \frac{(\sin \alpha)^2}{2n}\right] \qquad C' = S'(\tan \alpha)^2$$

- **Oblique Powers at 90 & 180**

$$Power @ 90 = (\sin(AXIS)^2 * CYL + SPH)$$
$$Power @ 180 = (\sin(AXIS)^2 * CYL + SPH)$$

- **Specular Magnification**

$$SM = \left[\frac{1}{1 - \frac{t}{n}D_1}\right]\left(\frac{1}{1 - hD}\right)$$

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Slide 32

Flat Transposition

-1.00 -1.00 @ 180
-2.00 +1.00 @ 090

Add	Add SPH + CYL (algebraically)
Change	Change SIGN of CYL power
Change	Change AXIS 90 Degrees

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Slide 33

-2.00 -1.50 @ 090

Flat Transposition

-2.00

-3.50

-3.50

-2.00

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Slide 34

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Slide 35

Flat Transposition

35

Slide 36
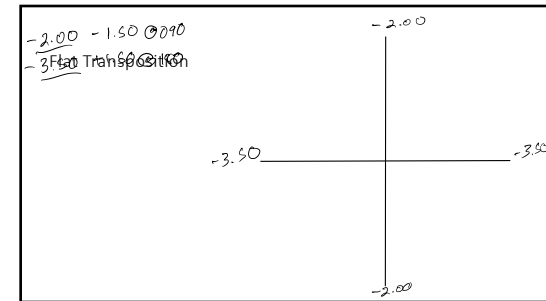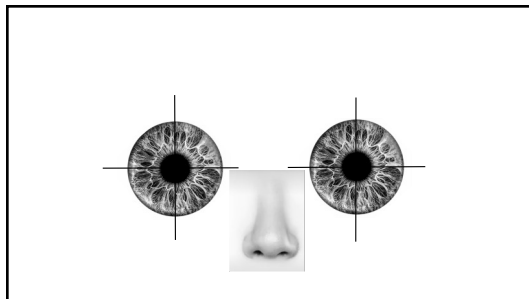
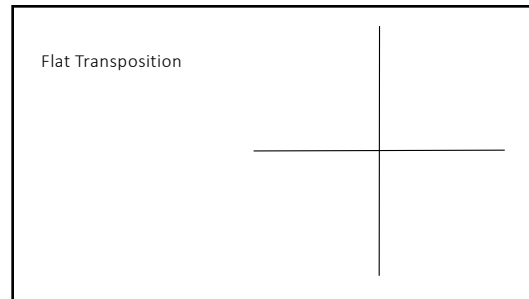### Oblique Cylinder Power

- TO DETERMINE THE PORTION OF CYLINDER POWER AWAY FROM THE AXIS
- 90 DEGREES = FULL CYLINDER POWER
- 60 DEGREES = 75%
- 45 DEGREES = 50%
- 30 DEGREES = 25%
- 0 DEGREES (at axis) = 0%
- Works in either direction

-2.50 -2.00 @ 030

1. Use axis to know percentage of cylinder power to use
2. Use percentage and multiply into cylinder power.
3. Take percentage of cylinder power and add to sphere power.

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Slide 37 — Oblique Cylinder Power

What is the power at 180 and 90 for following Rxs:

-3.00 -1.00 x 055

Power @ 90
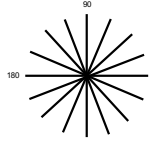$Power @ 90 = (sin(35)^2 x1.00 + 3.00)$
Power @ 90 = 3.33 (3.37)

Power @ 180
$Power @ 180 = (sin(55)^2 x1.00 + 3.00)$
Power @ 180 = 3.67 (3.62)

$Power @ 90 = (sin(AXIS)^2 * CYL + SPH)$
$Power @ 180 = (sin(AXIS)^2 * CYL + SPH)$

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Slide 38 — Prism

- Measurement
- Patient Problems
  - Base Down
  - Base Up
  - Base In or Out
- Decentration to obtain prism
- Slab Off
- Image Jump

