HEALTH
UNIVERSITY OF UTAH

MORAN
EYE CENTER

Manual Lensometry

1) the eyepiece; 2) the reticle or target adjustment knob; 3) the prism compensator; 4) the lens marker; 5) the gimbal or lens holder; 6) the eyeglass table; 7) the magnifier; 8) the axis adjustment wheel; 9) the filter control; 10) the inclination control; 11) the power drum; 12) the eyeglass table control.

Purpose:
Neutralize glasses by measuring sphere, cylinder, axis, prism, and optical center.
Equipment:
Lensmeter or focimeter (Lensometer is a brand).
Notes:
Use plus cylinder format. Identify single vision or multifocal lenses first.
Cautions:
Clean lenses to ensure accuracy. Scratches may affect readings, especially on progressives. Consult a technician if unsure. Avoid excessive eyepiece rotation to prevent accommodation errors.

Testing Process:

Turn on the lensmeter.
Focus the eyepiece:
- Set the power wheel and prism compensation to zero.
- Turn the eyepiece fully counterclockwise, then slowly rotate clockwise until the reticle is just clear.
- Adjust the power wheel into plus until the mires blur, then slowly reduce power until the mires are in focus.
- Avoid oscillating the power wheel back and forth to prevent accommodation.
- If the power wheel doesn't read zero at focus, refocus the eyepiece and recalibrate.

Mires:
- Single Line: Thin, closely spaced triple lines.
- Triple Line: Thicker, widely spaced triple lines.

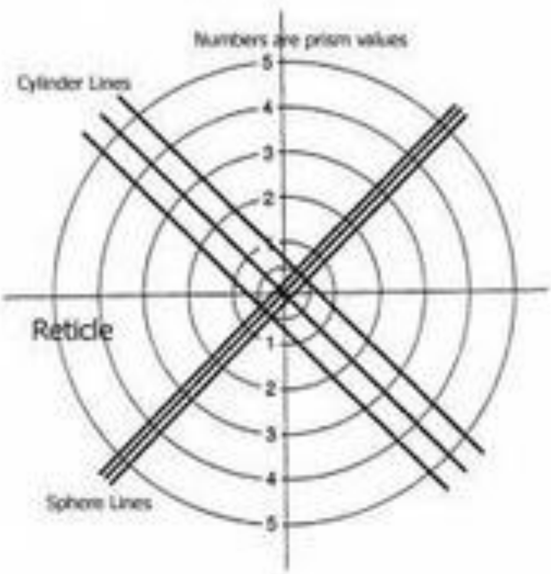
Position the glasses:
- Place glasses on the stage with the right lens aligned to the lens stop, temples facing away.
- For high plus lenses (e.g., aphakic), temples should face toward you.

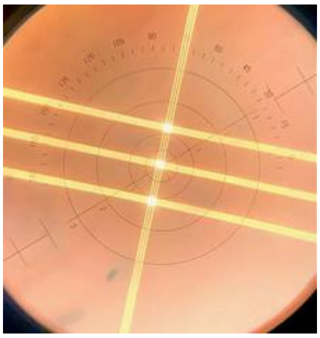
- Ensure both lenses rest flat on the stage to keep the glasses aligned. If the frame is bent or misaligned, hold it level to avoid incorrect astigmatism axis readings.
- Use the lever to center the mires in the reticle, then lock the lens in place with the gimbal.

Measuring spherical lenses (plus cylinder format):

- Turn the power drum to a strong minus value (~-10.00 or lower for more minus lenses).
- Slowly turn the power drum toward plus while using the cylinder axis wheel to focus and align the single line sharply.
- Adjust the lens position on the stop to center the target if needed—lift the lens holder slightly to avoid scratches.

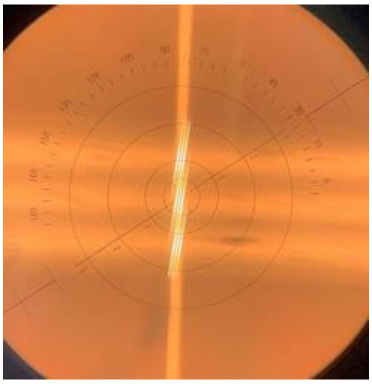
When looking into the eyepiece, you will see the Sphere Line mires and the Cylinder Line mires. If both sets of mires focus simultaneously, it's a spherical lens. Read and record the power from the power wheel (black = plus, red = minus) to the nearest ¼ diopter.



