

# How to do many optical things

(In your Optical Mission Team)

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## 1.0 Objective

This document is meant to be brief and easy to use. It should make it simple and easy to fit a person with glasses and perform several important optical tasks in an Optical Clinic. It is written to be helpful to a person with no previous optical training.

## 2.0 The Human Eye

To the right is a drawing of a human eye. The cornea is in the front of the eye. The lens is behind the cornea and the retina is on the back of the eye.

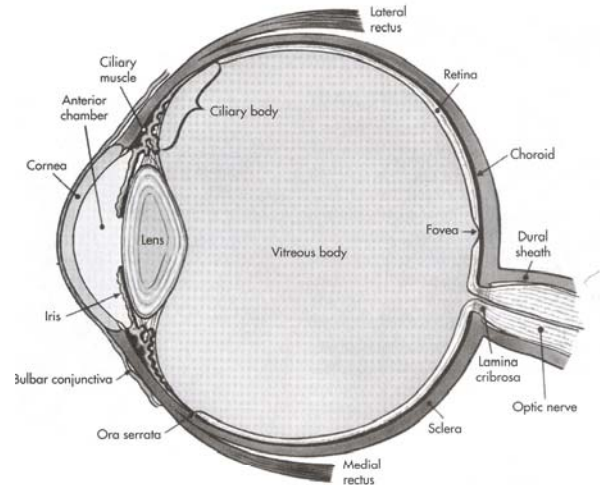
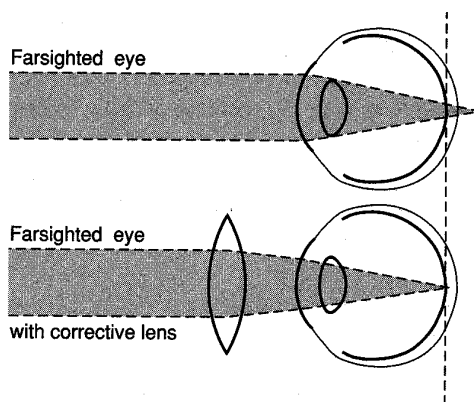


Fig. 1-2 The eye cut in horizontal section.

Below is a drawing which shows a farsighted eye:



In this picture light is coming in from the left and is focusing behind the back part of the eye. The lens refocuses this light to be on the surface of the back part of the eye (called the retina). This is called a “convex” or “Plus +” power lens. You can remember that a “convex” lens sticks out in the center. It makes things look bigger.

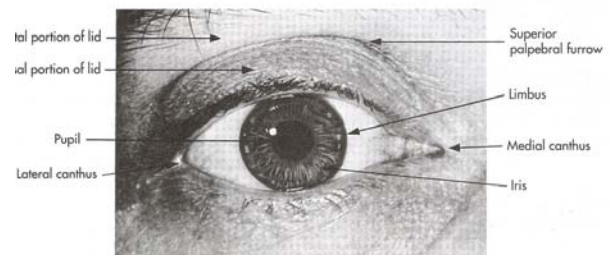
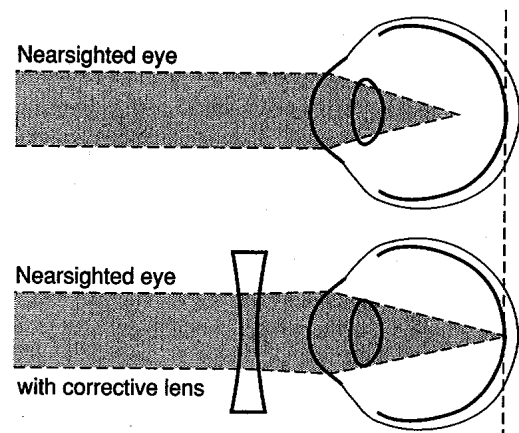
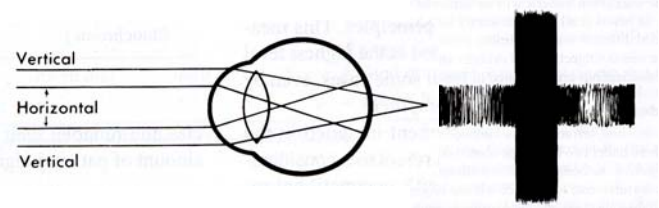


Fig. 1-3 Surface anatomy of the eye.

The picture to the right shows a nearsighted eye. In this case the light comes to focus in front of the retina. The lens moves the focus back to position on the retina. This is called a “concave” or “Minus -” power lens. A “concave” lens will “cave” in or be thinner in the middle. It will make things look smaller.



Another form of eye problem is called “Astigmatism. This is when there is distortion in the shape of the cornea (front of eye) where the eye is no longer like a sphere but instead is like a cylinder or more football shaped. With astigmatism the eyes have 2 focal points which can be in front of or behind the retina or both.



Look at the figure to the right. **Remember that with children, astigmatism is a problem even their very young and powerful eyes cannot fix.**

The Nikon or Righton Autorefractor and the Focometer will measure three shape and size parameters about the eye: Sphere, Cylinder, and Axis.

A “Sphere” is like a world globe (Figure 1). When you measure the Sphere of an eye, you are finding roundness mainly of the back of the eye. Near sighted people have minus, -, and far sighted people have plus, +, spherical power measurements.

“Cylinder” is a measure of how much the eye is shaped like a cylinder or perhaps more so a football or a can (Figure 2). Cylinder measurements are always minus measurements and are a measurement mainly of the front (Cornea) of the eye even though cataracts can induce some cylinder.

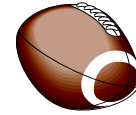
The “axis” is the angle the football or can is turned looking at the face of a clock (Figure 3). Look at the angles that you see on the clock face to the right (or looking into the face of a patient). 90 degrees is 12 o’clock. 180 or zero (0) degrees are on the horizontal (9 or 3 o’clock). The football in Figure 2 is at about 30 degrees. When it is standing on its end, it is at 90 degrees. The can is at 90 degrees of axis.

Cylinder and Axis are a measure of Astigmatism. If cylinder is zero, then there is no Astigmatism and it does not matter what the autorefractor says about axis.

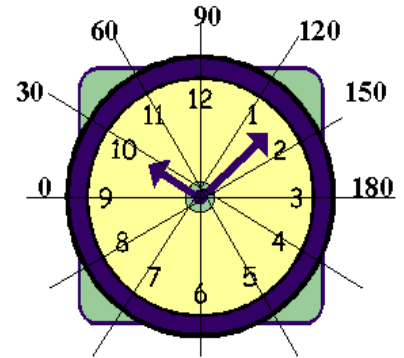
Another problem with the eye is called “presbyopia”. This is shown to the right. It is when the lens of the eye can no longer change shape to allow you to focus on some small print. It is simply “old eyes”. To correct this problem, there is a fourth parameter for glasses which is called “Add”. Add is **Additional** power which has been added to the distance prescription to allow the patient to read the small and close print.



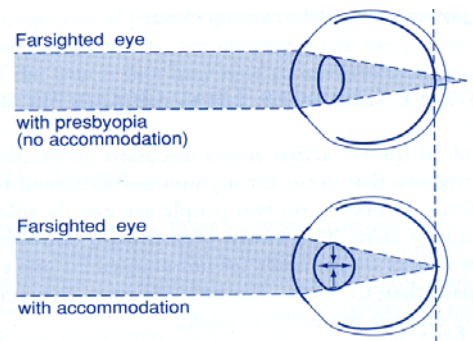
**Figure 1**



**Figure 2**



**Figure 3**



### 3.0 Eyeglasses Correction.

To summarize you have 4 different parameters about the eye which you may need to correct with eyeglasses. **1. Sphere (“+” for farsighted or “-“ for nearsighted)** if there is astigmatism.

**2. Cylinder (- only),<sup>1</sup>      3. Axis (0 -180) only**

and if there is presbyopia.

**4. Add (+ only)**

**REMEMBER:** Sometimes you can give a person with Astigmatism a pair of glasses with only Spherical lens. These are “Spherical Equivalent” lens. This is calculated by the following equation:

$$\text{Spherical Equivalent} = \text{Sphere} + \frac{1}{2} * \text{Cylinder}$$

For example if a patient has the following prescription:

$$\text{Sphere} = +3.50 \qquad \text{Cylinder} = -1.50 \qquad \text{Axis} = 93$$

$$\text{The Spherical equivalent would be: } +3.50 + \frac{1}{2} * (-1.50) = +3.50 - .75 = +2.75$$

Spherical equivalent for astigmatism is rarely helpful unless the cylinder is smaller than -2.00.

The eyeglasses inventory program handles both the add and spherical equivalent calculations for you automatically.

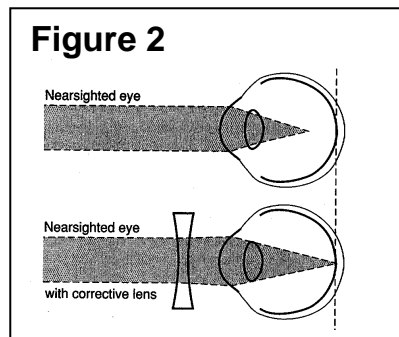
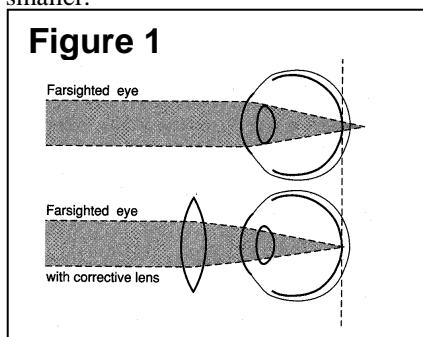
<sup>1</sup> Some Ophthalmologists use “Plus” cylinder notation. However, Kendall Optometry Ministry programs are designed to operate in “Minus” cylinder notation. The Glasses Reader program will allow the entry of “Plus” cylinder notation but it must be converted to “Minus” before storing in the glasses database.

### 4.0 What about reading glasses.

Ordinary reading glass lens are CONVEX (larger in the middle and thinner along the edges). They have “+” (plus) power lens. When they are put in front of a piece of paper they magnify the print on the paper. They are normally used by Farsighted people (See Figure 1). Should we give out of these glasses, we will go to the prescription glasses looking for the proper sizes. The Eyeglasses Inventory Program can assist you in this selection process.

#### GOOD ADVICE

If a person says that he/she cannot read because “my arms aren’t long enough” then the “ordinary” reading glasses will work. However, if the complaint is that they must hold the book very close to their face, then you will need to prescribe “-“ prescription glasses from the prescription inventory to move the reading distance out to 16 inches (40 cm). Minus prescription glasses are used by nearsighted people (Figure 2). When they are put in front of a piece of paper they make the print look smaller.



Typically we get from 400-600 pairs of new reading glasses in the following Diopter strength: + 1.00 +1.25 +1.50 +1.75 +2.00 +2.25 +2.50 +2.75 +3.00 +3.20 +4.00 The intent is to try to have more of the lowest (+1.00, +1.25 needed by young people) and highest (+3.00, +3.20, +4.00 needed by older people) you have fewer of the middle sized numbers. The glasses are placed in boxes or trays as shown below:



The customer will be asked to look at the reading chart (see example in Appendix C). They then try on several different strengths of glasses. You can make a good first guess by selecting the larger strengths for the elderly people, the middle strengths for the middle aged people, and the weakest strengths for the young people. (See “BiFocal Add Chart below from the Glasses Inventory Program.) Should they be able to read the bottom line of the chart holding the chart at a comfortable (16 inch) reading distance, then the glasses selection is acceptable. Note that it is better to have it too strong than too weak.

