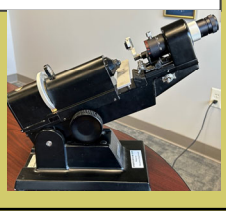
MANUAL LENSOMETRY

OOS Skills Workshop

Special thanks to CVP and EyeCare Partners Training Team



OBJECTIVES

- Identify parts of the manual lensmeter
- Review components of a glasses prescription
- List steps of manual lensometry
- Use Number Lines and Optical Crosses to denote lensometry readings and convert to sphere, cylinder, and axis results

LENSOMETRY

The lensmeter is an instrument that is used to read the prescription of a spectacle lens

-Eyepiece
-Gimbal
-Axis Wheel
-Spectacle Table
-Spectacle Table Lever
-Power Drum

COMPONENTS OF A PRESCRIPTION: SPHERE POWER

The first number in the Rx is the Sphere power.

- If the sphere power is minus, the eye is myopic.
- If the sphere power is plus, the eye is hyperopic.
- If the sphere power is zero (Plano), the eye is emmetropic.

-1.00 +0.50 x 90 +2.00 +0.50 x 180 PI +1.00 x 05
-2.00 +0.75 x 45 +0.25 +1.50 x 65 PI +2.25 x 90

COMPONENTS OF A PRESCRIPTION: CYLINDER

- The second number, when present, is the cylinder power
- Cylinder power can be in plus or minus

-1.00 +0.50 x 90 → **-0.50 -0.50 x 180**

-2.00 +0.75 x 45 → **-1.25 -0.75 x 135**

If there is no cylinder power, the lens is spherical. (SPH)

-1.25 SPH

COMPONENTS OF A PRESCRIPTION: AXIS

- The third number, if present, is the cylinder axis

-1.00 +0.50 x 90

-2.00 +0.75 x 45

COMPONENTS OF A PRESCRIPTION: ADD POWER

- There may be an ADD. This is the bifocal power, or near vision power.

-1.00 +0.50 x 90 **Add +2.50**

+2.00 +0.75 x 45 **Add +2.50**

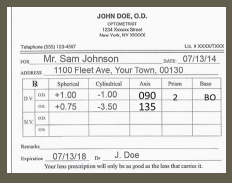
COMPONENTS OF A PRESCRIPTION: PRISM POWER

- If prism is present, the Prism Power and Direction will be indicated.

-1.00 +0.50 x 90 **2D BO**

-2.00 +0.75 x 45

- BO: Base Out (Esotropia)
- BI: Base In (Exotropia)
- BD: Base Down (Hypertropia)
- BU: Base Up (Hypotropia)



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FOR Mr. Sam Johnson DATE 07/13/14

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Rx		Spherical	Cylindrical	Axis	Prism	Base
D.V.	O.D.	+1.00	-1.00	090	2	BO
	O.S.	+0.75	-3.50	135		
N.V.	O.D.					
	O.S.					

Remarks

Expiration 07/13/18 Dr J. Doe

Your lens prescription will only be as good as the lens that carries it.

STEPS TO LENSOMETRY

- **Step 1:** Check Lensometer's power switch
- **Step 2:** Focus the eyepiece
- **Step 3:** Position the Spectacles on Table, Center Mires in the Reticle
- **Step 4:** Use Axis Dial to Align, Read the Axis
- **Step 5:** Use Power Drum to Focus Sphere Lines; Measure the Sphere Power
- **Step 6:** Use Power Drum to Focus Cylinder Lines; Calculate the Cylinder
- **Step 7:** Center bifocal segment in the Lensmeter
- **Step 8:** Use Power Drum to Refocus the Sphere Lines; Calculate the Add Power
- **Step 9:** Measure Prism (if present)

STEPS TO MANUAL LENSOMETRY: POWER AND EYEPIECE

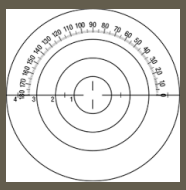
- Step 1: CHECK POWER SWITCH and Turn on.
- Step 2: FOCUS THE EYEPIECE.
  - Rotate counterclockwise until reticle is blurred, then rotate clockwise, just until clear.

STEPS TO MANUAL LENSOMETRY: POSITION THE EYEGLASSES

- Step 3: POSITION THE SPECTACLES
  - Position glasses on the **spectacle table** with temples facing away from the operator allowing for measurement of the back surface of the lens.
  - Be sure that the glasses are resting evenly on the spectacle table to prevent rotation of the lens and an incorrect reading. This is especially important for axis and prism determination.
  - Use the spectacle stage/lever to center mires in the reticle.

