DISPENSERS GUIDE TO PRISM

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1

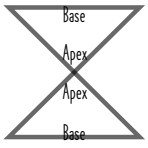
PRISM FOR DISPENSERS

- Objectives
- What is Prism and how does it affect vision
- Understanding the formulas for calculation of prism
- How to read the scripts with prisms
- Understanding the examples optical aids we can use to produce a prismatic effect.

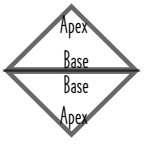
2

WHAT IS PRISM AND HOW DOES IT AFFECT VISION

- Charles Prentice? Prentice Rule?
  - Charles is considered on of the fathers of Optometry



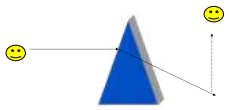
- What is Prism?
- The prism power of a lens at any point on its surface, in prism diopters, is equal to the distance away from the optical center (h) in centimeters times the power of the lens in diopters.



3

PRISM

- Light strikes a prism
  - light ray is bent (deviated) toward the base
  - image is displaced toward the apex.



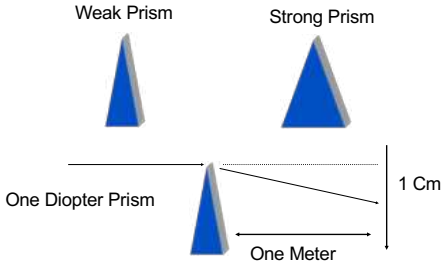
4

PRISM

- Power of prism is referred to as prism diopter
  - 1 Δ will deviate light 1 cm at 1 M
  - 2 Δ will deviate light 2 cm at 1 M
  - 3 Δ will deviate light 3 cm at 1 M

5

POWER OF A PRISM



6

BASIC PRISM TERMS

- Base Up - prism will appear above the 180 meridian
- Base Down - prism will appear below the 180 meridian
- Base In or Out - depending on the right or left lens, the prism will appear to the right or left of the 90th meridian
  - OD Base In will appear to the right of the 90th meridian
  - OD Base Out will appear to the left of the 90th meridian
  - OS Base In will appear to the left of the 90th meridian
  - OS Base Out will appear to the right of the 90th meridian
- Canceling - BU-BU, BD-BD, BI-BO
- Compounding- BU-BD, BI-BI, BO-BO

7

PRENTICE'S RULE

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

8

PRENTICE'S RULE

- **Ex: HOW MUCH PRISM IS GENERATED 8MM FROM THE OC OF A + 4.00 D LENS?**
- **Ex: HOW FAR DO YOU DECENTER A +4.00 D LENS TO CREATE 2 DIOPTERS OF PRISM?**

9

PRENTICE'S RULE

$$\Delta = \frac{Dd}{10}$$

HOW MUCH PRISM IS GENERATED FROM GLASSES MADE AT A PD OF 35MM IN THE RIGHT EYE WHEN IT WAS SUPPOSED TO BE MADE AT 32 MM WITH A +4.00 D LENS?

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

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

10

RX ANALYSIS FOR PRISM

- OD – 4.00 + 2.25 X 90

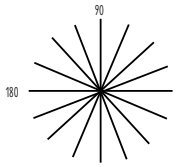
- Figuring Total Power
- What is Power at 90 =
- What is Power at 180 =

11

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.

12

SIMPLE FORMULA

Degrees from Axis	Memorize	Percentage of cylinder Power in this meridian
0	0	0
5	1	1
10	2	3
15	4	7
20	5	12
25	6	18
30	7	25
35	8	33
40	8	41
45	9	50
50	9	59
55	8	67
60	8	75
65	7	82
70	6	88
75	5	93
80	4	97
85	2	99
90	1	100

13

Taking Prism to the Dispensary

When does Prism effect vision?

If eyes move in same direction – NO EFFECT
If eyes move in OPPOSITE directions – HAS EFFECT

PRISMATIC TOLERANCE:

- Vertical prism is NOT tolerated well
- Horizontal will vary with patient
- Base in prism is the easiest to tolerate at the near point.