Look at the reading chart in Appendix C. Note the “+3.00, +2.50, +2.00, +1.50, +1.00” numbers in the side of the chart. This is a suggested power selection if the user can read this line and every line above it. Extrapolate for the other line selections to other sizes like 2.75, 2.25, etc. For example if the patient can read line 6 give them a +2.00. If the patient can read line 4 then give him a +1.50. Follow this procedure and you will fit glasses to a patient very quickly. If the user cannot read any lines on the chart, then you have the following choices:

1. Go to the prescription eyeglasses and choose a NON-astigmatism<sup>2</sup> eyeglass with a bifocal strength higher than +3.20. The computer will help you do this. Suggest that they ignore the top half of the lens. I will typically use a permanent black magic marker to mark over the back/top part of the lens.

OR

2. Construct the proper power using “Instant Eyeglasses” as shown in Figure 3.



BiFocal Add Chart		
From Age	To Age	Add Value
0	37	0.00
38	43	1.00
44	47	1.50
48	55	2.00
56	99	2.50

<sup>2</sup> “Non-Astigmatism” can be defined as any pair of eyeglasses which have a cylinder reading of –1.00 or less. Note that if the Sphere reading is small (like +2.0) then this cylinder reading should be even smaller (-.50 or -.25).

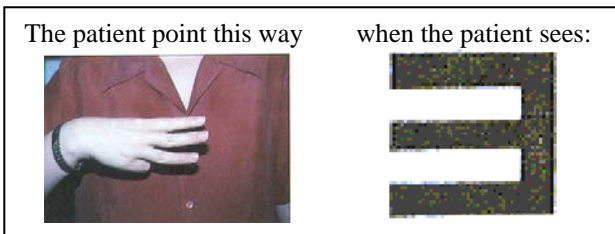
## 5.0 How to use the E-Chart (and other Tests) to measure a patient's eyes.

The E-Chart is shown below. The readings on this chart do not directly provide an eyeglasses prescription for the patient. However, they are an excellent way to measure the current clarity of vision and quantify any improvements made. A reading of 20/20, Red line #7, is desired with this chart. 20/30 is the green line #6 and sometimes might be the very best that you can do.

The E-Chart will be used for those needing distance glasses. It will be used once before and perhaps several times after glasses are fitted (as the prescription is refined). Since you will be directing the patient during the reading of the chart, you should use the laser pointer (see below) to point at the different lines on the chart.

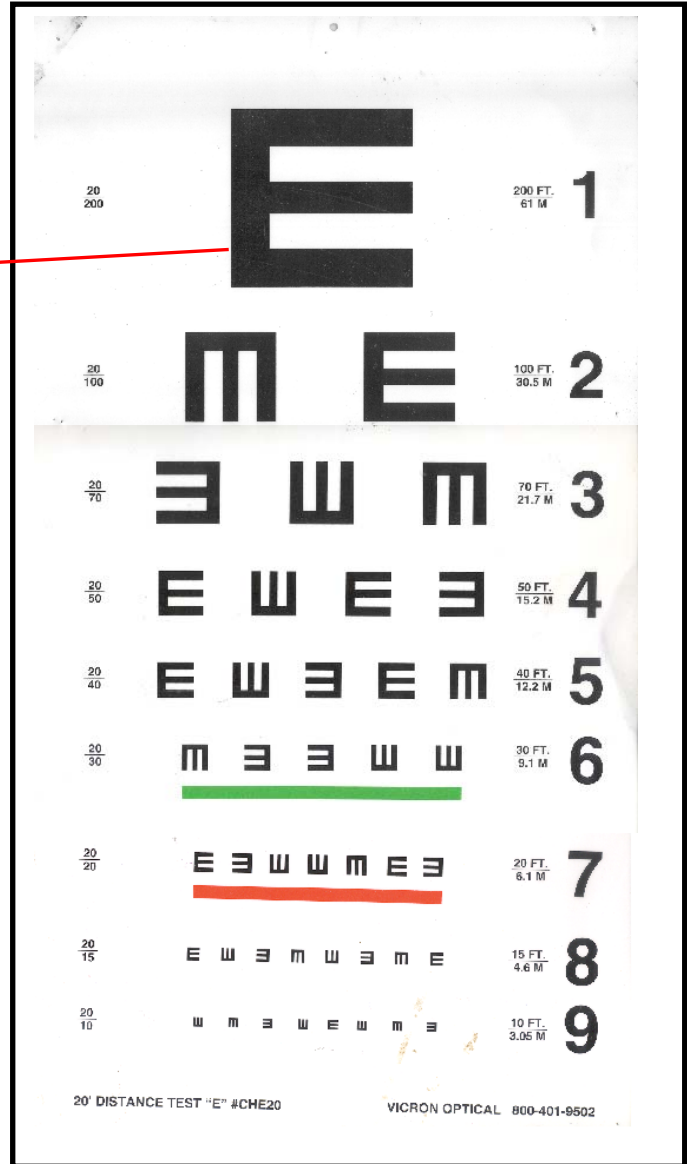


The patient will need to indicate with the hand which direction the E is pointing (as below):



First point to line 4 in the middle of the chart and ask the patient if he/she can see that. If not, go to line 1 and see if he/she can see that. If so, go to line 2 and ask the same question. If the patient says he/she can read line 3, then point at each letter on the line and ask the patient to point with a hand the direction the E is going. After this, record on the Patient Information form the 20/xxx reading for the patient. Add a “-n” after the reading if the patient missed “n” letters on the line. For example you might enter “20/50-2” meaning the patient read the 20/50 line but missed 2 of them. Another way to say it is “20/70+2”.

If the patient cannot see any of the lines, then show him/her the portable chart at 10 feet (instead of 20). Record the results as 10/200 or 10/100. If necessary try again at 5 feet and record the results at 5/200 or 5/100. If that fails then get within 16 inches of their eyes and hold up 3 fingers and ask them how many are showing. Test again with 2 and 1 fingers and record the results.

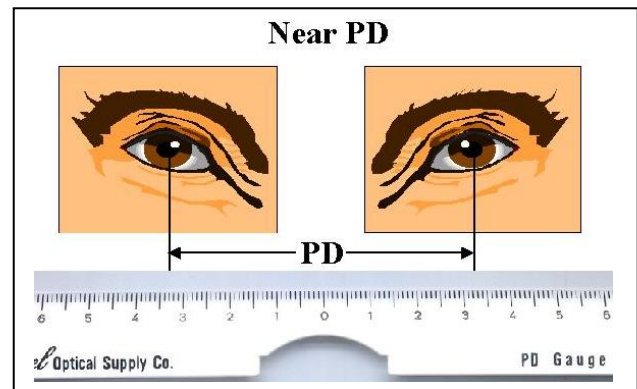


## 6.0 How to measure Pupillary Distance (PD)

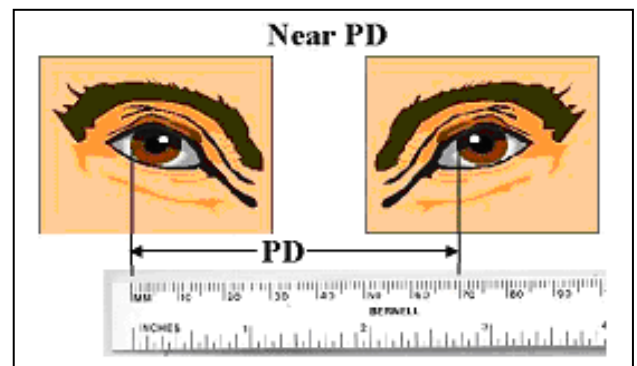
In some cases you may need to measure the PD for a person. Realize that if the glasses have the exact right prescription but the PD is wrong, the patient might either see double or a blurred image. This problem is bigger with more powerful glasses. Measure the PD **every time** before fitting a person with snap-together frames and lens. With used prescription glasses, you might be faster to try another pair rather than take the time to measure the PD.

The PD is the distance between the patient's pupils as shown in the pictures below. The "near" PD is used for reading while the distance PD is for seeing at a distance. The distance PD is always 4-6mm larger than the near PD. Place yourself about 16" (40 cm) away from the person for the test and have them remove their glasses so you can clearly see their eyes.

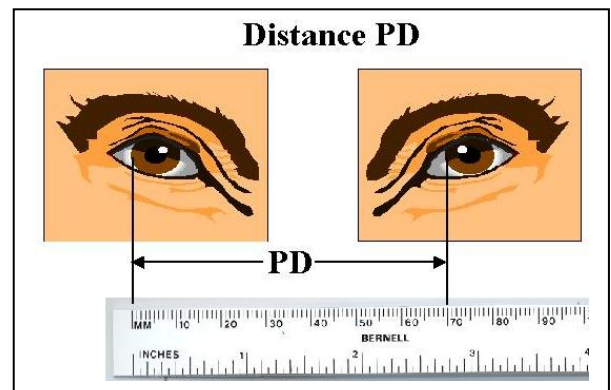
**Near PD: (center ridge mm ruler)** For the "near" PD place a center ridge mm ruler on the patient's nose just below their eyes. Have the patient look at your nose. Measure the distance from the nose to the center of each pupil and total the two readings. This example is 66 mm.



**Near PD (regular mm ruler):** You can also measure the "near" PD by placing a regular mm ruler in front of the eyes. Have the patient look at your nose. Measure the distance from the left of the iris of one eye to the left of the iris of the other eye. This example is 66 mm

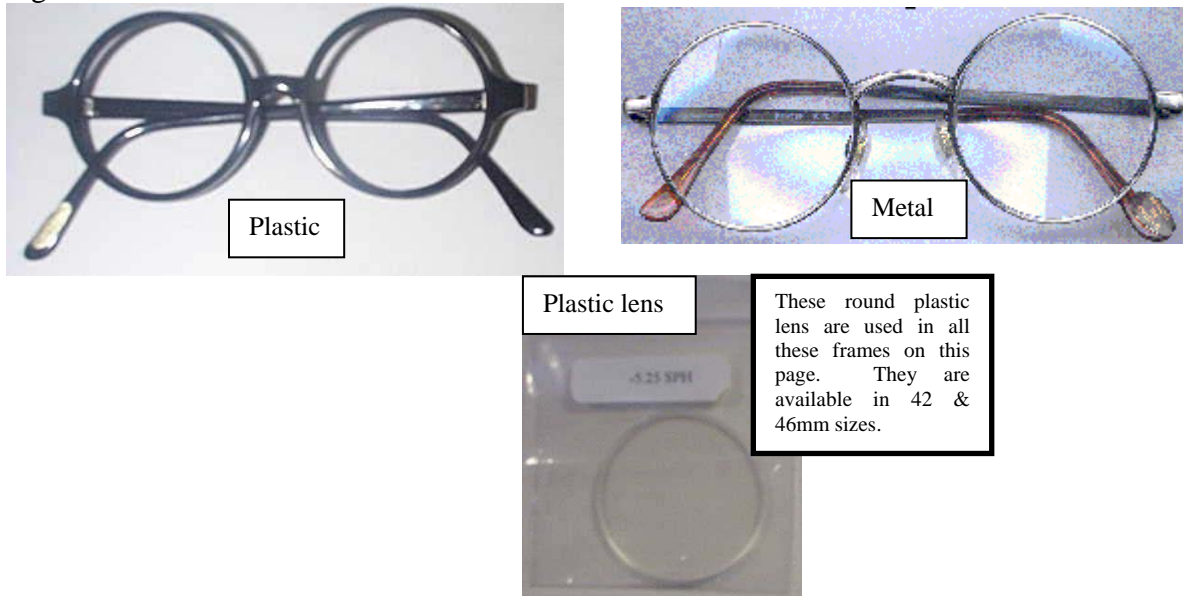


**Distance PD (regular mm ruler):** Have the patient look past your ear at an object across the room. Using a regular mm ruler measure from the left of the iris of one eye to the left of the iris of the other eye. This example is 70 mm.