THE RETICLE

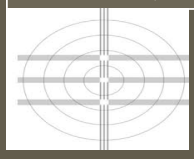
- The reticule is made up of crosshairs to assist in locating the optical center of the lens.
- The numbered circles are used to determine the amount of prism.
  - Each numbered circle represents one diopter of prism.

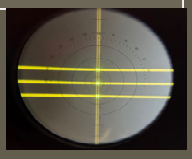


THE MIRES

GOAL: CENTER THE TARGET IN THE CENTER OF THE RETICLE.

IN THESE ILLUSTRATIONS:
-SPHERE LINES (THIN)
-CYLINDER LINES (THICK)





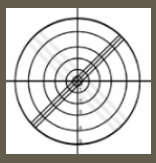
STEPS TO LENSOMETRY:

ALIGN THE AXIS

- Step 4: ALIGN THE AXIS
- If the lines appear broken, rotate the axis wheel until they appear straight.

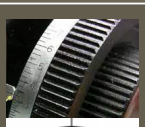
THE LINES SHOULD BE ALIGNED/UNBROKEN

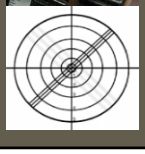
If the Sphere lines are broken, Rotate the Axis Dial.
Once aligned, you will have your axis.



STEPS TO MANUAL LENSOMETRY: MEASURE THE SPHERE POWER

- Step 5: MEASURE THE SPHERE POWER
- Turn power drum until the thin lines (Sphere Lines) come into focus.
- This "1st reading" is the Sphere Power in diopters
  - If the thin lines and the thick lines come into focus simultaneously, the lens is spherical.
  - If the thin lines are in focus, but the thick lines (Cylinder lines) are blurred, then the lens is a spherocylindrical lens. Additional steps must be conducted to determine the cylinder power.



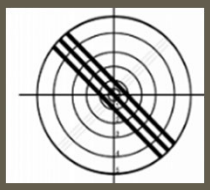


POWER DRUM INDEX IS A NUMBER LINE

To understand how to read the power drum on the manual lensmeter, you must understand the number line. The black numbers are plus and the red numbers are minus

STEPS TO MANUAL LENSOMETRY: MEASURE CYLINDER POWER

- Step 6: MEASURE THE CYLINDER POWER (if present)
- Turn the power drum until the thick lines come into focus. (Make note of the measurement on the power drum.
- This your "2nd reading" is NOT your cylinder power, but is needed to calculate the cylinder power.)
- The cylinder power is the difference between the 1st reading and the 2nd reading.



CALCULATING THE CYLINDER POWER

The **difference** between your reading for the sphere lines (1st reading) and the reading for the cylinder lines (2nd reading) is your Cylinder Power

Example: 1st reading = -2.00
2nd reading = +1.00
Cylinder power is +3.00

THE NUMBER LINE

As pictured below, if we travel from –2.00 to +1.00 on the number line, we are traveling plus three units, or +3.00 diopters.

STEPS TO MANUAL LENSOMETRY: CENTER BIFOCAL SEGMENT IN THE LENSMETER

- Step 7: CENTER BIFOCAL SEGMENT IN THE LENSMETER
  - Reposition the lens and center the mires of the bifocal in the crosshairs of the reticle. (They may not align perfectly, and that's ok.)

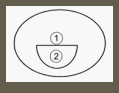
Ideal
vs
Reality

STEPS TO MANAL LENSOMETRY: REFOCUS THE SINGLE LINE AND NOTE THE READING FROM THE POWER DRUM

- Step 8: REFOCUS THE SINGLE LINE AND NOTE THE READING FROM THE POWER DRUM
  - Rotate the power drum until the thin line comes into focus.
  - (Note the measurement on the power drum. You will need this "3rd reading" to determine the bifocal add power.)
  - The bifocal add power is the difference between the 1st reading (Sphere Power) and the 3rd reading (Bifocal Power).

MEASURING A MULTIFOCAL LENS – LINED BIFOCAL OR TRIFOCAL

- When measuring the distance correction of a bifocal lens, we want to measure the lens at the optical center.
- The optical center of a conventional bifocal is just above the center of the horizontal line of the bifocal (1).
- The add power is read through the center of the bifocal segment (2).
- The middle section (intermediate) of a trifocal is always 1/2 the power of the lower (reading) section (we do not have to read this section)



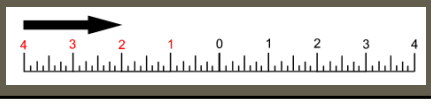
CALCULATING THE BIFOCAL POWER

The difference between your sphere power (1st reading) and the reading on the bifocal power (3rd reading) is your ADD power