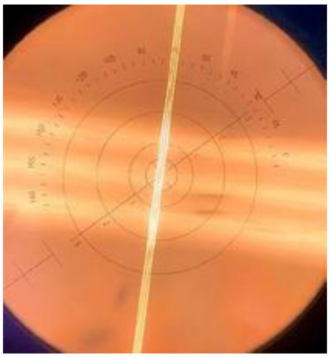
 

The power of this lens would be recorded as **-1.50 sphere**

Measuring a sphero-cylindrical lens:
If both sets of mires don't focus simultaneously or the lines appear broken, the lens is sphero-cylindrical. Focus each set of mires separately.

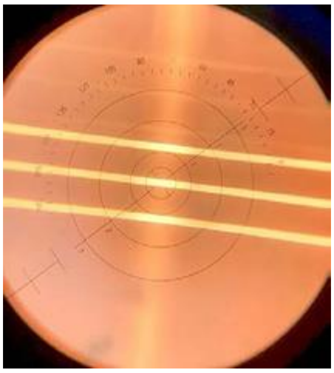


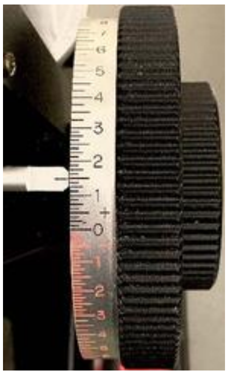
1. Focus the single line (thin mires) by adjusting the power drum and axis wheel until the lines are sharp and unbroken. Record this power as the sphere.
2. Turn the power drum toward plus until the triple line (thick mires) is in focus—no axis adjustment needed.
3. If the triple line doesn't focus at a higher plus (or less minus), rotate the axis wheel 90° and refocus the single line.
4. Note the triple line power, then calculate the cylinder power as the difference between this and the sphere.
5. Record the axis from the axis wheel.
6. Enter sphere, cylinder, and axis values in Epic, ensuring all plus/minus signs are correct.



SPHERE:
-1.50

Turn the Power Drum towards you (counter clockwise)





CYLINDER:
+3.00

(the difference between -1.50 and +1.50)

AXIS:
164

The prescription of this pair of glasses would be recorded as: -1.50 +3.00 x 164

Determining Optical Center:

1. Position the glasses on the lensometer as before.
2. Focus the single line (thin mires) and center them in the reticle.
3. Use the lensometer's marker to mark the optical center, or mark it manually if unavailable.

Place the glasses back on the patient and confirm the optical centers align with their pupils.
Alternatively, mark the pupil centers on the glasses while worn, then compare these marks to the optical centers measured on the lensometer.

Measuring bifocal (add) power:

After measuring the distance portion, center the bifocal segment on the lens stop. You may need to hold the glasses steady to prevent scratches, and mires may be off-center but must remain visible.

Lock in place with the gimbal if possible.

Turn the power drum toward you (more plus) until the thin mires are focused. If the cylinder power exceeds the add power, turn the drum away from you instead.

Note the power drum reading (do not record this number).

Calculate the bifocal power by subtracting the initial sphere reading from this reading.

Example:	First reading (single line in focus)	= -1.50
	Bifocal reading (single line in focus)	= +0.50
	Difference is bifocal power	= **+2.00**

You may also determine the bifocal power by turning the power drum towards you until the fat lines are in focus again and then determining the difference between the second power drum reading (fat lines in focus) and the current one. The bifocal power will be the same. As long as you determine the difference between the readings of the same line type (skinny to skinny and fat to fat) your bifocal power will be correct.

Example:	Second reading (fat lines in focus)	= +1.50
	Bifocal reading (fat lines in focus)	= +3.50
	Difference is bifocal power	**= +2.00**

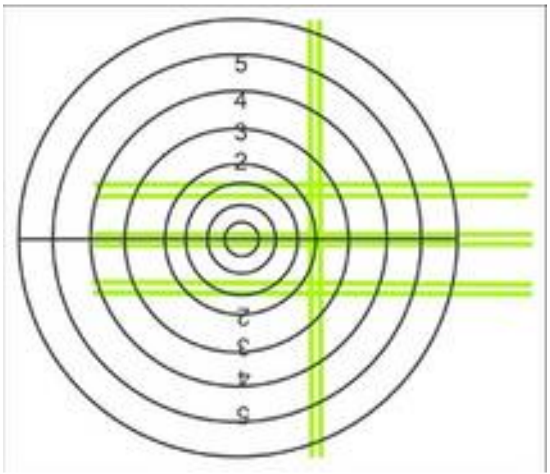
Record the bifocal power in the appropriate box in Epic

For high-power bifocals, it's best to place the glasses with temples facing you to read the bifocal segment.
If the distance portion is spherical, record the difference between the sphere reading and the bifocal reading when thin and thick mires focus together.
For trifocals, the middle segment power is assumed to be half the bifocal add (e.g., +2.50 bifocal means +1.25 trifocal). To manually measure trifocal power, center that segment and follow bifocal reading steps.