## 7.0 How to assemble Snap-Together glasses.

If no appropriate used prescription glasses can be found, you can assemble a pair using the snap-together lens and frames as shown below.



The metal and plastic frames are stocked in 65, 67 and 70mm PD (Pupillary Distance or distance between pupils). You should probably use these 70 mm sizes only on larger men whose PD measures to be this amount. The lens sizes are 46mm in diameter. You will have 55, 58, 61 and 65 mm sizes for children with 42mm lens.

The below procedures will allow you to construct plastic frame glasses to help a person with or without astigmatism. There are plastic lenses mainly in 70mm, 67mm, and 65mm PDs.

### **NOTICE**

**Always** measure the PD of the patient before fitting them with Snap-Together glasses.

Perform the following steps in the snap-together glasses assembly process. These glasses are available from Eye-Deal Eyewear. (See Appendix G).

## 7.1 For a patient with no astigmatism

When the patient has no astigmatism you can construct the glasses use the appropriate “sphere” power lens based upon the prescription that you have determined from the previously performed eye tests. Follow this procedure to construct any of the snap-together glasses.

1. Select the appropriate frame based upon the PD size. Modify it if necessary using the procedure in the main document.
2. The lens is inserted from the backside of the frame by popping it in. With plastic frames some pressure will be required to snap in the lens. With metal frames, you need to loosen the screws to insert the lens. You may have to scrape the edge of the lens to make it smooth and perhaps slightly smaller to be able to get the lens to fit.
3. Be sure that you keep the right and left side prescription straight and then insert the lens in the frame.
4. Test the patient with the E chart to verify that the prescription is correct. Make changes if necessary. An easy way to see what correction is needed is to use the “confirmation twister” mentioned in “Using the Trial Lens Set” section of this document.

## 7.2 For a patient with astigmatism

When an optometrist fits glasses to a person with astigmatism, they will order the lens manufacturer to construct a single lens that has the spherical, cylindrical and axis cut into the lens. Since we are assembling glasses for people in the field using a limited inventory, we don't have that kind of freedom. In order to handle astigmatism in the field we have available to us 3 procedures (**in order of preference**):

- 1) Find an appropriate pair in the prescription eyeglasses using either the printed list or the computer program. The computer program is your best bet for success.
- 2) **Let the Eyeglasses Inventory Program “Prescription Modification Wizard” help you with this procedure.**
- 3) Use the computer program “cut back” feature. A “cut back” pair of glasses is where you reduce the cylinder value while maintaining the same spherical equivalent. For example, in the above prescription if you reduce the cylinder by .25 giving a cylinder of .75 then you have to change the sphere to be 2.375. The computer program will allow you to search for “cut back” glasses quickly and easily many times. **You should use cut back (either or both eyes) almost every time you fit a patient with a cylinder more than 2.00.**
- 4) Use spherical equivalent. A “spherical equivalent” is a sphere only lens which has been found to be “equivalent” to a lens which has sphere, cylinder and axis. It will work for some but not all people. The computer program will compute spherical equivalent and will automatically search for glasses which are the spherical equivalent of the patient's prescription. Spherical equivalent is computed as follows:  
$$\text{Spherical equivalent} = \text{Sphere} + \frac{1}{2} * \text{cylinder}$$

For example, if the prescription is [sphere: +3, cylinder: -2, and axis: 30] then the spherical equivalent =  $3 + \frac{1}{2} * -2 = 3 - 1 = 2$ . You could therefore possibly fit a person with this prescription with a sphere = 2 and it work satisfactorily. **If the cylinder is greater than 2 then spherical equivalent likely will not work well.**

We have relatively few snap-together frames and lens so be sure that the patient cannot be helped with the used prescription glasses before assembling a snap-together pair of glasses.

### 8.0 How to use the Nikon or Righton Retinomax 2 or 3 Autorefractor

This section is meant to be brief and easy to use. If you need more details about the use of the Nikon Autorefractor refer to the document entitled "Nikon Retinomax 2 Autorefractor Usage Instructions"

#### USAGE STEPS

- 1. Pick the unit up and place the neck strap around your neck.



- 2. Have the patient sitting opposite you for the reading



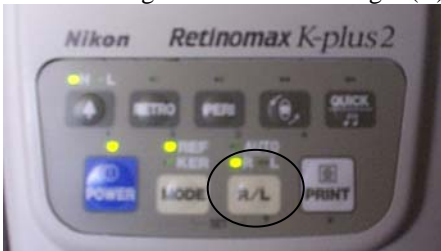
- 3. Be sure to position the forehead rest on the patient's forehead and also stabilize yourself as shown below.



- 4. The patient will see this for a Retinomax 2 autorefractor and a Tulip on a field for the Retinomax 3.



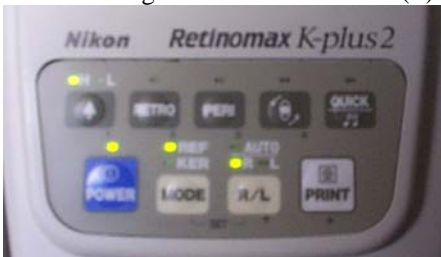
- 5. Set the Right/Left control to Right (R)



- 6. Position the unit over the pupil of the right eye and you will see the below. Press the start button (trigger) to make the reading.



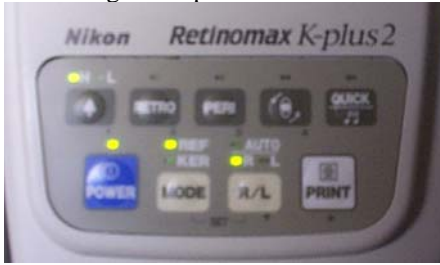
- 7. Set the Right/Left Control to Left (L).



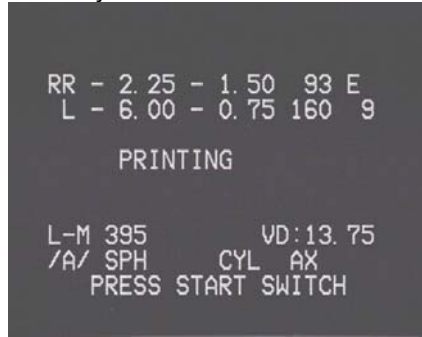
- 8. Position the unit over the left eye and this reading will be automatic.



9. Press the PRINT button to send the reading to the printer.



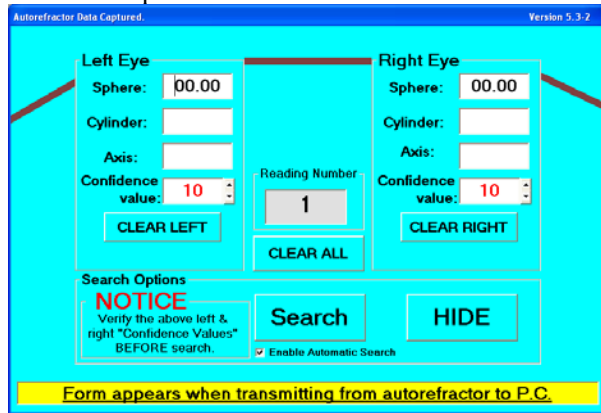
10. And you will see the below.



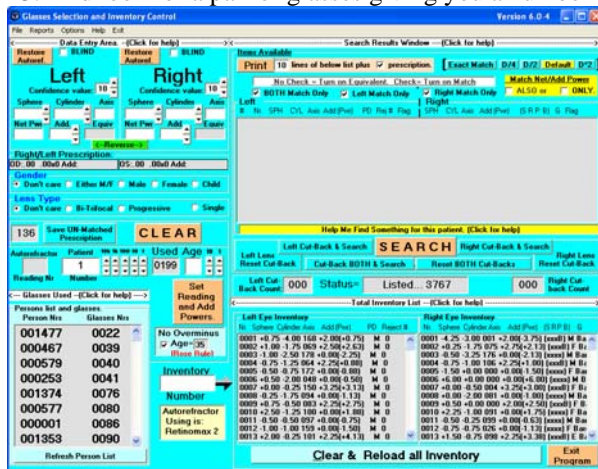
11. The printer will start printing. (Note: If you do not have the below printer, the Dymo Labelwriter printer may be used instead.)



12. The computer will receive the data.



13. And look for a pair of glasses giving you a number



14. You will find this number on the glasses in the boxes.



15. Fit the glasses to the patient.



16. And watch for the smile



## 9.0 EYE DISEASES AND CONDITIONS

This section describes the eye diseases which I see most frequently and am able to recognize. See Appendix I for the effects on the vision for the various eye conditions.

### 9.1 GLAUCOMA

One of the most serious eye disease is Glaucoma. There is little you personally can do for Glaucoma other than (in possibly 75% of the cases) detect it early. There is frequently pain associated with Glaucoma.

We have discovered an inexpensive unit (\$65.50) called a Proview from Bauch and Lombe. Wilson Ophthalmics will sell this unit to us. This device is used to test the InterOcular Pressure (IOP) of the eye. The test is very simple. The test can be performed by the patient himself or with the assistance of the Optical worker in the area. An average reading is 16 mmHg (Millimeters of Mercury). 21 mmHG is the highest acceptable. **75% of the individuals having an IOP pressure higher than 21mmHg will have Glaucoma.**

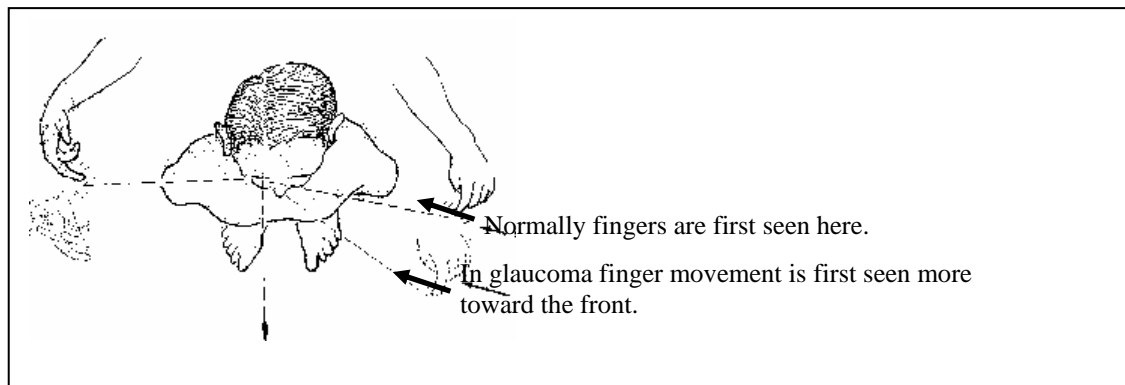
If you get an elevated reading in an individual, you should arrange for them to be checked by a qualified ophthalmologist. You cannot say with certainty they have Glaucoma but with a 75% likelihood you can certainly say they need to go to an ophthalmologist. To the right shows a picture of a woman performing the test on herself.



As you can see the test is done by touching the eyelid when the eye is looking down and opposite to the place where the instrument makes contact.

