

The Optical Cross 2015

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Create a number line

10 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 10

Insert 3 hash marks between every number

Determining cylinder power

- Two questions should be asked to determine the cylinder power:
 1. In what direction on the number line is travel occurring (on the number line) from the sphere to the cylinder (either in the negative direction or in the positive direction)?
 2. What is the distance traveled from the sphere to the cylinder power (the amount of cylinder present in the prescription)?

Continuing Ed Opportunity

- **Online Continuing Education Program**
Continuing education (CE) allows the Paraoptometric to stay current within the eye care field and is especially important in the study of direct patient care and office competency. Additionally, certified paraoptometric must obtain 18 hours of CE credit from approved education providers to maintain certification designation. The Paraoptometric Section (PS) provides FREE 6 articles each year (one every other month) for PS members that are worth one hour of CE. You read the article, successfully answer the exam questions, and you will receive your CE slips by mail.
- The following articles were designed to cover a broad scope of patient issues ranging from patient care, disease treatment, to ophthalmic dispensing. Participants should review each article and complete the accompanying continuing education examination. Each accurately completed examination is worth one hour of paraoptometric continuing education credit. The corresponding CE exams expire December 31, 2008. **Please allow four to six weeks to receive proof of CE.**

Answers on presentation

- Some of the answers in this presentation are intentionally incorrect, so be prepared to defend your answers...

Optometric Math

- **ALGEBRAIC ADDITION**
- Algebraic addition is simply combining two or more numbers together. If you always think of algebraic addition in terms of dollars and cents you probably won't make any mistakes. It's really amazing that people who are terrible in math always seem to know their bank balance or how much change they should get back from a purchase. Throughout this section the examples will be explained mathematically and where possible, monetarily

Math Rules

- These two rules may be compiled into a table that should be memorized.

- | | |
|--------------------|------------------|
| • $+ \times + = +$ | - $\times + = -$ |
| • $- \times - = +$ | - $\div + = -$ |
| • $+ \div + = +$ | - $\div - = +$ |

Prescriptions: Optical Cross

- **Optical cross is a diagram that denotes the dioptric power in the two principal meridians of a lens.**

Hint: Think of the value of the numbers as they are read off of the lensmeter wheel.

Optical Cross Steps

- Step 1 draw a number line - +
3 2 1 0 1 2 3
- Step 2 read the question (plus or minus cylinder)
- Start in the direction of the less power...document it
- Document the axis of this power
- Calculate the distance traveled from set number to termination

Prescriptions: Optical Cross

• Optical Cross Example



Plus cylinder notation:

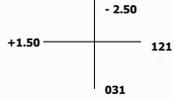
$$+3.00 +2.00 \times 090$$

Minus cylinder notation:

$$+5.00 -2.00 \times 180$$

Hint: The sphere is "married" to the axis; the cylinder is the distance between the numbers on the cross

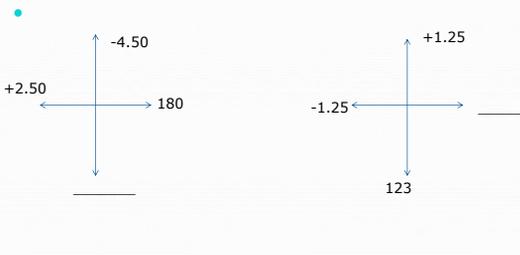
Optical Cross



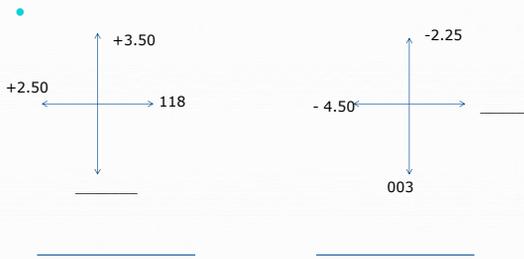
- To take an RX off the Optical Cross in **Minus Cylinder Form**:
- Step 1 Start with the most plus sphere power (use your number line)
- Step 2 Your axis is "married" to your sphere
- Step 3 Your cylinder is the distance traveled between the sphere and number 90 degrees away

Find the answers to the above equations

Take off the Cross



Take off the Cross in +/-



Put on the Cross



Put on the Cross



Axis Rule

- Note: Optical meridians (axis) can only lie between 0 and 180 degrees.
- Example: The following prescription will be placed on the cross: -2.00 -1.50 X 180

Advanced Optical Cross

- There is a very basic formula used on the basic National Opticianry Competency Examination (NOCE) to calculate power in meridians other than the 2 principal ones.

It goes like this:

At axis, 0% of the cyl is in effect.

30 degrees from the axis, 25% of the cyl is in effect.

45 degrees from the axis, 50% of the cyl is in effect.

60 degrees from the axis, 75% of the cyl is in effect.

90 degrees from the axis, 100% of the cyl is in effect.

Other than those, you'll need a calculator or excellent math skills, but you won't find these harder questions on the basic NOCE. You will find them on the Advanced NOCE. Wes.

Prescriptions: Transposition

• Transposition

- Step 1 = Combine the sphere and cylinder power mathematically
- Step 2 = Change the sign of the cylinder
- Step 3 = Change the axis by 90 degrees

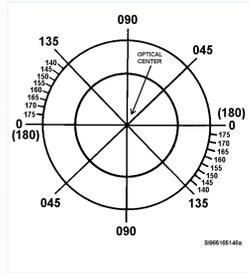
Hint: When combining positive and negative numbers, think in terms of money. Example: -2.00 combined with +0.50 If you are \$2.00 "in the hole" and you deposit \$0.50, what is your balance?