Example: 1st reading = -4.00
3rd reading = -2.00
ADD power is +2.00

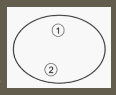
USE THE NUMBER LINE

- The add power is the distance traveled on the number line.
- From -4.00 (Sphere lines/Distance Segment) to -2.00 (Bifocal Segment) is 2 units in the positive direction on the number line.
- Therefore the add power is +2.00.
- The Add Power is recorded as: **Add +2.00**



MEASURING A MULTIFOCAL LENS - PROGRESSIVE

- There are no segment lines to guide us when trying to read a progressive lens. There are markings on the lens, but they are not always easily seen. The distance correction is read from the upper/central area of the lens (1). The add power is read through the lower/nasal area of the lens (2)
- The reading add power is engraved on the progressive lens
- This number is sometimes visible on the temporal area of the lens, slightly below center.
- The number is typically abbreviated, e.g. "22" means an add power of +2.25.
- It is not unusual to read the add power on the lensometer as being lower than what is engraved on the lens



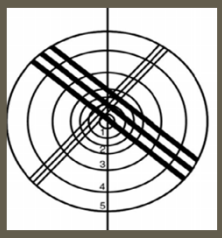
PROGRESSIVE LENS TIP

The ADD power is etched in the lens

STEPS TO MANUAL LENSOMETRY: MEASURING PRISM

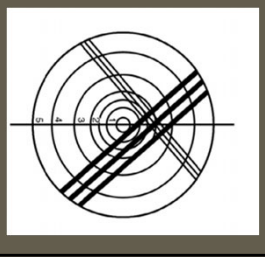
- Step 9: MEASURING PRISM
- Prism is present when the mires cannot be centered on the central part of the reticles.
- Each black concentric ring represents 1 prism Diopter (1Δ). Count the number of circles from the center of the reticle to the center of the crossed mires.
  - Displaced towards the nose (nasally), then it is Base In prism (BI).
  - Displaced towards the temple (temporally), then it is Base Out prism (BO).
  - Displaced superiorly, then it is Base Up prism (BU).
  - Displaced inferiorly, then it is Base Down prism (BD).

MEASURING PRISM – RIGHT EYE



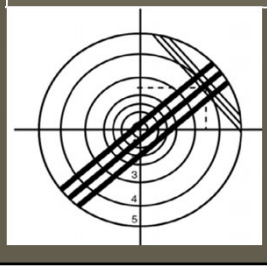
1Δ BU

MEASURING PRISM – RIGHT EYE



2Δ BI

MEASURING PRISM – RIGHT EYE



4Δ BI, 4Δ BU

TRANSPOSITION

- 1) Sphere is sum of sphere and cylinder powers,
- 2) Change the axis from plus to minus or vice versa
- 3) Flip axis 90 degrees

- Transposing from plus to minus
- Ex: -2.00 +1.00 x 090 becomes -1.00 -1.00 x 180

- Transposing from minus to plus
- Ex: +3.00 -2.25 x 075 becomes +0.75 +2.25 x 165