Another double check for Glaucoma is the "Peripheral Vision" test. Below is an illustration of this test.

### TEST FOR GLAUCOMA



### TEST ONE EYE AT A TIME.

Have the person cover one eye and with the other look at an object straight ahead of him. Note when he can first see moving fingers coming from behind each side of the head.

The problem with this test is IF they fail it, permanent damage to the eye has already been done while if they fail the Proview test, there might not yet be any eye damage.

## 9.2 PINK EYE (CONJUNCTIVITIS)

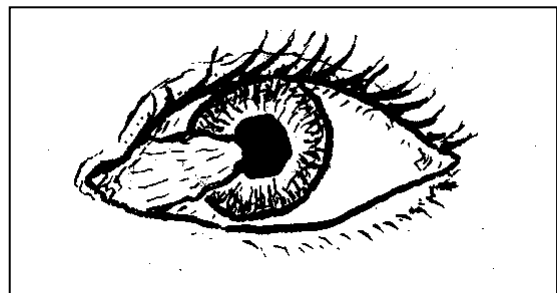
This infection causes redness, pus, and mild ‘burning’ in one or both eyes. Lids often stick together after sleep. It is especially common in children.

**Treatment:** First clean pus from the eyes with a clean cloth moistened with boiled water. Then put an antibiotic eye ointment (you can get from the druggist) .

**Prevention:** Most conjunctivitis is very contagious. The infection is easily spread from one person to another. Do not let a child with pink eye play or sleep with others, or use the same towel. Wear rubber gloves or wash hands after touching the eyes.

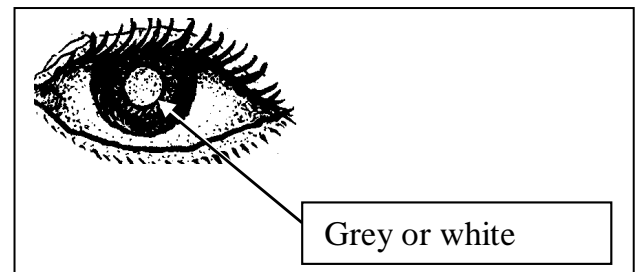
## 9.3 PTERYGIUM

This is a fleshy thickening on the eye surface that slowly grows out from the edge of the white part of the eye near the nose and onto the cornea; caused in part by sunlight, wind, and dust. Dark glasses may calm irritation and slow the growth of a pterygium. It should be removed by surgery before it reaches the pupil. Unfortunately, after surgery a pterygium often grows back again and sometimes more quickly. To the right is how it looks like on the eye. At this point it is blocking vision. Tell them to use sunglasses to protect his/her eyes and retard the pterygium growth. Give the patient some of the slip-in sunglasses if you have nothing else.



## 9.4 CATARACT

The lens of the eye, behind the pupil, becomes cloudy making the pupil look grey or white when you shine a light into it. Cataracts are common in older persons, but also occurs, rarely, in babies. To the right is how it looks. Note that “pinhole” glasses might help a person see with cataracts.



Surgery and removal of the cataract lens is the only solution; however, if you have some very heavy glasses in your inventory, these could help this patient very much as everything will be made larger and easier to discern.

## 9.5 EYE PAIN

Eye pain can mean a lot of things but frequently if they say “My eyes hurt if I read for a long time” means one or more of these things:

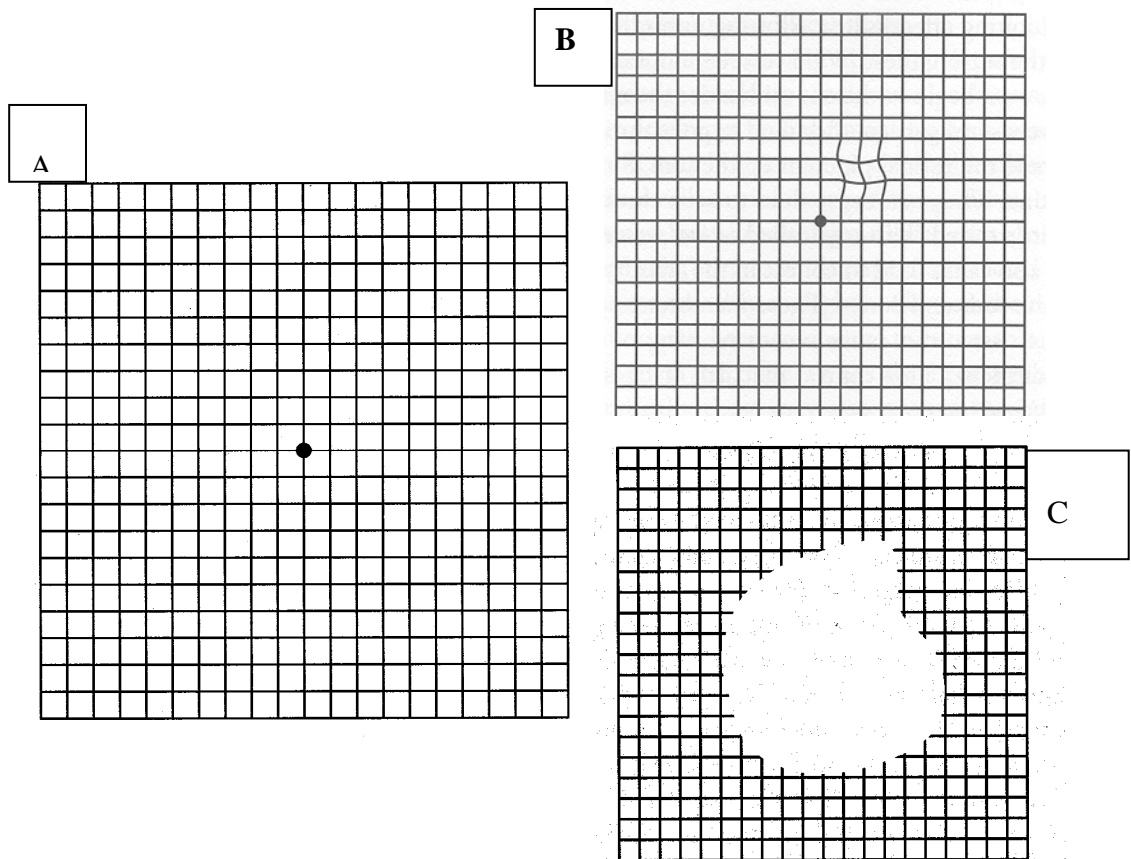
- 1) Not enough light focused over your left shoulder,
- 2) Smoke in the house not ventilated to the outside,
- 3) The wind blowing dust and dirt into the eye
- 4) The need for reading glasses.

The solution for number 1 is obvious but maybe not be something the patient can easily do anything about. Show them the picture in Appendix B for item 2. Suggest that they boil and cool water and splash wash their eyes for number 3. You can help them with number 4.

## 9.6 MACULAR DEGENERATION

Below is a “tool” called an Amsler Grid. Use this to determine if the person has macular degeneration. Note that this typically has the opposite affect of Glaucoma. Instead of losing his/her peripheral vision, with Macular Degeneration they lose their central vision. Their peripheral vision typically remains intact.

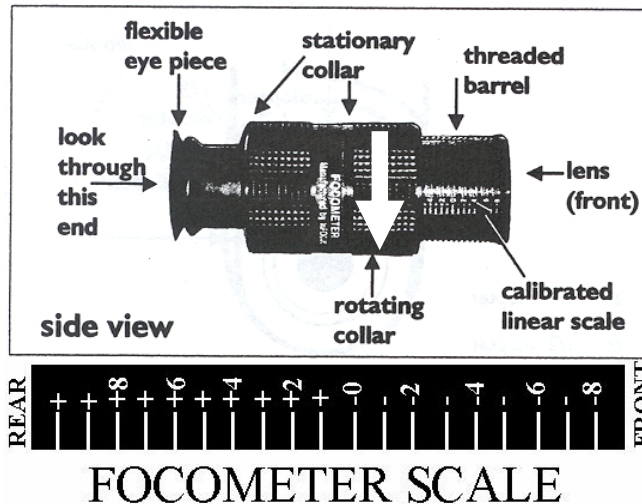
The Amsler grid (shown immediately below) is a possible way to determine vision loss. The patient is told to stare into the grid focusing on the center dot. If any part of the grid is broken, absent, irregular, or wavy lines, then there is definitely degeneration in the back of the eye. If the grid shows up as the one labeled C, then the person might have “Macular Degeneration” which will eliminate central vision.



## 10.0 USING THE FOCOMETER.

### ALWAYS TEST RIGHT EYE FIRST.

Some optical teams using the Focometer (see below) mounted on a tripod to measure the prescription of the customer's eyes. An autorefractor is faster and more accurate but a Focometer is much cheaper and requires no electricity. Refer to Appendix E for help reading the Focometer calibrated scale.



### 10.1 QUICK FOCOMETER TEST (No Astigmatism)

When the person first uses the focometer, have them focus it on the E chart (placed 20 feet away) as shown to the right.

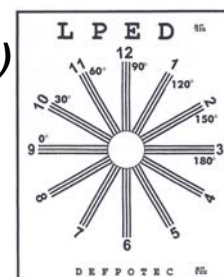
Extend the Focometer to its full length (as shown above) and then turn it back in until the customer can read the smallest line on the chart. Use the laser pointer to point at the chart. If the customer can read (through the Focometer) at least the 20/30 line (green #6 line) then they have very little astigmatism and it can be ignored. Take a single reading from the Focometer and this is the "Sphere" reading. Use this reading to find a pair of glasses from the Prescription eyeglasses selection.

If the customer cannot read at least the 20/30 line with the Focometer, then they must proceed to the next section to measure the Cylinder Power and Axis for Astigmatism.

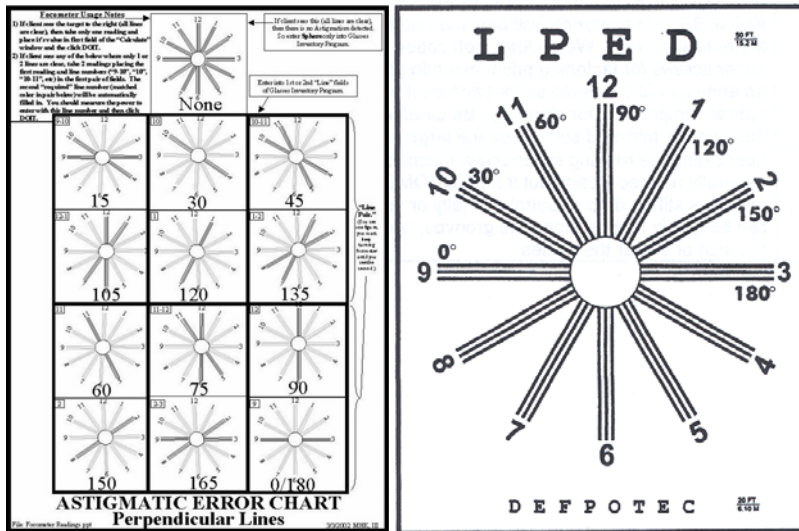


### 10.2 DETAILED FOCOMETER TEST (Has Astigmatism)

The Focometer has its own bulls eye chart (see below) placed 20 feet away. To the right is a copy of the Focometer bulls eye chart. The chart looks very much like an asterisk "\*". There are 12 numbered triple lines arranged 30 degrees apart. Measurement between the lines are interpreted always as 1/2 way (15 degrees).