Answer: \$1.50 "in the hole", or -1.50.

Components of an Optical Prescription

- Axis

- The number in the axis block indicates where the sphere meridian is located on a 180° circle



Prescriptions: Transposition

- -1.00 +2.00 X 160
- +1.25 -0.75 X 030
- Plano +1.00 X 090
- +1.00 -2.00 X 070
- +0.50 +0.75 X 120
- +1.00 -1.00 X 180

Transposition Examples

1 Minute Optical Cross



- To take an RX off the Optical Cross in **Minus Cylinder Form**:
- Step 1 Start with the most plus sphere power (use your number line)
- Step 2 Your axis is “married” to your sphere
- Step 3 Your cylinder is the distance traveled between the sphere and number 90 degrees away

Find the answers to the above equations, you 1 minute

Transposition 1 Minute Drill

- Step 1 = Combine the sphere and cylinder power mathematically
- Step 2 = Change the sign of the cylinder
- Step 3 = Change the axis by 90 degrees

- 1. + 1.75 - 0.75 X 030
- 2. - 2.25 + 1.00 X 170
- 3. - 1.75 + 2.00 X 125

Review Questions 3 minutes

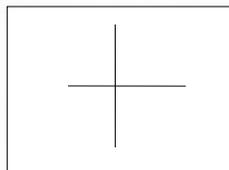
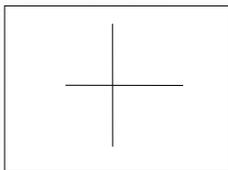
- -1.00 -1.00 x 090 transpose
Answer_____
- - 0.50 -2.00 x 008 transpose
Answer_____
- -1.00 -1.50 x 160 transpose
Answer_____
- - 5.00 -3.00 x 088 transpose
Answer_____
- -3.00 -1.50 x 095 transpose
Answer_____
- - 2.50 + 1.50 x 103 transpose
Answer_____
- -1.00 + 0.50 x 162 transpose
Answer_____
- + 2.50 + 2.50 x 103 transpose
Answer_____
- -2.50 + 1.00 x 029 transpose
Answer_____

Review Questions 1 minute drill

- Put the following Rx on the Optical Cross

-2.00 -1.00 x 080

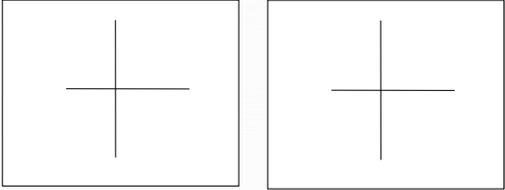
-3.00 - 2.50 x 107



Review Questions

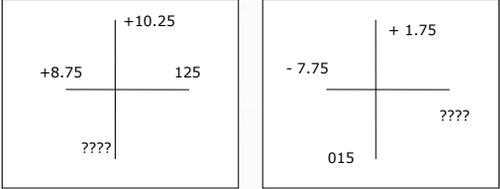
Place the following Rxs on the optical cross

+ 2.75 - 1.25 X 112 - 8.25 - 2.25 X 179



Review Questions

Remove the following Rxs from the optical cross



Review Questions 90 Seconds

- Give the spherical equivalent to the following prescripts

-2.00 -1.00 x 080 Answer _____
 -1.00 -2.00 x 010 Answer _____
 +2.00 -1.00 x030 Answer _____
 -3.00 - 0.50 x 070 Answer _____
 +3.00- 1.00 x 060 Answer _____

Review Questions

- Convert the following Rx to Near Vision Only aka NVO, SVN, reading glasses

<ul style="list-style-type: none"> -2.00 -1.00 x 080 -1.50 -2.00 x 180 +3.00 OU Answer _____ 	<ul style="list-style-type: none"> -4.00 -0.25 x 090 -1.00 -0.50 x 098 +2.00 OU Answer _____
<ul style="list-style-type: none"> -1.00 -0.50 x 010 -2.00 -0.75 x 100 +1.25 OU Answer _____ 	<ul style="list-style-type: none"> +2.50 -1.00 x 090 +1.00 -0.75 x 180 +2.25 OU Answer _____

Review Questions 1 minute drill

- Transpose the following Rx from *plus cylinder form* to *minus cylinder form*

<ul style="list-style-type: none"> -2.00 +1.00 x 090 Answer _____ 	<ul style="list-style-type: none"> -1.00 +3.00 x 070 Answer _____
<ul style="list-style-type: none"> -1.00 +1.50 x 010 Answer _____ 	<ul style="list-style-type: none"> -0.50 +2.00 x 145 Answer _____
<ul style="list-style-type: none"> -3.00 +2.00 x 095 Answer _____ 	

Review Questions 1 minute drill

- Convert the following prescription from *minus cylinder to plus cylinder* format

<ul style="list-style-type: none"> -1.00 -1.00 x 090 Answer _____ 	<ul style="list-style-type: none"> -0.50 -2.00 x 008 Answer _____
<ul style="list-style-type: none"> -1.00 -1.50 x 160 Answer _____ 	<ul style="list-style-type: none"> -5.00 -3.00 x 088 Answer _____
<ul style="list-style-type: none"> -3.00 -1.50 x 095 Answer _____ 	



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Thank you very much