Measuring Prism:
Measure prism only at the point on the lens aligned with the patient's pupil (mark this spot first).
Use the reticle to determine prism amount and base direction, up to 5 prism diopters.
- Mires displaced up = Base Up (BU)
- Mires displaced down = Base Down (BD)
- Mires displaced toward nose = Base In (BI)
- Mires displaced toward temple = Base Out (BO)

To measure amount, count concentric rings from center to where mires intersect:
- First ring = ½Δ (usually unlabeled)
- Subsequent rings = 1Δ each (rings 1 to 5 often labeled)

Measure prism where the single and triple mires intersect. For high cylinder lenses, alternate focus to find the intersection point.



If this were the right lens the prism would be 2Δ BI.

If this were the left lens the prism would be 2Δ BO.

Measuring Prism with Prism Compensating Device (PCD):

If mires aren't visible, use the PCD to measure prism.

- For vertical displacement:
- Rotate the PCD knob clockwise for base down or counterclockwise for base up until mires center in the reticle.
- For horizontal displacement:
- Turn the knob to 180°, then rotate to center the mires.
    - If mires move from bridge to temple → Base In (BI)
    - If mires move from temple to bridge → Base Out (BO)

Record the amount of prism from the prism compensation knob, and note the direction of the base in the appropriate box in Epic.

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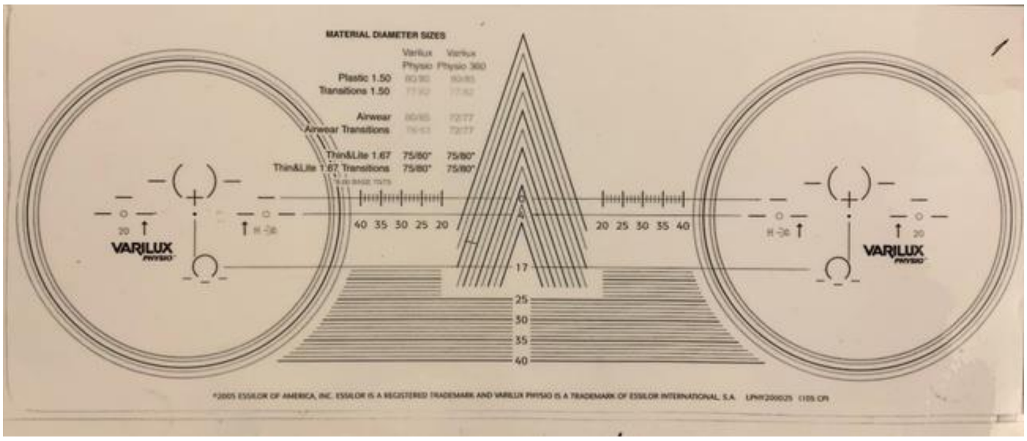
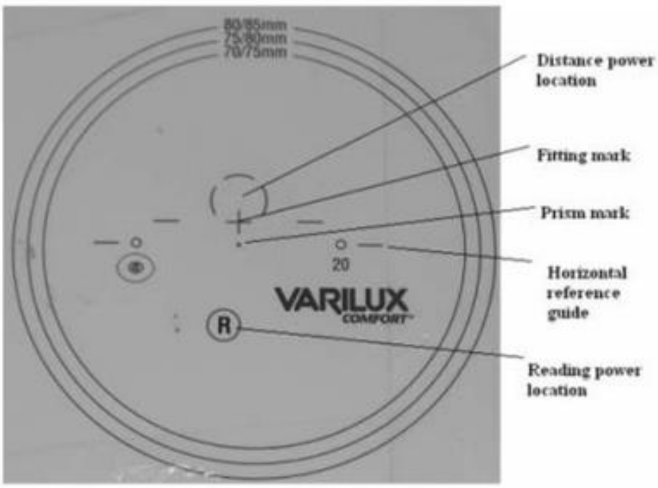
Measuring Progressive-Add Lenses (PALs):

Unlike bifocals/trifocals, PALs have no visible line dividing distance and reading zones, requiring a different lensometry method.

- Look for etched markings in the mid-lower temporal corners of each lens—these indicate the add power.
- Use the etching to determine the add; visibility may vary by manufacturer.
- A lighted magnifier may help locate faint etchings.
- Use a progressive lens template to identify where to measure the distance and near portions accurately.



