

Prisms in Ophthalmology

NEUTRALIZING PRISM IN GLASSES
PRISM TO MEASURE EOM DEVIATION

1

There are 2 kinds of prism in glasses.

- **Wanted**
 - Prescribed by the physician
- **Un-wanted**
 - Error in placement of optical center
 - In measuring PD
 - Lab manufacturing error



2

Unwanted prism

Must mark where the patient is looking through
Place where patient is look through over the center of the lens stop
Then read amount of prism the patient is actually looking through

3

There are 3 ways to put prism into glasses

- Ground in / Added on Prism
- Prism from decentration
- Fresnel Prisms



4

Ground in / Added on prism

- Usually done when large amounts of prism are required
- May be added to the whole lens- Optical center may be off lens
- Slab off added from seg line down
- Fresnel prism added to all or part of a lens



5

Prism from decentration

- Location of optical center is not over visual axis
- Usually done for small amounts of prism
- Prentices Rule
- **Prism = Rx x decentration in cm**



6

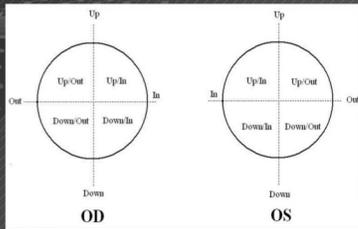
Prism Directions

- Horizontal**
 - Base In (BI)
 - Base Out (BO)
- Vertical**
 - Base Up (BU)
 - Base Down (BD)
- Oblique**
 - A combination of Horizontal and Vertical prism



7

Prism Specification

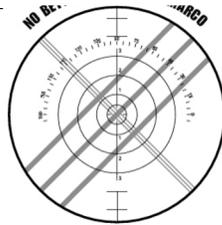


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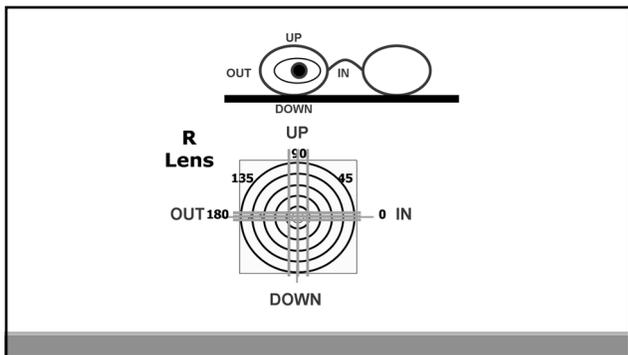
Centered Target – No Prism

Targets that center above the horizontal axis have a base direction between 0-180

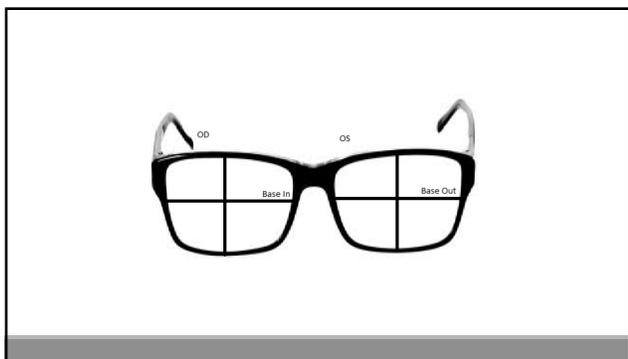
Targets below the horizontal have an axis between 181-360



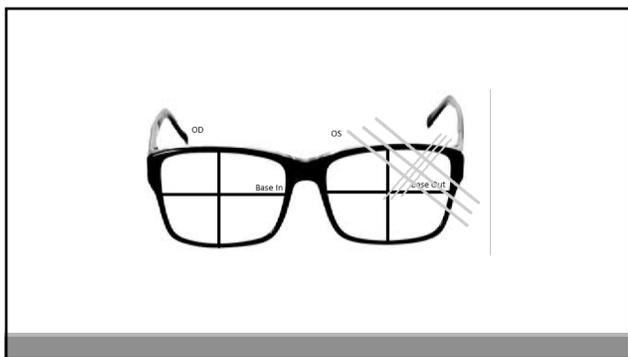
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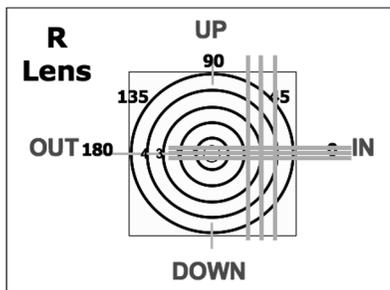


12

Target not in center of the reticule

The lensometer **target** is always decenter in the direction of the base.