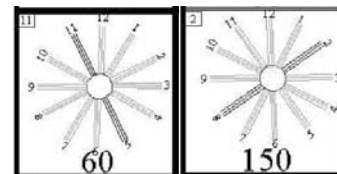


To assist in getting a proper reading from the customer, we will be using a specially constructed “Astigmatic Error” chart which shows all possible ways the customer can see the bulls eye. A copy of this is below and is in Appendix D. Appendix E shows information on reading the Focometer scale.



The user is asked to POINT to the symbol on the chart which most looks how he/she sees on the bulls eye through the Focometer. If the user points to the one labeled “None” he/she as no astigmatism in that eye. This makes it much easier. You can then make note of the power reading on the instrument and test the other eye. This single reading will be the “Sphere” power. If the user points to another symbol on the chart, he/she should continue turning the Focometer in a clockwise direction until he/she sees the other symbol in the same block on the chart.

For example if he sees the first symbol to the right, make note of the Focometer reading and continue turning the Focometer until he/she sees the second symbol to the right (perpendicular line).



Make note of the second Focometer reading and the angle (150) above. The prescription is recorded as: **First reading -(First Reading-Second Reading) Second Angle**  
 Which is known as: **Sphere Power - Cylinder power Axis of Cylinder**

Example: The customer get the first reading showing lines 5,11 at 60 degrees to be darker. The Focometer reads +4.25. He continues turning the instrument and gets the second reading showing lines 2,8 at 150 degrees to be darker. The Focometer reads +1.75. Here is how the prescription is calculated:

1<sup>st</sup> reading: +4.25 dioplers 60 degrees  
 Minus 2<sup>nd</sup> reading: -1.75 dioplers 150 degrees  
 Cylinder: -(+2.50)dioplers at 150 degrees axis

**Prescription: Sphere: +4.25 Cylinder: -2.50 Axis: 150 degrees**

You can use the user’s eyeglasses sheet to record and calculate the above readings. If you just enter the above 1<sup>st</sup> and 2<sup>nd</sup> readings and click **Calculate**, the computer will calculate the above prescription for you..

If you cannot find the proper glasses for Astigmatism correction, use what is called “**Spherical Equivalent**”. The formula is “**Spherical equivalent = Spherical measurement + half of the cylinder measurement**”. Do this only if the cylinder is no more than +2.00. For example the spherical equivalent of prescription: Sphere = -2.00, Cylinder = -1.50 and Axis = 120. Calculation: -2.00 + ½(-1.50) = -2.00 + - .75 = -2.75 diopters. Again the computer program will calculate this for you. For details on and how to acquire this program go to this web site:

<http://eyeglasses-inventory.com/>

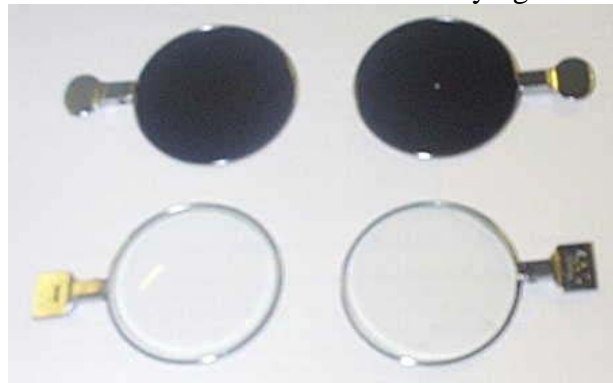
## 11.0 USING THE TRIAL LENS SET.

**NOTE:** If you don't have a trial lens set, you might be able to borrow one (as I did) from a local optometrist. They have to buy these at school but frequently are already provided one on their job. They therefore have one sitting at home unused.

Sometimes you may need to verify that the prescription produced by your autorefractor or Focometer was right. If so, the trial lens set is very handy. Also, you will sometimes have an occasion where a patient simply cannot get a good reading from the Focometer or an autorefractor. The focometer might be too confusing for them. It also might not have a wide enough + or - range to accommodate the very limited vision of some patients. If that is the case then your best bet is the trial lens and frame set. Below is a picture of a trial lens set with the frames to the right.



Below are 4 trial lens. On the top left is an occluder to block the eye. To the right of that is a pinhole occluder. Note that a characteristic of a pinhole occluder is a person with poor vision might see very well through it when it would be impossible otherwise. On the bottom left is a - Sphere lens with the power marked on the tab. To the right of it is a - cylinder lens with its marking on the tab. This lens will have scratches on it identifying the zero axis.



### 11.1 Frame Setup

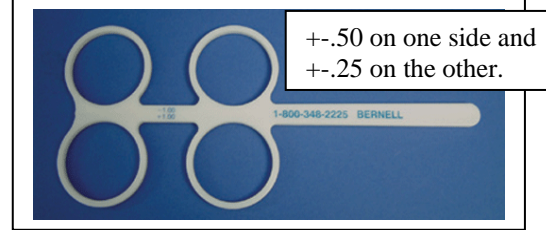
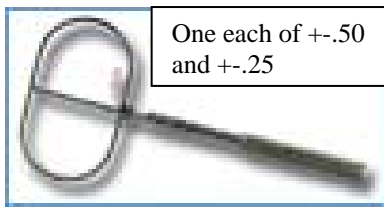
Each lens of the trial frame will hold up to 4 trial lens. The front 3 positions can be rotated using the dials on the left and the right lower sides. This allows you to put in glasses with cylinder and then rotate this lens to the correct axis for the patient's prescription. The rear position is typically used only for + or - spherical lens. Supposed you get prescription of Sphere: -8 Cylinder: -1.5 and Axis: 30. Follow these steps:

1. Place the -8 lens in the rear position closest to the eye.
2. Place the -1.5 lens in the rear/front position.
3. Holding the tab move the lens until the mark on it lines up either to the 0 or 180 position,
4. Now rotate the knob until the lens mark lines up with the 30 degrees position.

Complete the setup of the other side of the frame and you are now ready for a test.

## 11.2 Check Sphere with confirmation twister.

Have the patient look at the E-Chart with the left eye blocked. If the patient can see the 20/20 line clearly, then you are finished with that eye. Move the block to the other eye and try again. If the patient cannot see the 20/20 line, then use the “ $\pm.50$  or  $\pm.25$  Confirmation Twisters”



(see above) trying both sides of the twister asking which is better. Now add or subtract this amount from the trial frame by replacing the trial lens with another larger or smaller lens. Keep doing this until you get the person to indicate that they can read the 20/20 line with that eye or until they can read the lowest line. Refine the setting further with the “ $\pm.25$  Confirmation Twister”. Now perform the same process on the other eye.

## 11.3 Astigmatism correction

If the patient cannot achieve 20/20 vision with either or both eyes in step 2 above, then likely he/she has uncorrected astigmatism. Have the patient first look at the Focometer chart and see if all lines are equally as clear using both eyes. Now block the left eye (using the eye block from the trial lens set) and repeat the test. Move the block to the other eye and repeat the test. If the patient can see all lines equally as clearly (but not necessarily totally clear) then the astigmatism axis setting is correct and further Spherical refinement (Step 2) might be needed.

Referring to Appendix D, if the patient sees one or two lines darker than the others, then read the axis from the degree indicators on the Focometer chart. Remember to extrapolate when you are between two lines coming up with (for example) 135 degrees. Now place a  $-.50$  cylinder lens in the trial frame and adjust the angle to match the degrees that you found. Again get the patient to try the E chart to see if they can achieve 20/20 vision. Ask them to slowly turn the axis knob on the trial lens frame until they have the most clarity. If 20/20 has still not been achieved, then increase the cylinder to  $-1.00$  and set the axis to the same value. Continue this process until you achieve the best clarity possible.

If you have an autorefractor, it is far better than the focometer and you should use it for astigmatism (Cylinder + Axis) measurements.

## 11.4 Record your Prescription

Now read the prescription off of the trial lens frame. Record on the patient information sheet the left and right eye axis, the value of each – cylinder lens and also the total amount of spherical lens inserted. Use this prescription to search for a pair of glasses using the Eyeglasses inventory computer program or the sorted computer printouts.

## 12.0 The Lens Rack

The Lens Rack (shown to the right) can frequently be used to discover a person's prescription. Sometimes it is needed (even if you are using an autorefractor) if the person has cataracts or macular degeneration. Under these circumstances the autorefractor may not make a reading.. It is best if the patient has little astigmatism but it can always at least help you improve their vision somewhat. To the right is a picture of the lens rack. They look somewhat like paddles with holes in them. The one of the left has "Concaves" or "-" (minus) lens for near sighted people. The one of the right has "Convex" or "+" (Plus) lens for far sighted people. See if a person sees things well up near but not far. If so, use the left paddle. If a person sees things well at a distance but not up close, use the right paddle.

With one eye blocked with an occluder, a person will look through the lens from weakest to strongest at the E-Chart. They will move from lens to lens until they find one which works the best for them.

If the patient cannot see the 20/20 line, then use the "+-.50 or +-.25 Confirmation Twisters" (see Section 11.2) trying both sides of the twister asking which is better. Now add or subtract this amount from the lens power and you have the spherical prescription (no cylinder or axis) for that eye. Keep doing this until you get the person to indicate that they can read the 20/20 line with that eye or until they can read the lowest line. Refine the setting further with the "+-.25 Confirmation Twister". Now perform the same process on the other eye. Most optical teams have +-.50 & +-.25 confirmation twisters along with paddles in the optical kit.



To the right is a picture of a patient being tested with a Lens Rack.



### 13.0 Helpful Tools

This section documents a collection of miscellaneous useful tools to assist in the fitting process. Below is a picture of a couple of different items called “occluders”.



The black occluder is called a “pinhole” occluder. Put this in front of a person to see if they need glasses. If they can see through this device better than without, then they definitely need glasses.

Another use of “pinholes” is in the place of lens making what is called “pinhole” glasses. We keep a couple of these in inventory and they might be the absolutely only way you can improve the vision of some people especially somebody with cataracts. If you would like to purchase pinhole glasses for your mission trip then enter "Pinhole Glasses" in GOOGLE and you will see many different choices.

You will frequently use the white occluder to cover up one eye when you are testing another eye.

All optical teams have these occluders in their optical kit.

**14.0 Purchase Recommendations**

(Revised: 3/15/2017)

**14.1 Recommendation for reading glasses purchases.**

**NOTE:** For all teams it is recommended that they purchase readers. Sunglasses are optional. The used prescription inventory does not include many readers. It is mainly stocked with glasses for distance to support measurements made by the autorefractor.

From: Shark Eyes, Inc.

2110 East 25th Street.  
 Vernon, California 90058  
 1-877-405-3937

Web: <http://www.sharkeyes.com/>  
 Direct line: 1-323-589-7828  
 Fax: 1-323-589-7992

**PLEASE NOTE.** The part numbers change frequently so discuss your order with Shark Eyes to be sure of your choices.

Typical 1 Doz Mixture of powers in Reading Glasses											
	+1.00	+1.25	+1.50	+1.75	+2.00	+2.25	+2.50	+2.75	+3.00	+3.25	+3.50
1	1	1	1	1	2	1	1	1	1	1	1

However, more glasses are needed in the low power area. The quality of these metal rim glasses is excellent.