Progressive Lens Template



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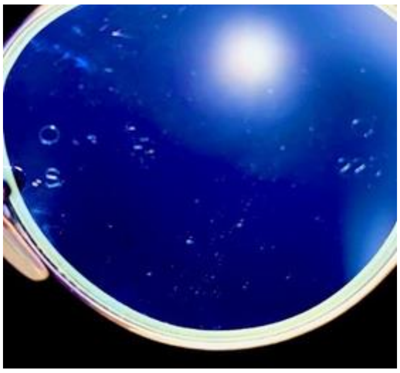
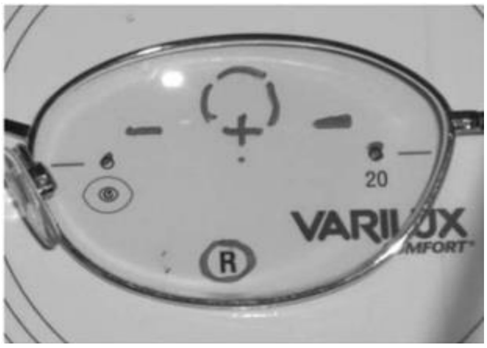
HOW TO USE A PROGRESSIVE LENS TEMPLATE

1. Locate bifocal power on temporal side of lens. Just above it, mark the circular etching with a Sharpie or grease pencil. Directly across from that etching, on the nasal side, should be a similar circular etching. Mark that one, as well.

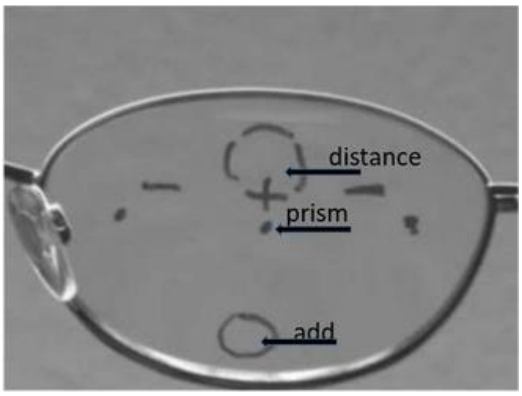


2. Place lens on template, and align markings with those on the template

3. Use a marker to trace the other template markings onto the lens



4. Place spectacles on lensometer and read from the designated spots:



NOTE: Read the distance Rx from the circle, not the “+” sign

Transposition:

There may be times when a glasses Rx is not written in plus cylinder. Listed below are the steps to change a minus cylinder Rx to a plus. *The same steps are done to turn a plus cylinder Rx to minus cylinder.*

Algebraically add the cylinder power to the sphere power. This is your new sphere power.

Change the sign of the cylinder, (-) to (+) or (+) to (-). Do not change the power of the cylinder, as that stays the same.

Change the axis by 90°. If the axis is 90° or less you will add 90. If the axis is 91° or more you will subtract 90.

Transposition Examples:

Starting Rx: -2.50 + 1.00 x 085

<u>Step 1:</u> Add the CYL to the Sphere (-2.50+1.00) = -1.50

<u>Step 2:</u> Change the sign of the CYL (+1.00) = -1.00

<u>Step 3:</u> Add or subtract 90 from the Axis whichever is applicable to stay between 0 and 180 (085+090) = 175

New Rx Transposed Rx: -1.50 - 1.00 x 175

Done in reverse

Starting Rx: -1.50 -1.00 x 175

<u>Step 1:</u> Add the CYL to the Sphere (-1.50-1.00) = -2.50

<u>Step 2:</u> Change the sign of the CYL (-1.00) = +1.00

<u>Step 3:</u> Add or subtract 90 from the Axis whichever is applicable to stay between 0 and 180 (175-90) = 085

Documentation:

When documenting glasses prescriptions it is best to ALWAYS write in three digits. That will help if there is any confusion, especially when handwriting them. When it comes to handwriting the numbers, sometimes our periods (.) aren’t distinct and that can lead to trouble deciphering a prescription. Using three digits helps with clarification.

-0.50 vs -.50
-1.00 vs -1.0

090 vs 90

Some computer systems are designed to have a 3 digit axis for glasses prescriptions, so if you do not put a third digit it will just put a ‘0’ there, turning 10 into 100. There is a large difference between 10 and 100, and could make for a large error in the making of the glasses. Currently, Epic does not have this feature, but it is best to treat it as though it does because it may in the future.

Documenting lensometry in Epic is done under “Wearing (WRx)” under the “Refraction” tab in the Ophthalmology Exam.

You may also document any notes in the ‘Note’ section.