Learning Objectives:

1. Identify the key parts of a manual lensometer
2. Know how to visually differentiate sphere lines from cylinder lines & how to make them clear & straight using the components of the lensometer
3. Understand the concept of "distance traveled" when reading the power wheel of the lensometer to determine cylinder value and ADD power

Purpose of the Lensometer

With a manual lensometer, you can:
- Determine power of spectacle lenses
- Locate the optical center (OC) of a lens
- Measure prism in a lens

Components of the Lensometer

POWER WHEEL:
- BLACK numbers indicate plus (+) power
- RED numbers indicate minus (-) power

Think of a lensometer POWER WHEEL as a "number line" wrapped around a circle. It will make it easier to understand DIRECTION & DISTANCE traveled - key concepts in lensometry
Preparing the Manual Lensometer for use and Testing it’s Accuracy

Preparation:

- Adjust lensometer height, until it’s comfortable to look through eyepiece
  - Usually a lever on machine you **LOOSEN** so unit can move up/down
  - **SAFETY!** Before you “loosen” the lever, **get your hand under the machine** so it doesn’t slam down!
  - When machine @ correct height for YOU, tighten lever again

Preparation (cont.): Focus the eyepiece

- Place a piece of paper in Lens Holder

Preparation (cont.): Focus the eyepiece

- Now, turn the eyepiece **counterclockwise (CCW)** until it stops (i.e. go in + direction)

Preparation (cont.): Focus the eyepiece

- Look into the eyepiece & slowly turn it **clockwise (CW)** until the reticle becomes clear...then STOP!
Preparing the Manual Lensometer for use and Testing it’s Accuracy (cont.)

Check the calibration of Lensometer:
- Turn lensometer on & look into the eyepiece
- Turn the power wheel to focus the SPH & CYL lines clearly
- Look at the power wheel - it should read zero ("0") diopters

(NOTE: If it does not, your lensometer needs serviced!)

Neutralizing a Single Vision Spherical Rx

Start with SPHERICAL Lenses:

Insert glasses w/the RIGHT lens in the lens holder & temples pointing AWAY from you.

CORRECT 🙆  Both touching table
WRONG 😞 Only one lens touching table

Neutralizing a Single Vision Spherical Rx (cont.)

- Be sure both lenses touch lens table!
Neutralizing a Single Vision Spherical Rx (cont.)

Look into the eyepiece & rotate Power Wheel until the SPH & CYL lines come into focus.

(NOTE: You can center the SPH/CYL lines by moving the glasses, if needed.)

Neutralizing a Single Vision Spherical Rx (cont.)

- Once SPH & CYL lines come into sharp focus, you can record the dioptric power indicated by the Power Wheel.
- Since this is a spherical lens (SPH & CYL lines focused@same time), you would record “SPH” after the number to indicate no cylinder or axis.

What POWER is shown on this power wheel?

Neutralizing a Single Vision Sphero-cylindrical Rx

• Neutralizing SPHEROCYLINDERS
  – Start with the power wheel set at +9.00
  – Insert specs & center OD lens in lensometer
  – Turn Power Wheel until SOMETHING (anything!) comes into focus, then STOP!
  • If the 3 thin lines are in focus, you got SPH first (that is what you want! 😊)
  • If the 3 ‘fat’ lines are in focus, you got CYL first & you need to fix that...
    – (...turn the axis wheel 90 degrees until CYL lines ‘transform’ into SPH lines.)

Neutralizing a Single Vision Sphero-cylindrial Rx (cont.)

• Fine focus the SPH lines (3 skinny lines) & make sure they are straight and perfect
• Use the Power Wheel & Axis Wheel to refine them, if needed

Neutralizing a Single Vision Sphero-cylindrial Rx (cont.)

Record the power indicated on the Power Wheel as the SPH power
Neutralizing a Single Vision Sphero-cylindrical Rx (cont.)

Since SPH is “married” to the AXIS, record the axis indicated on the axis wheel.

Neutralizing a Single Vision Sphero-cylindrical Rx (cont.)

• Now turn the Power Wheel until the CYL lines (three fat lines) come into focus.
  (NOTE: Do NOT turn the axis wheel!)

Neutralizing a Single Vision Sphero-cylindrical Rx (cont.)

IMPORTANT (critical) CONCEPT!

• The CYLINDER power is NOT the number you see on the Power Wheel!!

• CYL power is “calculated” by the distance traveled from the SPH reading to the CYL reading on the Power Wheel!

Neutralizing a Single Vision Sphero-cylindrical Rx (cont.)

So, let’s put it all together:

1) SPHERE lines came into focus w/the wheel @ BLACK 2.00
2) AXIS wheel was @ 087 (when SPHERE lines were sharp/clear)
3) CYLINDER lines came into focus w/the Power Wheel @ BLACK 1.00

WHAT IS THE RX?