Here is what I recommend that you purchase from Shark Eyes:

When you receive these glasses, you will have to sort them putting only one power per box

<p><b>UNISEX GEORGIO CAPONI READERS WITH SPRING HINGE</b>—                  Springer assortment includes mixed readers with metal frames. The power of the eyeglasses in this assortment will range from +1.00 - +3.50. You will receive (1) pair of each power and one additional pair of +2.00.</p> <p>Quantity to order- 50 dz. (min. purchase <b>25</b> dz)                  Part number- <b>GCMTL3</b>                  Price per dz.- <b>\$18.36</b>                  Price per pair of eyeglasses- <b>\$1.53</b>                  Total cost for 50 dz. Reading glasses- <b>\$918</b></p>	<p>Alternative 2:                  Same power range as to the left. This are not “springer” glasses. It is a mixed metal/plastic mix.</p> <p>Quantity to order – 50 dz (min. purchase <b>25</b> dz)                  Part number: <b>WIRG</b>                  Price per Dz - <b>\$14.00</b>                  Price per pair of eyeglasses- <b>\$1.17</b>                  Total cost for 50 dz Reading glasses- <b>\$700</b></p>
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**PLEASE NOTE:** All reading glasses should be round rather than cut back at the top to allow them to not only be used for reading but also be used by some people for distance.

We also recommend you purchase additional readers in the more common powers of +1.00, +1.25, +1.50 and +3.50

To get the best price you need to call Shark Eyes and identify yourself as representing a mission team.

### 14.2 Recommendation for Sunglasses Purchases.

From: Shark Eyes, Inc.

2110 East 25th Street.  
 Vernon, California 90058  
 1-877-405-3937

Web: <http://www.sharkeyes.com/>  
 Direct line: 1-323-589-7828  
 Fax: 1-323-589-7992

Sunglasses are optional; however, we do encourage you to purchase them to be given out in the village.

**Hang Ten Kids**

- Quantity recommended to order- 2 dz.
- Part number- **HTK01B**
- Price per dz. = **\$23**
- Price per dz. = **\$1.93 ea;**
- Total cost for 12 dz. pair of childrens sunglasses - \$276

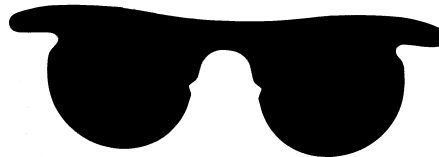
**For Adults:**

- Quantity recommended to order- 50 dz
- Part number: **DZNDT144 WITH PROP65**
- Price per pair - **\$.95**
- Total cost for 50 dz pair of sunglasses - **\$570**

### 14.3 Other Miscellaneous Purchases

The next item is the drop behind the lens glasses. They are called “Slip in Myds” and below is their information. They will be placed behind every pair of used prescription glasses you hand out (unless the glasses are sunglasses already).

From: i-Promotions, Inc.  
 9785 Mackenzie  
 Suite 104  
 St. Louis, MO 63123-5438  
 Phone: 314-638-1900  
 Fax 314-638-1818



I suggest that you only get one box and keep any left over taking it back to be used on your next trip.

Quantity (Box)	Actual Quantity	Description	Price Each box	Total Price
1	250	Slip-In Myds (Sunglasses slip behind regular glasses.	\$37.50	\$37.50

**VERY IMPORTANT!!**

**EVERYBODY SHOULD GET SOME KIND OF SUNGLASSES.**

The next item is also ordered from “I-Promotions” is used after you dilate a person’s eyes.

Quantity (Box)	Actual Quantity	Description	Price Each box	Total Price
2	25	Post-Myds with Temples	\$7.75	\$15.50

You also need to purchase arm bands to use in the clinic. A good source for these arm bands is:

Wristbands Medtech USA, Inc  
7380 Sand Lake Rd.  
Unit 500, 5<sup>th</sup> Fl  
Orland, On 32819  
Phone: (800)-361-1259  
Fax: (888)-652-6565  
[www.medtechgroup.com](http://www.medtechgroup.com)

Quantity (Box)	Item Nr.	Description	Price Each	Price Total
2	P035010065B0500	Plastic ¾" x 10" Straight wave solid white box of 500	40	80
1		Shipping for above.		37.84

Notice that these particular bands do not come numbered. However, when you call the above, ask if you can get them sequentially numbered from 1 to 1000 and they will do it at no additional costs. Getting these armbands is **incredibly useful**. I will enter this number as the patient number in the Eyeglasses Inventory program. The number prints out on the picklist so you can correlate the list to the right patient. I will also write the age on the armband with a Sharpie.

An inexpensive alternative to the armbands is to get a roll of 1.5" wide masking tape and a clipboard. Put ten 1.5" strips of tape on the clipboard and put patient numbers on the left side of each strip. When the patient comes into the clinic put their age on the right side of the strip and place it on the top of their shirt or blouse.

The last item is something you need to get your doctors to order for you. These are dilating drops used on younger people.

1. Proparicane Hcl .5% (Numbs the eye in about 5-15 seconds)
2. Tropicamide (1%) (will paralyze the focusing capability / accommodation of the eye and dilate it somewhat)

Another useful address is:

InFocus  
327 Tealwood  
Houston, Tx 77024  
Tel: 713-468-3040  
Fax: 713-468-7704  
Attn: Vasu Mistry at 361-857-8664  
[www.infocsonline.org](http://www.infocsonline.org)  
[infocusintl@aol.com](mailto:infocusintl@aol.com)

They provide numerous supplies for Optical Mission teams. For more information check out their web site.

## 15.0 What to do with your Used Prescription Glasses

You will collect a number of used prescription glasses. Please send all of these glasses to:

Kendall Optometry Ministries, Inc  
4820 Nottinghamshire Drive.  
Jeffersontown, Ky. 40299  
Attn: Holland Kendall  
Phone: (502)-640-2227

My E-Mail address is [hollandkendall@kendalloptoministry.org](mailto:hollandkendall@kendalloptoministry.org) Kendall Optometry Ministries, Inc has 6 measurement stations positioned at homes, and churches. Volunteers sit at these stations and measure eyeglasses many hours each week. We have a limited supply of barcoded (with prescriptions) glasses to sell to Christian Mission teams at \$.30 each plus shipping.

## 16.0 Preparation Checklist

From when you first start your planning, you should consider speed and accuracy. In an eye-glasses clinic they work against each other. When you think of speed, remember that on the last day you may turn some people away because you give out of time. Imagine standing in line for 2 days only to be turned away! The faster you are able to do your job, the fewer that number will be. The goal is to make it zero.

You can have a lot of both speed and accuracy. In the next sections we will discuss the size and arrangement of the optical area. It will also discuss the number of workers. Try not to cut back on your workers. If you have to, you might be able to get one or more native language speaking volunteer(s) to do things like:

1. Crowd control,
2. Going over the reading chart with somebody and selecting the right pair of glasses,
3. Set up several reading chart lines (if you have the space and people),
4. Do a “Pre-screening” test (see below) to cut down the number of people who have to use the Autorefractor (slowest part of the operation), and
5. Possibly looking through your boxes of prescription eyeglasses for the right number.

### ***TO SPEED THINGS UP***

1. Purchase some hospital wristbands (see previous section) and put a sequential number on some Avery 8167 labels (80/sheet). Place this sequential number on each wristband. When people first line up for the clinic or when they enter the clinic, put this band on their wrist. This number will benefit you in a number of ways: 1) to keep patients in order, 2) to relate patient paperwork to the patient. 3) to allow you to take a lunch break and patients can get back in line in the correct order, etc. A cheaper alternative to the wrist bands is to get some 1.5” wide masking tape and tear about 8 two inch sections and place them on a clipboard. Now write the patient number on the left of this tape and when the patient arrives write the age on the right. Apply the tape to the top of their shirt or blouse. Be sure to write on the armband or tape the patients age.
2. When patients come into the area, get them to first look at the E chart. If they can read at least the 20/30 line then skip the distance test for them and move on to the reading test. Get them to the right area quickly.
3. Get a laser presentation pointers to use to point to the E chart. This will prevent you from having to station a person next to the chart to point at each line. Bring plenty of batteries.
4. When you show the person the reading chart (Appendix C), do **not** get them to read each line at a time until they get to the lowest line that they can read. Instead have them point to the smallest print on the page that they can read clearly. Get them to try the line below that to be sure and then look at the “+x.xx” indicator on the chart and pick the most appropriate pair of glasses.
5. Have individual small boxes with the reading glasses in the boxes from left to right (or top to bottom) organized in order and with power indicator labels on the front.
6. Have the prescription glasses (boxes of 80 each) laid out in a table from left to right from 1 to the maximum number. Some teams have glasses racks shown in Appendix A.
7. When you remove a pair of glasses from the prescription glasses selection, be **sure** to use the computer or an inventory checkout sheet to mark it USED in your inventory list so you don’t go looking for this pair over and over.
8. If you get backed up in the reading glasses area and the Autorefractor area isn’t busy, then pull people who need distance glasses out of the reading glass area and fit their

glasses. Mark their sheet to be sure that when they exit the reading glass area you know that they can go ahead and leave the optical area. Do the reverse if you get backed up in the Autorefractor test area.

9. If you make copies of Appendix B (Instructions for eye care), hand them out to the people who you believe particularly need them.
10. When you talk to your translator they will frequently describe the same problem: “My eyes burn and hurt when I read.”. Train the translator to ask these questions: 1) Do you read with a good strong light over your left shoulder, 2) Do you have the smoke from your fire ventilated from your house (no smoke in house), 3) have you been in the sun a lot (wear sunglasses), or 4) do you have dust and dirt in your eyes? If so, wash out your eyes with sterilized (boiled and cooled) water. Show them the Appendix B pictures.
11. Have all your prescription glasses measured, cleaned, numbered, bagged and sorted beforehand. Make sure they are in the computer inventory.
12. Do all eye tests in the same order: Right eye, and left eye.

### **SUPPLIES YOU WILL NEED**

1. Take a supply of ballpoint pens, paper, scissors and 2 – 3 clipboards.
2. Glasses cleaner fluid and lots of soft cloth,
3. Take some jewelers screwdrivers, tweezer pliers, replacement eyeglass screws, superglue, and wire (to use in place of some screws).
4. A heat shrink tubing gun to heat the glasses to bend them in shape. The KOM optical cases have one of these units.
5. A laser presentation pointer (+ batteries) to point to the eye charts (Also in KOM optical case).
6. Penlights to inspect their eyes. (Also in KOM optical case)

When you arrive on site, try to set up your clinic like the drawing in Appendix F. This will work very well for you.

**REMEMBER** that the autorefractor must be operated in a dimly lit area for maximum accuracy. Be sure the corner of the room where you use the autorefractor has no direct sunlight. If you have to then partition it off with sheets of black plastic.

## 17.0 SETTING UP OUR STATION

When we arrive in our location we will get all our boxes into our area. We will use the tape measure and identify a location to hold the two eye charts and a location 20 feet away where the people will stand for their eye test. Appendix F shows the layout plan for the area. Keep in mind that your area is in 2 sections: 1) Reading glass fitting area (Initial Inspection), and distance test area (near “E” chart and Focometer). People may need to go to only one or both. Those using an autorefractor will need an autorefractor test area.

**VERY IMPORTANT**  
The autorefractor test area must be dimly illuminated.

Looking at the drawing there are 3 types of workers.

- 1) North American English speaking. One of these retrieves glasses from inventory, one does the initial examination, and one handles the Focometer and/or autorefractor.
- 2) Translators. One helps the initial examiner and the other helps those operating the focometer.
- 3) A local native helper who does crowd control.

It is very important to control the entrance into the eyeglasses area as progress can be greatly slowed if the crowd is allowed to wander into the space.