Compounding

Base Up - Base Down
Base In - Base In
Base Out - Base Out

Cancelling

Base Up - Base Up
Base Down - Base Down
Base In - Base Out
Base Out - Base In

14

FEELING OF EXCESSIVE PRISM

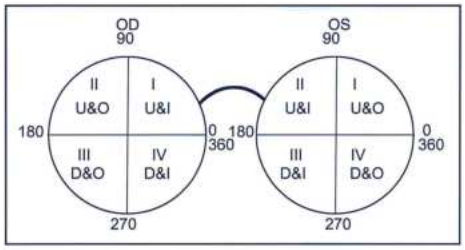
When does Excessive Prism effect vision?

What Effect?

- Excessive Base Up
  - Causes the floor or other horizontal expanses to seem convex as the wearer feels like he is standing on a hill, vertical objects may seem shorter; the wearer may feel like he is walking downhill.
- Excessive Base Down
  - Makes floor or horizontal expanses seem concave as the wearer feels like he is standing in bowl, vertical objects may seem taller the wearer may feel like he is walking uphill.
- Excessive Base In or Base Out Prism
  - 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.

15

BASE DIRECTIONS



16

HOW TO READ THE SCRIPTS WITH PRISMS

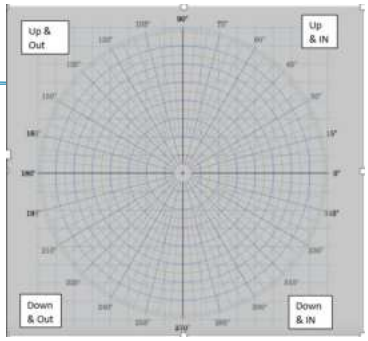
	Sphere	Cylinder	Axis	Prism	Prism
OD	-1.00			2Δ up	1Δ in
OS	-1.00				

- The various ways you may experience prism written on an RX.
- RESOLVING PRISM - is when it has specified directions
- RESULTANT PRISM - Is in the form with an axis

	Sphere	Cylinder	Axis	Prism
OD	-1.00			2.4@145
OS	-1.00			

17

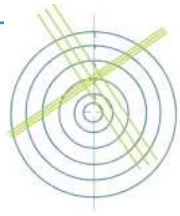
RESOLVING AND RESULTANT PRISM TRICK



18

HOW MUCH PRISM AND BASE DIRECTION IS PRESENT?

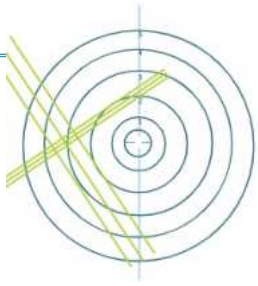
- Prism is read at the point where the middle sphere line and the middle cylinder line intersect with the horizontal or vertical line drawn for reference.
- In this instance, since the vertical line is exactly on the 90-degree reticle reference line, there is ONLY vertical prism…no horizontal prism
- Answer – 2^BU



19

OD LENS

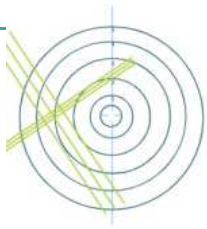
HOW MUCH PRISM AND WHERE?



20

OD LENS
HOW MUCH PRISM AND WHERE?

- Now we have horizontal prism. Use the same concept as before, but now you will have to identify whether this would be base in or base out.
- Remember your prism grid…OD toward the ear/left is base out.
- Count the prism rings, noting ½ and whole.
- Since if you draw the line through the sphere/cylinder intersection, there is NO vertical prism…only horizontal.
- Answer – 3^BO



21

WHAT DOES VERTICAL IMBALANCE DO?