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Slide 39 — Prism: Patient Problems

Excessive Base Down:
- Bottom of bowl
- Floor looks concave
- Looking / Walking UP hill
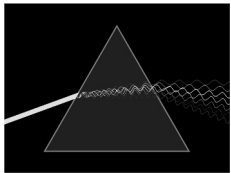- Objects TALLER/looking up at objects

Excessive Base Up:
- Top of ball/mound
- Floor is convex
- Looking / Walking DOWN hill
- Objects SHORTER/ looking down at objects

Excessive Base In or Base Out:
- May cause the wearer to see horizontal objects as high at one end and low on the other
- The too high side will always be towards the apex.

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Slide 40 — Prism Measurements
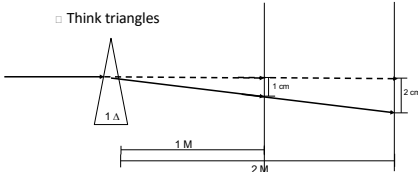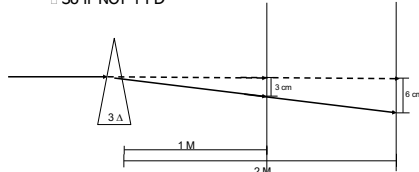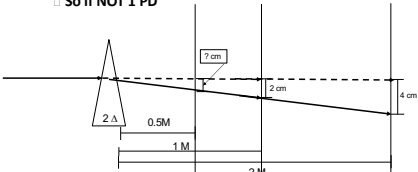
One prism diopter = Deviate light by 1 cm over 1 M

Think triangles

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Slide 41 — Prism Measurements

One prism diopter = Deviate light by 1cm over 1m

Think triangles

1 Δ
1 cm
2 cm
1 M
2 M

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Slide 42 — Prism Measurements

One prism diopter = Deviate light by 1 cm over 1 M
Think triangles
So if NOT 1 PD

3 Δ
3 cm
6 cm
1 M
2 M

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Slide 43 — Prism Measurements

One prism diopter = Deviate light by 1 cm over 1 M
Think triangles
So if NOT 1 PD

2 Δ
7 cm
2 cm
4 cm
0.5M
1 M
2 M

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Slide 44 — Prism Measurements

How much does a 3 Δ deviate light at:

1 M = 3cm
2 M = 6cm
3 M = 9cm

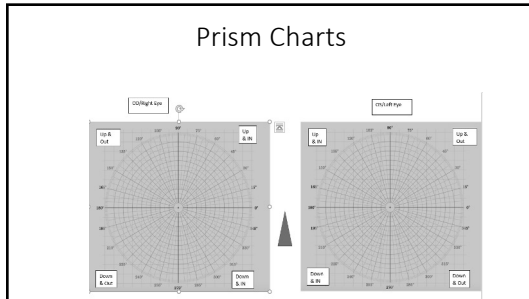0.5M = 1.5 cm

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Slide 45 — Prism Measurements

So simply put your Prism diopters in a Fraction form (over 1)

3 Δ = 3/1
- That is essentially your fraction/ or ratio. (3cm/1M)

If a question asks how much is deviated:

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Prism Charts

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Prentice's Rule

The prismatic effect of a lens on rays of light that pass through it at points other than it's optical center is equal to the product of the the dioptric power of the lens and the distance in centimeters from the optical center to the point of passage.

$$\Delta = \frac{dD}{10} \qquad d = \frac{\Delta x 10}{D} \qquad D = \frac{\Delta x 10}{d}$$

Δ = prismatic effect
D = Lens BVP (in D)
d = distance from OC (in mm)

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Examples

$$\Delta = \frac{dD}{10} \qquad d = \frac{\Delta x 10}{D} \qquad D = \frac{\Delta x 10}{d}$$

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RESULTANT PRISM

EXAMPLE:
Based on the following parameters OD PL 3Δ BU & 5Δ BI
What is the resultant prism?