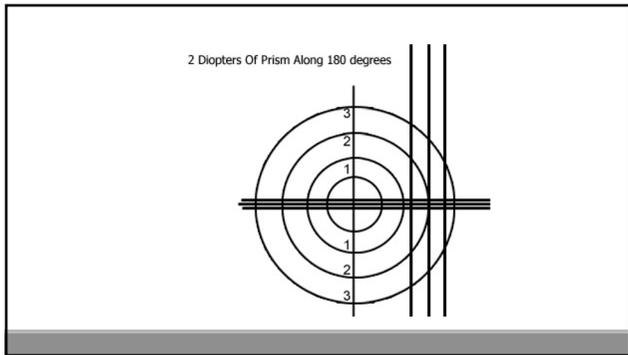
13



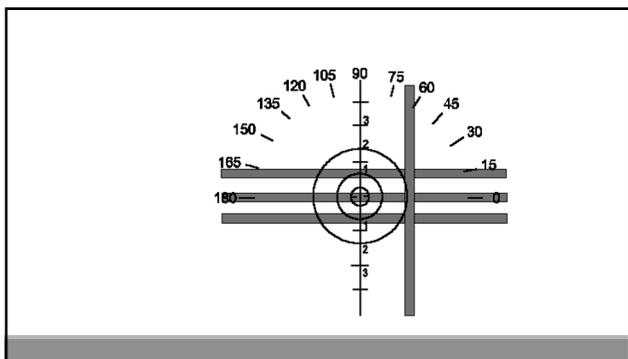
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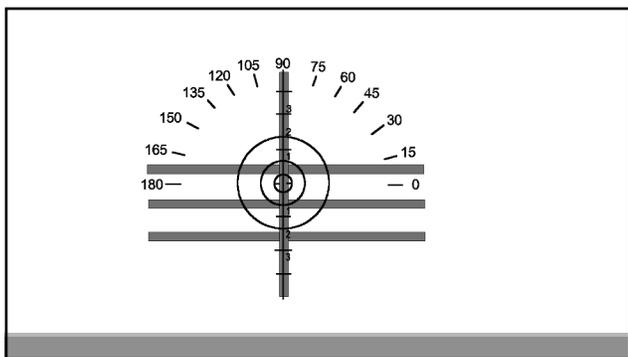
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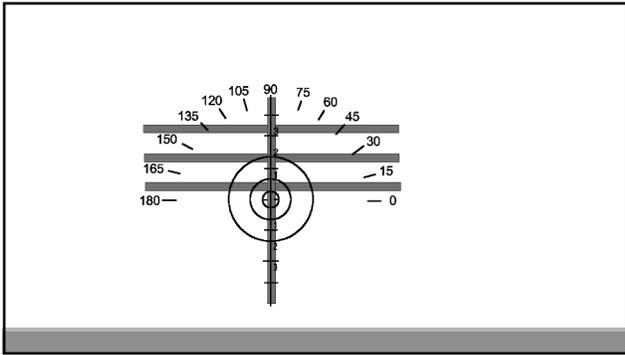
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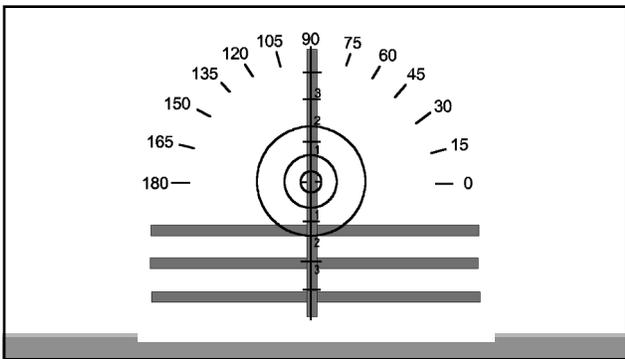
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19



20

Vertical Prism

Be sure not to change the height of the lens stage when changing from the right eye to the left eye.

21

Prism Measurement

- In an unknown lens
 - Patient may come in with a prescription that you are not sure if it contains prism in the lenses
 - After power of the lenses are neutralized and the optic centers are marked, measure the distance between the optic centers (DBOC)
 - If DBOC does not equal to the patient's distance PD, then there is prism in the lens

22

Determining Power and Axis of Prism:

