I. Transposition

1. Change the axis by 90 degrees
2. Change the sign of the cylinder
3. Combine the sphere with the cylinder

**EXAMPLE**

Rx: -1.00 +2.00 x 180

1. Change the axis by 90 degrees
   180-90 = 90
2. Change the sign of the cylinder
   +2.00 becomes -2.00
3. Combine the sphere with the cylinder
   -1.00 combined with +2.00 = +1.00

**HELPFUL HINTS**

Think about the numbers as if the first one is the balance in your checkbook and the second one is either a deposit (+) or a debit (-)

**PRACTICE**

1. Rx: +2.50 +1.25 x 060
2. Rx: -1.00 +1.75 x 080

II. Spherical Equivalent

1. Combine ½ of the cylinder power to the sphere
2. Drop the axis

**EXAMPLE**

Rx: -1.00 +1.00 x 180

1. Combine ½ of the cylinder power to the sphere
   (+1.00 / 2) = +0.50 Combined with -1.00 = -0.50
2. Drop the axis
   Spherical equivalent is: -0.50 sphere

**PRACTICE**

Rx: +2.00 -0.50 x 090

III. Reading Prescription
1. Combine the add power with the sphere power. The cylinder and the axis stay the same.

**EXAMPLE**
Rx: -1.00 +1.00 x 180 Add +1.25
1. Combine the add power with the sphere power. The cylinder and the axis stay the same.
-1.00 (sphere power) combined with +1.25 (add) =+0.25
Reading Rx: +0.25 +1.00 x 180

**PRACTICE**
What is the reading glasses prescription for the following?
+1.00-1.25 x 180
+1.25 -1.00 x 175
Add +2.00

---

IV. Meters to Feet/Feet to Meters

1. Meters to Feet
   1 m = 3.28 ft.
   Divide denominator by 3
   6/6 (6/3=2) so 6/6=20/20
   6/9 (9/3=3) so 6/9=20/30

2. Feet to Meters
   Just do the opposite
   Multiply denominator by 3
   20/20 (2x3=6) so 20/20=6/6
   20/30 (3x3=9) so 20/30=6/9

**PRACTICE**

<table>
<thead>
<tr>
<th>Feet</th>
<th>Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>20/80</td>
<td>6/12</td>
</tr>
</tbody>
</table>

---

V. Converting Focal Length into Diopters

Formula: D=1/F
D=power of lens in diopters
F=focal length in meters

**EXAMPLES**
Lens with focal length of 1 m = 1/1 = 1.00 D
Lens with focal length of 2 m= 1/2 = 0.50 D
Lens with focal length of 4 m= 1/4 = 0.25 D

**PRACTICE**
What is the dioptric power of a lens with a focal length of .5 m?
VI. The Optical Cross

- A spherical lens has one power.
- A spherocylindrical lens has one spherical and one cylindrical surface, giving it 2 radii of curve (unequal power).
- An optical cross is used to illustrate the powers of a spherocylindrical lens.
- Remember: The power of the cylinder is found 90 degrees away from the placement of the axis.

\[
\begin{align*}
+3.00 & \quad +1.00 & \quad +4.00 \\
+3.00 & \quad 0 & \quad +3.00 \\
Rx: & \quad +3.00 +1.00 \times 180
\end{align*}
\]

\[
\begin{align*}
-4.00 & \quad 0 & \quad -4.00 \\
-4.00 & \quad +1.00 & \quad -3.00 \\
Rx: & \quad -4.00 +1.00 \times 090
\end{align*}
\]

**PRACTICE**

\[
\begin{align*}
-1.00 & \quad +1.00 & \\
-1.00 & \quad 0 &
\end{align*}
\]

Rx:
VII. Prentice’s Rule

- If the patient is not looking through the optical center of a lens that has power, they are looking through prism
- Prism = Power x Decentration in cm
  - Prism = lens power (in diopters) multiplied by D in cm
    (Where D = amount the patient PD varies from the major reference point in cm)
- Plus lens-decentration shifts with the lens
  - Lens decentered out/induced prism is BO
- Minus lens-decentration shifts opposite from the lens
  - Lens decentered out/induced prism is BI

EXAMPLE
-4.00 (power) x .5cm (decentration in cm) = 2 prism diopters

PRACTICE
Rx: OD: +11.00 Sph
    OS: +12.00 Sph
The optical centers are both displaced 4 mm temporally (out)
How much decentration?

VIII. Low Vision Calculations

- To find the dioptric power of a magnifier, multiply the X power by 4.

EXAMPLE
A magnifier that is 10x would be 40 diopters (10 x 4 = 40)
To figure the distance that a magnifier should be held from the page to get the clearest image:
- Convert the diopters to X by dividing by 4
- Divide this number into 1

**EXAMPLE**
Where should a 20 D magnifier be held for clearest vision?

\[
\frac{20}{4} = 5 \times \\
\frac{10}{5} = 2 \text{ inches}
\]

**PRACTICE**
Where should a 2x magnifier be held to achieve the clearest vision?

What is the dioptric power of a 2x magnifier?

**IX. Test Height Calculations**

- The 20/400 E should be 88 mm in height if patient is 20 feet away.
- What if patient is 17 feet away?

**EXAMPLE**

\[
\begin{align*}
20 \text{ ft} & \quad 17 \text{ ft} \\
88 \text{ mm} & \quad X \text{ mm}
\end{align*}
\]

<Cross multiply>

88 times 17 equals 1496

<Divide each side by 20>

X equals 74.8

**PRACTICE**
What if the patient is 15 feet away?