At the back of the room are several tables where we can lay out the many pairs of glasses in order. They will remain in their boxes of 80 glasses per box. (Some teams have a glasses storage rack as shown in Appendix A.) Another table will be set up with reading and sunglasses. We should also get some paper towels from the kitchen area. We have several bottles of glasses cleaner solution in the boxes. We also have many soft cotton rags to clean the glasses should they need to be. They have already been bagged and cleaned. We should get a very small container with clorox water in it or use disinfectant wipes. This will be used to sterilize the Autorefractor rubber eyepiece between each patient.

When people come into our area, we review the sheet which they would have received from the medical center. We always expect the doctors to have seen the person first. The sheet looks like the one to the right. You can also find it in Appendix H.

When the patient enters the door, we put a numbered band on his/her wrist and put a corresponding number on his/her sheet. We will be looking for comments on the sheet which might tell us if the medical doctors have determined there is some particular optical problem. The sheet also has space where we can record the readings which are taken from the autorefractor. The sheet is retained when the person leaves the area and is counted at the end of the day to determine the number of glasses handed out that day. Remember to remove the numbered band on his/her wrist before the patient leaves the room. This band is used to reorder people back in the line when we leave for lunch or the end of a day. You don't want the patients to keep the band and give it to another person.

Patient Number: <b>Anteojos (Eye Glasses)</b>			
<b>Doctors Notes:</b> <small>PROBLEMAS SENTIENDO: NEAR: FAR: BOTH: (check one)</small>			
<b>Pupillary Distance (PD)</b> → Near P.D.: _____ Distance P.D.: _____			
<b>FOCOMETER READINGS:</b>			
<b>Left</b>	<b>Right</b>	<b>Left</b>	<b>Right</b>
<small>Spherical/Diopter</small>	<small>Spherical/Diopter</small>	<small>Spherical/Diopter</small>	<small>Spherical/Diopter</small>
1st Reading: _____ Diopters	1st Reading: _____ Diopters	1st Reading: _____ Diopters	1st Reading: _____ Diopters
2nd Reading*: _____ Diopters	2nd Reading*: _____ Diopters	2nd Reading*: _____ Diopters	2nd Reading*: _____ Diopters
<small>* "2nd Reading" only a useful value on glasses in 13 diopters</small>		<small>* "2nd Reading" only a useful value on glasses in 13 diopters</small>	
<b>BEFORE</b>	<b>DISTANCE TEST</b>	<b>AFTER</b>	<b>BEFORE</b>
20/	20/	20/	20/
<b>READING TEST</b>		<b>READING TEST</b>	
<b>BEFORE</b>	<b>AFTER</b>	<b>BEFORE</b>	<b>AFTER</b>
<small>(Give Lens Number in case it can be easily read)</small>		<small>(Give Lens Number in case it can be easily read)</small>	
<b>MMHG</b>		<b>MMHG</b>	
<small>ICP - Intraocular Pressure (see for Glaucoma) The cutoff is 20</small>		<small>ICP - Intraocular Pressure (see for Glaucoma) The cutoff is 20</small>	

Please understand I am NOT an optometrist. I have had some experience identifying some eye problems and perhaps with the assistance of the real doctors, we can determine if some people have eye disease. (See the Eye Diseases Section)

After a quick physical examination of the person's eyes, we will ask them several questions:<sup>3</sup>

1. Do you have problems reading close but can see fine at a distance?

**Español: ¿Tiene usted problemas en leer lo que tiene cerca, pero puede ver bien a la distancia?**

2. Do you have problems seeing at a distance but can see fine up close?

**Español: ¿Tiene usted problemas en ver a la distancia, pero puede ver bien lo que está cerca?**

3. Do you have problems seeing both close and far?

**Español: ¿Tiene usted problemas en ver tanto lo cercano como lo lejano?**

If the person answers “Si” to question 1 but “No” to the next two questions, then we will fit them with reading glasses. Refer to the next section for a description of the process we will use to fit a person with reading glasses. A person might be fitted for 2 pairs of glasses... one for reading and one for seeing at distances. Remember that the computer program can match both the distance and also the bifocal segment of the glasses so that only one pair of glasses might be needed.

Here are also some quick questions you can ask when you are doing the distance or reading tests or testing with the autorefractor:

1. Can you see clearly?

**Español: ¿ Puede usted ver bien, claramente?**

2. No blinking please. (of the eyes).

**Español: No parpadee por favor.**

3. Keep you eyes open wide.

**Español: Abra los ojos bien grandes.**

4. Open your eyes wide.

**Español: Abra bien los ejos.**

5. Look Straight

**Español: Mire al centro.**

6. Do you have trouble reading?

**Español: ¿ Tiene problemas para leer ?**

---

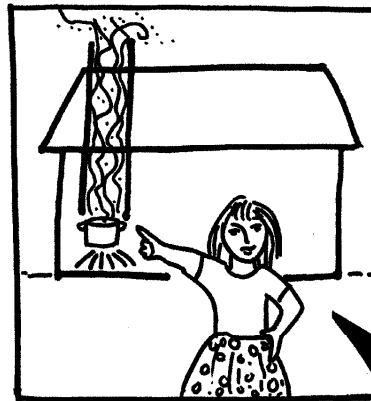
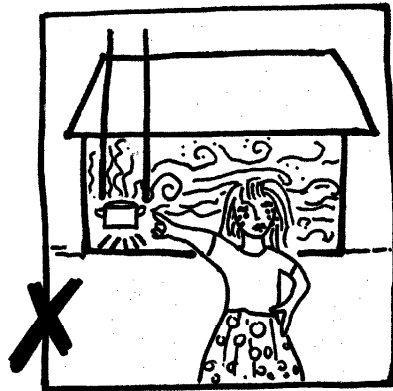
<sup>3</sup> Special thanks to Carlos A. Scheer who is a translator and a ham radio operator (working with I.H.S.) for helping with these translations.

## APPENDIX A – Glasses Racks & Boxes



APPENDIX B – INSTRUCTIONS FOR EYE CARE PAGE 1

# Para ojos de buen salud



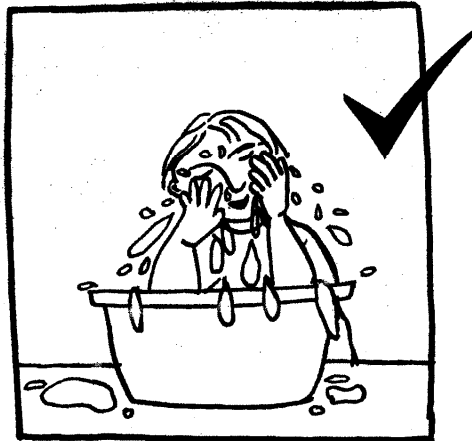
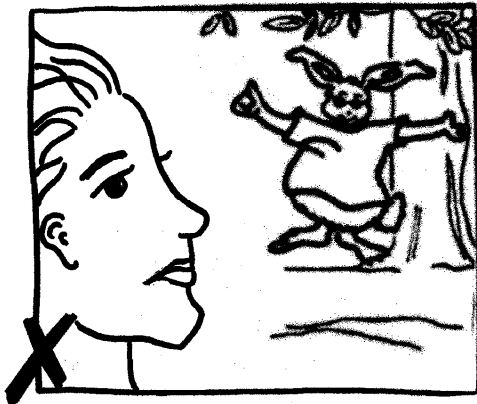
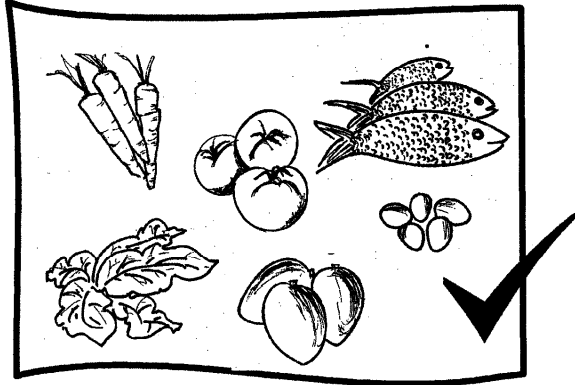
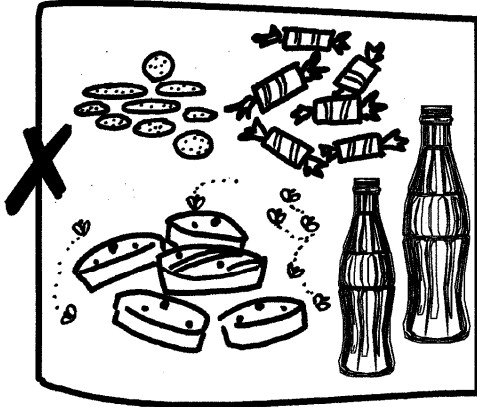
**InFOCUS**

327 Tealwood Drive Houston Texas 77024 USA Tel: 713 468 3040 Fax: 713 468 7704

<sup>4</sup> NOTE: The 2 pages making up this appendix can only be copied by purchasing the originals from InFocus at the price of \$5.00 per original. With these originals, you can make as many copies as you wish.

APPENDIX B (Cont) – INSTRUCTIONS FOR EYE CARE PAGE 2<sup>5</sup>

# Para ojos de buen salud



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<sup>5</sup> NOTE: The 2 pages making up this appendix can only be copied by purchasing the originals from InFocus at the price of \$5.00 per original. With these originals, you can make as many copies as you wish.

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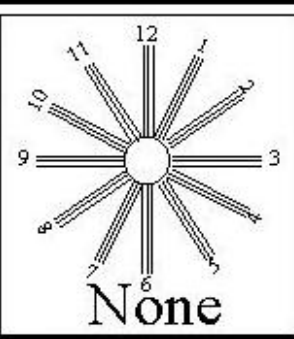
**APPENDIX C – SPANISH READING CHART**


---

- +3.00** 11. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16
- 
10. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16
- 
- +2.50** 9. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16
- 
8. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16
- 
7. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16
- 
- +2.00** 6. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16
- 
5. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16
- 
- +1.50** 4. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16
- 
3. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16
- 
2. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16
- 
- +1.00** 1. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16
- 
0. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16
- 
- 1. Porque de tal manera amó Dios al mundo, que ha dado a su Hijo unigénito, para que todo aquel que en El cree, no se pierda, mas tenga vida eterna. San Juan 3:16

### APPENDIX D – FOCOMETER ANGLE CHART

- Focometer Usage Notes**
- 1) If client sees the target to the right (all lines are clear) then take only one reading and place it's value in first field of the "Calculate" window and the click DOIT.
  - 2) If client sees any of the below where only 1 or 2 lines are clear, take 2 readings placing the first reading and line numbers ("9-10", "10", "10-11", etc) in the first pair of fields. The second "required" line number (matched color in pair below) will be automatically filled in. You should measure the power to enter with this line number and then click DOIT.



If client sees this (all lines are clear), then there is no Astigmatism detected. So enter **Sp** here only into Glasses Inventory Program.

Enter into 1st or 2nd "Line" fields of Glasses Inventory Program.