Neutralizing a Single Vision Sphero-cylindrical Rx (cont.)

RX is:

+2.00 -1.00 X 087

Confused?

Let’s look at some examples to drive the concept home...
Neutralizing a Single Vision Sphero-cylindrial Rx (cont.)

1. Sphere focuses at black 2.00
   Cylinder focuses at black 1.00
   Axis is 087
2. Sphere focuses at black 4.00
   Cylinder focuses at red 2.00
   Axis is 043
3. Sphere focuses at red 5.00
   Cylinder focuses at red 6.00
   Axis is 060
4. Sphere focuses at black 0.50
   Cylinder focuses at red 0.50
   Axis is 133
5. Sphere focuses at 0.00
   Cylinder focuses at red 3.00
   Axis is 086

Remember, the Power Wheel is just a number line wrapped around a circle...

How to Determine the ADD Power of a Multifocal

- Measure & record the Rx in the top portion of the lens (as just described.)
- Set the Power Wheel back to the SPHERE power reading obtained in the top portion of the lens.

How to Determine the ADD Power of a Multifocal (cont.)

- Raise the spectacles up; get the bifocal segment properly positioned in the lens stop

How to Determine the ADD Power of a Multifocal (cont.)

Rotate the power wheel in the PLUS direction to focus the SPHERE lines in the bifocal segment...

How to Determine the ADD Power of a Multifocal (cont.)

The distance you traveled from your starting (distant) SPHERE reading to this this “new” (bifocal) SPHERE reading is the ADD POWER

EXAMPLE:

Rx in distance (top) portion of lens showed SPHERE power to be +2.00
- The SPH lines in bifocal segment of the lens came into focus at +4.00.
- The DISTANCE TRAVELED? Two diopters in the PLUS direction; ADD POWER for these specs is: +2.00 ADD
Procedures for Lens Neutralization using a Manual Lensometer (cont.)

TWO METHODS to measure ADD POWER:

PRACTICAL method:
Take ADD power measurement w/TEMPLLES POINTING AWAY FROM YOU (as we’ve been doing.)
**USE when DISTANT SPHERE is +3.75D or less “plus”.

EXACT method:
Take ADD power measurements w/TEMPLLES POINTING TOWARD YOU (i.e., flip glasses around.)
**Use when DISTANT SPHERE is +4.00D or more “plus”.

Progressive Add Lenses (PALs) and Prism

• PALs can be measured on a manual lensometer EXACTLY as we’ve just described. The “key” is to mark them with the correct template first, so you know where to take your distant, near, & prismatic measurements.

Example Rx:
OD: +2.00 -1.00 X090 Prism: 2 BD
OS: +1.75 -0.75 X085 Prism: 2 BI

For Vertical prism, you:
1. Center strongest lens
2. Now, move to the other lens WITHOUT moving the lens table!
3. Observe if the SPH/CYL crossing point is still centered, or is it up or down from center...

For Horizontal prism, find the optical centers (OCs) of each lens & mark them with the lensometer...

Progressive Add Lenses (PALs) and Prism (cont.)

PRISM can be ordered in two ways:
1) Vertical - base up [BU] or base down [BD]
2) Horizontal - base in [BI] or base out [BO]
   –Both types can be measured using the manual lensometer.
Progressive Add Lenses (PALs) and Prism (cont.)

Horizontal prism (cont.)

1. Measure the distance from optical center (OC) to optical center (OC) of each lens
2. Compare result to the patients PD (PPD)
3. If they are off by 3mm or more, mark the glasses where the pt is looking through the lenses.

OCs measure 60mm here -

Progressive Add Lenses (PALs) and Prism (cont.)

Horizontal prism (cont.)

In this example, the OCs measured 60mm & the patients PD (PPD) was 70mm.

(Off by 10mm total!)

Progressive Add Lenses (PALs) and Prism (cont.)

Horizontal prism (cont.)

• We need to mark the glasses where the pt looks through the lenses to see if there is induced horizontal prism.

Progressive Add Lenses (PALs) and Prism: Horizontal prism (cont.)

Center lens in lensometer @ point where the pt is looking thru them, as shown...

Progressive Add Lenses (PALs) and Prism: Horizontal prism (cont.)

If the SPH/CYL crossing point is still centered (as shown), there is no horizontal prism...

Progressive Add Lenses (PALs) and Prism: Horizontal prism (cont.)

If you see that the mires have moved IN toward the nosepads, you have base-in (BI) prism, AS SHOWN IN THIS IMAGE

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(NOTE: If the mires had moved OUT toward the temples you would have had base-out [BO] prism.)

2D Base IN (BI) prism - OS