Right Lens

1.5 Δ BO

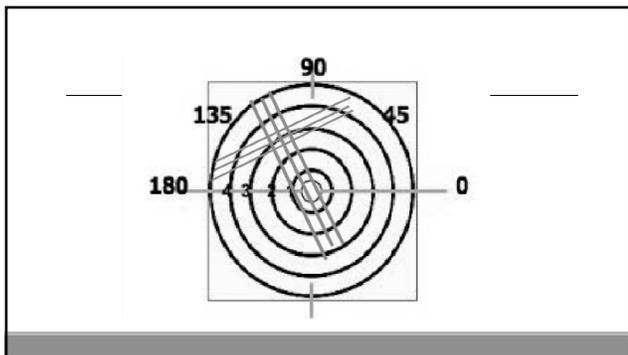
2.0 Δ BU

2.5 Δ @ 127°

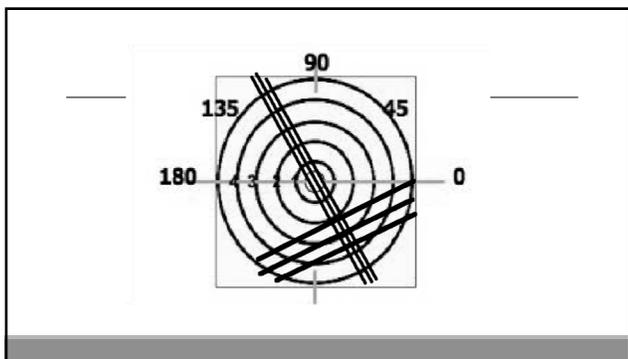
23

Right

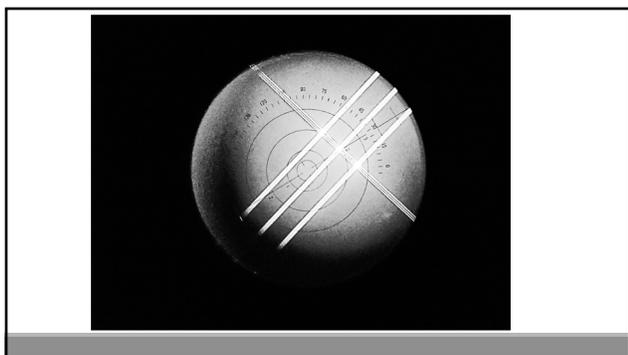
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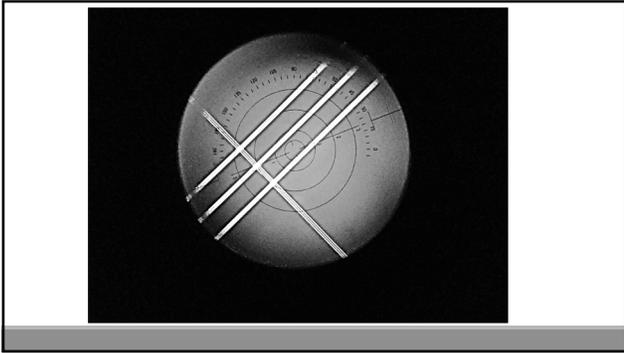
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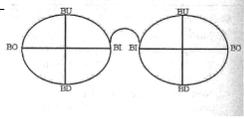
29

Hands-On: TIP

When neutralizing a pair of glasses, it is important to begin with the strongest lens first to ensure correct placement of the optical center for each lens. This is very important when dealing with lenses that include prism.

30

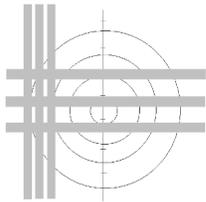
Read glasses with prism:



- Mark the center of the lens using the patient's PD
- Place the center of the lens over the lens stop
- The direction of a prism is determined by its base
- Calculate the direction of the prism in relationship to the bridge of the frame

31

...Read glasses with prism:



- Focus the target (displaced target.) The displacement of the target will be in the direction of the base of the prism.
- Rotate the reticle to cross the lines of the target.

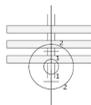
32

...Read glasses with prism:

Read the number of the circle over the intersection of the target.

To read prism of over five diopter, use the prism compensating device (if your lensometer is equipped with one.)

Example:
Ground in prism measures 2^b base up



33



34

Prism Compensating Device:

Place the optical center of the lens in the lens stop.

Set the power drum to the power of the lens.

If there is over five Δ of prism rotate the PCD to bring the target into the center of the reticle.

Rotate the knob on its own axis for prism power.

Rotate knob about the optical axis to change base direction.

Prism power and base direction are read from the dial.

35

...Prism Compensating Device:

To determine horizontal prism (BI or BO), the device should be locked in the 180 degree position.

To determine the vertical prism (BU or BD), the device should be locked in the 90 degree position.

Most lensometer are capable of neutralizing up to 20.00D or prism power with the PCD.