<p>9-10</p> <p>15</p>	<p>10</p> <p>30</p>	<p>10-11</p> <p>45</p>
<p>12-1</p> <p>105</p>	<p>1</p> <p>120</p>	<p>1-2</p> <p>135</p>
<p>11</p> <p>60</p>	<p>11-12</p> <p>75</p>	<p>12</p> <p>90</p>
<p>2</p> <p>150</p>	<p>2-3</p> <p>165</p>	<p>9</p> <p>0/180</p>

**"Line Pair."**  
 (You see one figure, you must keep turning focometer until you see the second.)

## ASTIGMATIC ERROR CHART

### Perpendicular Lines

## APPENDIX E – FOCOMETER SCALE CHART

**side view**

**front view**

● 1/4 diopter  
● 1/2 diopter  
— 1 diopter

Interpreting diopter division marks on the focusing collar

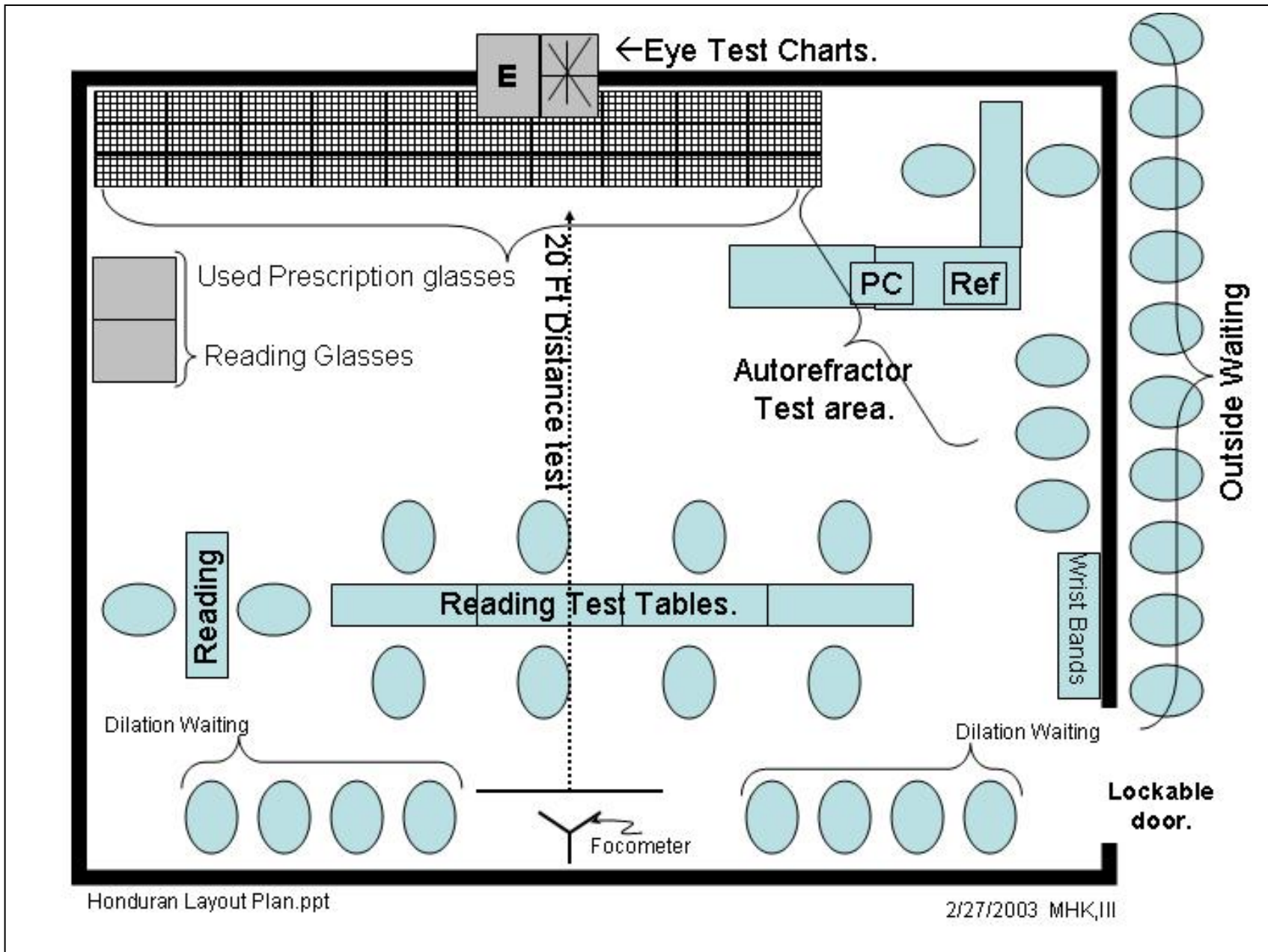
+1.00	+0.75	+0.50	+0.25	.00	-0.25	-0.50	-0.75	-1.00
-------	-------	-------	-------	-----	-------	-------	-------	-------

**Reading the FOCOMETER SCALE**

File: FOCOMETER SCALE.PPT

1/27/2002 MHK.III

### APPENDIX F – Optical Area Layout Plan



## APPENDIX G – Addresses and References

### CONTACTS:

InFocus (provides Focometer)

327 Tealwood

Houston, Tx 77024

Tel: 713-468-3040

Fax: 713-468-7704

Attn: Vasu Mistry at 361-857-8664

[www.infocusonline.org](http://www.infocusonline.org)

[infocusintl@aol.com](mailto:infocusintl@aol.com)

Reichert Ophthalmic Instruments

(Makes Lensometer)

P.O. Box 123, Buffalo, NY USA 14240

Phone: 716-686-4500

Fax: 716-686-4563

[www.reichert.com](http://www.reichert.com)

Ideal Eyewear (via Infocus)

(makes Instant Eyewear)

Call Mike Trombley

1-716-297-1500

i-Promotions, Inc.

(Makes Slip-in sunglasses)

9785 Mackenzie

Suite 104

St. Louis, MO 63123-5438

Phone: 314-638-1900

Fax 314-638-1818

Wilson Ophthalmics

(Sells E-Charts and Proview tester)

1-800-222-2020

Attn: Anita

Bernell Optical VTP

4010 N Home Street

Mishawaka, In. 46545

800-348-2225 or 574-259-2070

Fax: 574-259-2102

<http://bernell.com/>

Wristband and Medical Speciality Products  
(provided wristbands for patients)

1-800-940-3993

<http://www.wristbandsupply.com/wrist.htm>

OR

Wristbands Medtech USA, Inc

7380 Sand Lake Rd.

Unit 500, 5<sup>th</sup> Fl

Orland, On 32819

Phone: (800)-361-1259

Fax: (888)-652-6565

[www.medtechgroup.com](http://www.medtechgroup.com)

Texas Lions Club

(Provides measured used prescription  
glasses & 30 dozen reading glasses at 60  
cents each)

c/o Ike Fitzgerald

2811 West Golfcourse Rd

Midland, Tx 79701

Phone: 915-682-7074

### REFERENCES:

Ophthalmology

(An illustrated Colour Text)

M. Batterbury

B. Bowling

Churchill Livingstone Publishing

ISBN 0443-05537-8

Where there is No Doctor

A village health care handbook

David Werner with

Carol Thuman and Jane Maxwell

ISBN 0-942364-15-5

Published by: The Hesperial Foundation

Refer to eye care chapter

The Eye Book “A Complete Guide to Eye  
Disorders and Health”

Gary H. Cassel, M.D.

Michael D. Billig, O.D.



Harry G. Randall, M.D.

A Johns Hopkins Press Health Book

ISBN: 0-8018-5835-6 (alk. paper)

ISBN: 0-8018-5847-X (pbk.: alk. paper)

### APPENDIX H – Patient Referral Form

 **Anteojos** 

Please provide this person with glasses for:

Nearsighted: \_\_\_ Farsighted: \_\_\_ Reading: \_\_\_

Name/Age of Person: \_\_\_\_\_



Male: \_\_\_ Female: \_\_\_ Child: \_\_\_

Further Description of problem: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

 **Anteojos** 

Please provide this person with glasses for:

Nearsighted: \_\_\_ Farsighted: \_\_\_ Reading: \_\_\_

Name/Age of Person: \_\_\_\_\_



Male: \_\_\_ Female: \_\_\_ Child: \_\_\_

Further Description of problem: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

 **Anteojos** 

Please provide this person with glasses for:

Nearsighted: \_\_\_ Farsighted: \_\_\_ Reading: \_\_\_

Name/Age of Person: \_\_\_\_\_



Male: \_\_\_ Female: \_\_\_ Child: \_\_\_

Further Description of problem: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

 **Anteojos** 

Please provide this person with glasses for:

Nearsighted: \_\_\_ Farsighted: \_\_\_ Reading: \_\_\_

Name/Age of Person: \_\_\_\_\_

Male: \_\_\_ Female: \_\_\_ Child: \_\_\_

Further Description of problem: \_\_\_\_\_

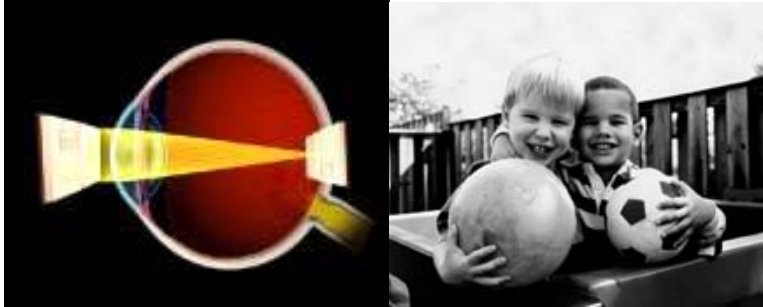
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### APPENDIX I – EYE CONDITIONS (What you see)

#### Normal Eyes



#### Age related Macular Degeneration



#### With Cataracts



#### Diabetic Retinopathy



#### With Glaucoma



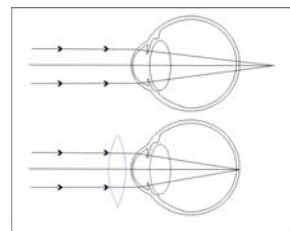
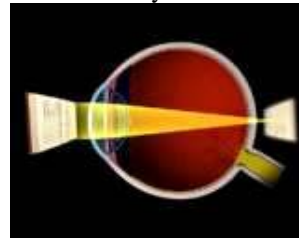
#### Myopia (Near Sightedness)

See at Near Only

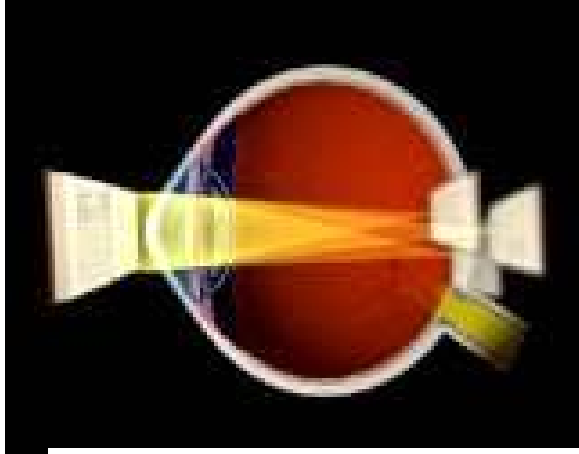


#### Hyperopia (Far Sightedness)

See at far only.



## Astigmatism



## Prevalence

According to an American study published in *Archives of Ophthalmology*, nearly 3 in 10 children between the ages of 5 and 17 have astigmatism. A recent Brazilian study found that 34% of the students in one city were astigmatic. Regarding the prevalence in adults, a recent study in Bangladesh found that nearly 1 in 3 (32.4%) of those over the age of 30 had astigmatism. A recent Polish study revealed that "with-the-rule astigmatism" may lead to the onset of myopia. A number of studies have found that the prevalence of astigmatism increases with age.

Original

ai0

Compromise

ai0

Horizontal Focus

ai0

Vertical Focus

ai0



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**Created to train willing workers to serve the Lord.**

**By Holland Kendall      Last revised: 5/6/2014**