$$P = \sqrt{H^2 + V^2}$$
$$a = tan^{-1}\left(\frac{V}{H}\right)$$

In this example:
a. H = 5, V = 3, P² = 5² + 3² = 34, and P = √34 = 5.8Δ, tan a = 3/5 = 0.6, and a = 31°
(Use the tan⁻¹ key.)
b. Since 31° is between 0 and 90, which is what we wanted, the resultant prism is 5.8Δ @ 031, or 5.8Δ BU & I @ 031°. In the lensmeter the target will look like this:

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RESOLVING PRISM

4-35. The prism found in the lensmeter for a pair of glasses is 2.0Δ @ 045, and the lens is a right lens. Resolve this prism into its component parts.
On the diagram the long side P of the triangle is 2.0 and the angle ∠a that the prism makes with the axis is 45 degrees. The angle 45° is quadrant I, which is U and I for the right lens.
V = (P)(sin a) = (2.0)(sin 45) = (2)(0.707) = 1.4Δ BU, since V is vertical
H = (P)(cos a) = (2.0)(cos 45) = (2)(0.707) = 1.4Δ BI, since H is horizontal
The prism resolves to **1.4Δ BI & 1.4Δ BU.**

$$V = (P)(\sin a)$$
$$H = (P)(\cos a)$$

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Resolving and Resultant Prism Trick

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Bi-Centric Grinding

Figuring out Slab Off or Reverse Slab Off

1. Find Power at 90 for both eyes
2. Find "drop" (how much do the eyes move down from Dist to Near VERTICALLY)
3. Use prentices rule to determine Prism induced in each eye
4. Find difference, and that is amount of slab off to order at near

SLAB-OFF AND REVERSE SLAB-OFF		
	SLAB-OFF	REVERSE SLAB-OFF
Two minus lenses	Highest minus	Lowest minus
Two plus lenses	Lowest plus	Highest plus
One plus, one minus	The minus lens	The plus lens

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Bi-Centric Grinding

OD -4.00 -2.00 x 180
OS -2.50 -0.50 x 180   +2.50 Add OU
ST 28 bifocal
Looking 4 mm above seg at distance
Looking 5 mm below seg while reading
Total 9mm drop

OD: Power at 90= -6.00   Drop = 9mm   prism = 5.4
OS: Power at 90 = -3.00   Drop = 9mm   prism = 2.7

Difference = 2.7 Prism diopters...will require that much Slab off in OD to eliminate vertical imbalance

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Bi-Centric Grinding

Slab Off

Note...can also take DIFFERENCE in dist power at 90 between OD and OS and multiply by amount eye drops vertically and will come up with same difference (as long as ADDs are similar)

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Prism Problems

Decentration to obtain prism problem

How far must a +2.00 +2.00 x 135 lens be moved to create 2^ ?

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Prism Problems

Decentration to obtain prism problem

How far must a +2.00 +2.00 x 135 lens be moved to create 2^ ?

$Sph = +2.00$
$+50\%$ of cyl $+1.00$
Total Power $+3.00$

$Dec_{cm} = \dfrac{\triangle}{P_{180}} = \dfrac{2}{3} = .67cm$ or $6.7mm$

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Induced prism due to decentration error.

How much prism and what base direction is created if a -5.00 -1.00 x 60 is decentered 5mm too much?

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Induced prism due to decentration error.

How much prism and what base direction is created if a -5.00 -1.00 x 60 is decentered 5mm too much?

$Sph = -5.00$
$+75\%$ of cyl $= -0.75$
Total Power $= -5.75$

$\triangle = P \times dec$
$\triangle = 5.75 \times .5cm = \boxed{2.875}$

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Examples

Make sure you understand Oblique Axes

Power at 90 and or 180

ANSI standards (vertical and horizontal)
Prims (induced/decentered)
Slab off
   find diff in vertical meridian/90 OD vs OS
   Find diff vertical
   Use prentices rule to find amount of prism

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End of Part 1

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