36

| A plus lens | A minus lens |
|---|--|
| Optical center moved nasally = base in (BI) | Optical center moved nasally = base out (BO) |
| Optical center moved temporally = base out (BO) | Optical center moved temporally = base in (BI) |
| Optical center moved up = base up (BU) | Optical center moved up = base down (BD) |
| Optical center moved down = base down (BD) | Optical center moved down = base up (BU) |

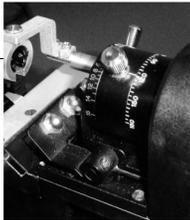
37



If there are more than 5 prism diopters the target must be brought back into the field with the prism compensating device. Rotate the prism compensating device knob to bring the center of the target to coincide with the center of the reticle.

38

Rotate the power drum when necessary to focus the cylinder target and rotate the prism compensating device knob until the target is exactly centered in the reticle crosshair. The prism power and base direction are read directly from the prism diopter power scale and the prism axis scale (if the prism diopter power scale is red, add 180° to the prism axis scale for base meridian).



39

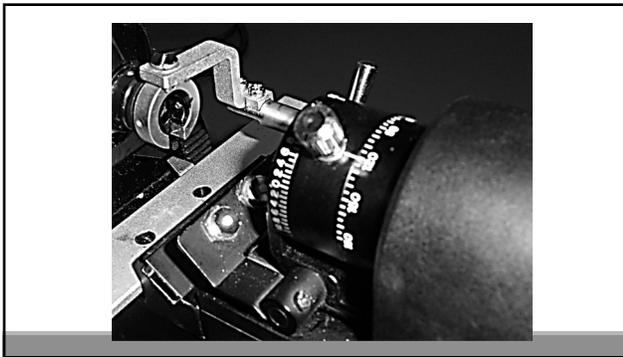
In the event the prism to be measured is between 15 and 20 diopters,

set the prism compensating device to the 15 prism diopter scale and rotate about the Lensometer optical axis until the target comes into the field.

Continue this rotation until the target is at the nearest point to the reticle center. Refocus the target.

The actual prism power will be the prism reading plus 15 prism diopters and the base meridian must be read from the prism axis scale.

40



41

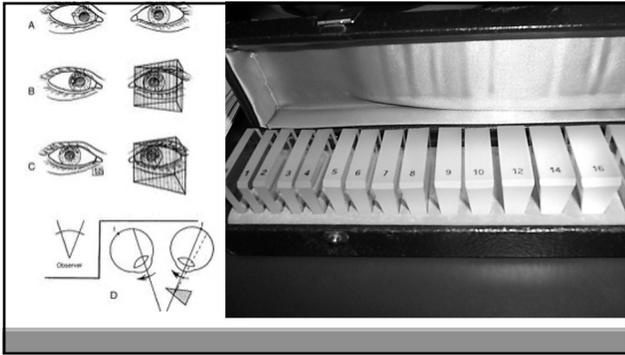
Prism can be canceled by hand

Use prism of the opposite base direction.

The amount of prism needed to recenter the target is the amount of prism.

The base direction in the spectacles will be 180 degrees away from the base of the neutralizing prism.

42



43

Krimsky Measurements

Uses prisms to artificially place the deviated light reflex onto the correct position.

Prism can be placed over either eye if child fixates with either eye.

Prism should be placed over the fixing eye in patients with a blind eye.

BO corrects ET
 BI corrects XT
 BD corrects hyper
 BU corrects hypo

44

Prism and Cover Measurements

Requires steady fixation with either eye.
 Cannot be used on infants or very young children.

Vision must be good enough to fixate well.

Requires that both eyes move freely, no restrictive strabismus (Grave's).

If restrictive strabismus, place the prism over the restricted eye.

45

Prism and Cover Measurements

Alternate (Cross) Cover Test

- Measures the largest deviation (tropia and phoria).
- Have patient fixate on accommodative target (20/40 or smaller letter).
- Cover is alternately placed over each eye, never allowing binocularity.
- Prism is increased or decreased until no movement of either eye occurs with cross covering.
- The amount of prism that neutralizes the eye movement is the size of the deviation.



46

Prism and Cover Measurements

Alternate (Cross) Cover Test

- Occasionally, one eye seems to be neutralized with a given prism and the fellow eye will continue to move.
- This is a tip-off that a primary and secondary deviation exists.
- Record deviation with prism over each eye AND with other eye covered.



47

Extra Tips for Accurate Measurements Using Plastic Prisms

Prisms come in 2 shapes

- Right angle (large prisms 25D or more)
 - Flat side is placed closer to patient
- Isosceles (smaller prisms)
 - Can be used with either side in front of patient.



Split prisms, rather than stacking them.

Largest prism available is 50 diopters.

When measuring more than 50 diopters, a second prism is added to the fellow eye.

48

Thank You!