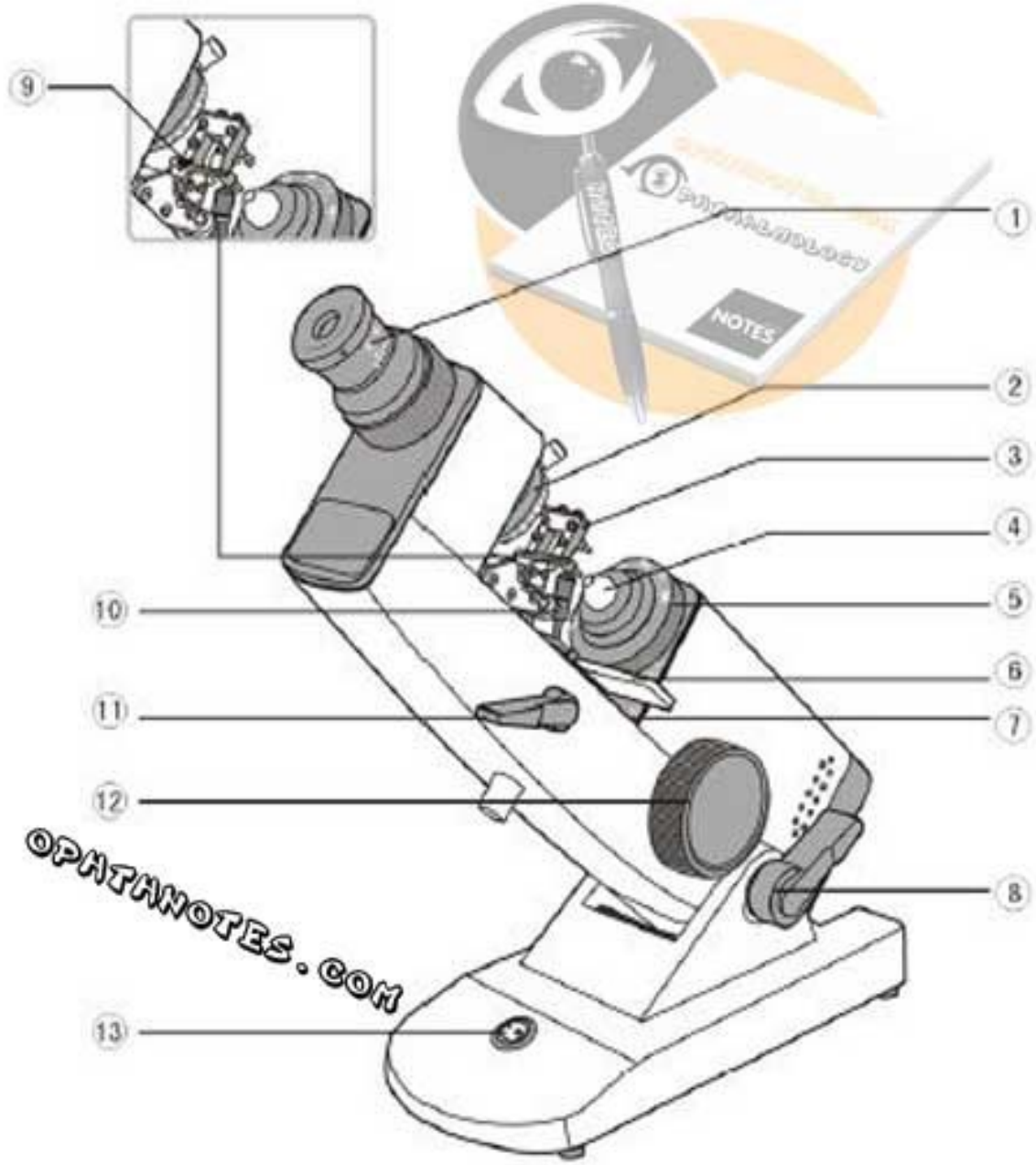


Fig.2

① .Eyepiece
* ② .Prism compensation device
③ .Lens pressing unit
④ .Objective lens bearing seat
⑤ .Astigmatism axis measuring hand wheel
⑥ .Lens pushing board
⑦ .Diameter ruler
⑧ .Device inclination lever
⑨ .Marking unit
⑩ .Ink pad
⑪ .Lens pushing unit
⑫ .Diopter measuring handwheel
⑬ .Power switch

MANUAL LENSOMETRY PLUS CYLINDER

Single Vision Glasses

- Focus eye piece
- With outside of glasses facing you, center the right lens in the middle of the cross hairs.
- With one hand on the axis wheel and the other hand on the power knob, turn the power knob away from you to high minus. Now turn the power knob towards you bringing the thin lines in focus first. The power in which the thin lines come in focus, is the amount of the sphere. Example: -1.00
- **NOTE: if the thick lines come in focus first, rotate the axis 90 degrees away and then bring the thin lines in focus.** Now note when the thin lines come in focus.
- Continue to turn the power knob towards you (adding plus power) until the thick lines are in focus, the amount of cylinder is the difference between where the thin lines come in focus and where the thick lines come into focus. The sphere is written first, the amount of cylinder power that is needed is the second number and the axis where the cylinder is needed is the third. Example: -1.00 +0.50 x 90.

Bifocals and Trifocals

- Center the glasses directly above the bifocal/trifocal segment and read the power. You will use the same process as described above for single vision glasses.
- To find the power that is in the bifocal segment, bring the thin lines in focus as the segment is centered in the lensmeter. The difference from where the thin lines came in focus at the top and where they come in focus in the segment is the amount of add or bifocal power. The trifocal power is generally half of the bifocal power. Example: -2.00+1.00x75 is the distance power. Since the thin lines at the top come in focus at -2.00 and the thin lines at the bottom come in focus at +1.00, the add power is +3.00.

Progressive Lenses

- Read the distance power the same as above but make sure to read them very high at the top of the glasses. They will not be centered as they were for SVL. In progressives, the distance correction is at the top and gradually plus power in added as you move down the lens towards the bottom.
- To read the add you can have the outside of the glasses facing you and hold glasses up to the light and read the etching on the lenses or use the green machine to read the etching.

Additional Notes

- If you have difficulty centering lenses, there may be prism in them. This is measured by the concentric circles inside the lensmeter. In order to read accurately though , the optical centers on the glasses need to be marked while the patient is wearing them and then prism is read as they are centered on the lensmeter by the dot.
- If you are not sure if there is an add, get the thin lines in focus at the top of the glasses and bring the glasses upwards and see where the thin lines come into focus at the bottom. If the thin lines blur at the bottom, then there is an add since the power is different from the top.