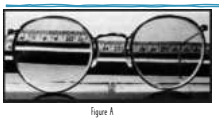


Figure A

Figure B

FIGURE A

- NOTICE THE RIGHT LENS? WHAT CAUSED THIS TO OCCUR? WHAT BASE DIRECTION CAUSES AN IMAGE TO BE DISPLACED UPWARD?

FIGURE B

- THE IMAGE IN BOTH LENSES IS DISPLACED EQUALLY. WE CALL THIS YOKED PRISM. YOKED PRISM IS SEEN IN PAL LENSES AND SHOULD BE CHECKED AS PART OF THE FINAL INSPECTION.

22

PRISM

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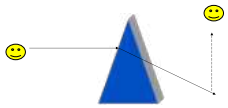


23

UNDERSTANDING THE EXAMPLES OPTICAL AIDS WE CAN USE TO PRODUCE A PRISMATIC EFFECT.

- Visual correction for a deformity
  - Examples of patients who might benefit from it.
- Slab-off
  - Understanding BUMM method: Base Up Most Minus
  - How the lab can help
- Fresnel Prisms
  - Examples of how they are applied.
  - Benefits to the patient

24

UNEQUAL REFRACTIVE ERRORS

- Why do you need to know
  - Unequal powers

- Isometropia
- Anisometropia
- Antimetropia

25

ANISOMETROPIA

- "unequal measure"
- The condition when the two eyes require a different degree of correction (1.00 or more) but the same kind of correcting lens (+ or –)
- The condition may cause vertical prism imbalance (double vision/diplopia) at near or cause a difference in the retinal image sizes between the two eyes

26

ANISOMETROPIA

- Example Rx:
  - OD –7.00 D. sphere
  - OS –3.00 D. sphere

- Example Rx:
  - OD +7.25 sphere
  - OS +5.25 sphere

27

ANTIMETROPIA

- "opposite measure"
- The condition when the two eyes require opposite kinds of corrective lenses (+ or -)
- The condition may cause vertical prism imbalance at near (double vision/diplopia) or cause a difference in the retinal image sizes between the two eyes

28

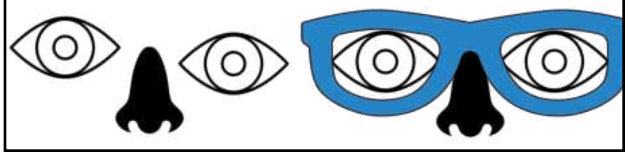
ANTIMETROPIA

- Example Rx:
  - OD +1.75 sphere
  - OS -1.00 sphere
- Example Rx;
  - OD -2.25 sphere
  - OS +1.50 sphere

29

UNDERSTANDING THE EXAMPLES OPTICAL AIDS WE CAN USE TO PRODUCE A PRISMATIC EFFECT.

- Visual correction for a deformity
- Examples of patients who might benefit from it.



30

SLAB OFF OR SLAB ON

- When to use Bi-Centric Grinding
  - Over 1.5 Diopters of Vertical Imbalance
  - Not all patients are at this threshold
  - Some patient's brains can regulate it even higher
  - Power of the Script plays a role But when?

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

31

BI-CENTRIC GRINDING

What is the approximate vertical imbalance at a reading level of 8 mm for the following prescription?

What slab-off could be ordered, and in which lens?

OD -3.00 SPH ADD +2.000 OU
OS +1.00 SPH

- Slab Off - BU on most minus
- Reverse slab-off - BD on most plus

32

FRESNEL PRISM

- Was used for the first time to manage strabismus.
- In 1970, the optical scientific group from San Rafael of California designed a combination of a series of Fresnel press on prisms.
- These prisms are made up of plastic membranes with powers ranging from 0.5–30 prism dioptres.
- The Fresnel prism is derived from the concept of hand-ground lenses prepared by the physics and French specialist Augustine Fresnel in 1921.

33

CLOSING REMARKS

- Objectives
  - What is Prism and how does it affect vision
  - Understanding the formulas for calculation of prism
  - How to read the scripts with prisms
  - Understanding the examples optical aids we can use to produce a prismatic effect.

34