

# The ABCs of Pediatric Vision

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## Disclosures

- The content of this course was developed independently without commercial bias or influence
- We are the founding partners of SightLine Ophthalmic Consulting, LLC
- Our presentation contains images from the Visionix VX40 lens analyzer
- Essilor, Visionix - Consulting





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## Course Objectives

- Pediatric population
- Eyewear market share
- Visual conditions
- Visual development
- Educating parents and children
- Treatment options
  - Frames
  - Lenses
  - Cases
- Marketing and displaying kids eyewear



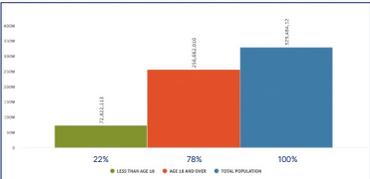
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# Pediatric Population



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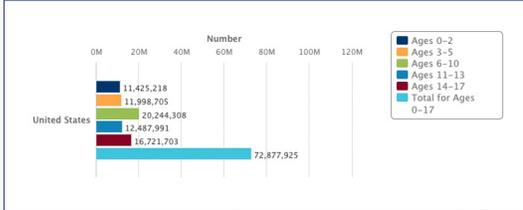
## USA Pediatric Population



The Annie E. Casey Foundation, KIDS COUNT Data Center, [datacenter.kidscount.org](http://datacenter.kidscount.org)

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## USA Pediatric Population Distribution by Age



Child Population - Kids Data.org

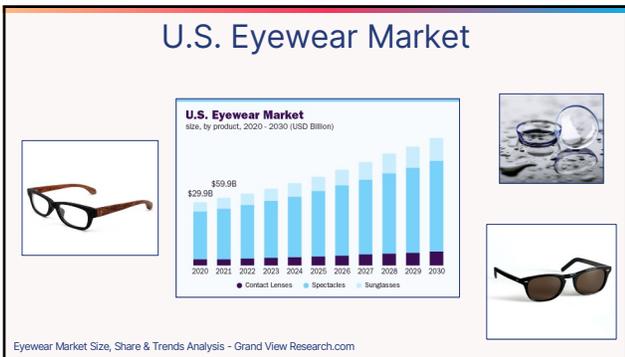
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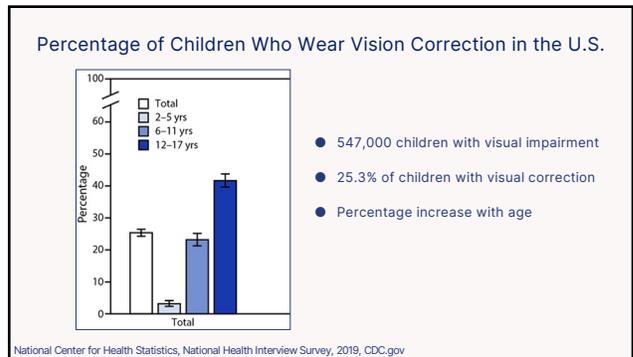
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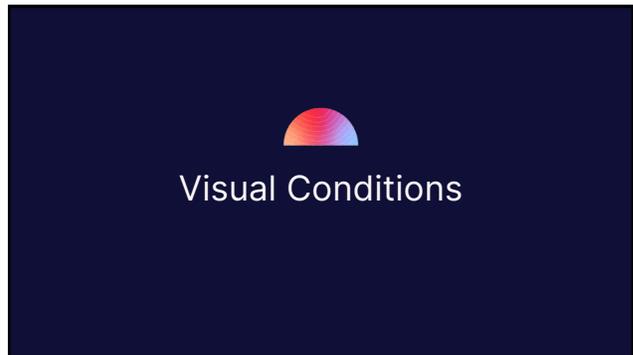
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### What are the Consequences?



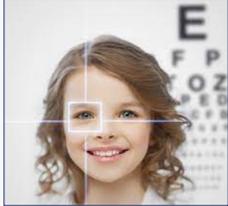
**POOR EYESIGHT  
LEADS TO  
POOR PERFORMANCE.**

Children's Vision Care in the 21st Century & its Impact on Education, Literacy, Social Issues, & the Workplace: A Call to Action, Joel N. Zaba, Journal of Behavioral Optometry

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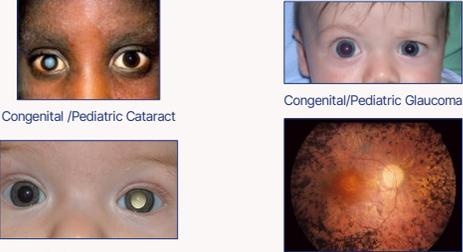
### Most Common Visual Impairments

- Refractive Errors
  - Myopia
  - Hyperopia
  - Astigmatism
- Amblyopia (Lazy eye)
- Strabismus (Cross eyed)
- Binocular Vision Dysfunction (BVD)
  - Convergence Issues
  - Divergence Issues
- Accommodation Disorders
  - Insufficiency
  - Excess
  - Spasm



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### Childhood Eye Diseases



Congenital /Pediatric Cataract

Congenital/Pediatric Glaucoma

Retinoblastoma

Retinitis Pigmentosa

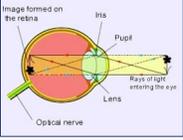
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### Visual Development

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### Visual Processing = Learning



Visual processing



700 neural connections/second

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### What do infants see?

Black, white, and 50 shades of gray




3 DAYS 1 MONTH 3 MONTHS 6 MONTHS 1 YEAR

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## What's Normal? Birth -24 months

**Vergence:** Accurate at 3 months  
**Accommodation:** Developed at 3-4 months  
**Stereopsis:** Developed at 3-4 months  
**Color Vision:** Developed at 3-4 months



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## Normal Range of Refractive Error

AGE	Normal
6 months	0 - 3.00D
9 months	0 - 2.25D
12 months	0 - 2.00D
18 mos	0 - 2.00D
24 mos	0 - 2.00D
30 mos	0 - 1.75D
36 mos	0 - 1.75D
48 mos	0 - 1.75D

AGE	Normal
5mos - 3 Years	0 - 1.75D
3Year - 5 Year	0 - 1.25D

AGE	Normal
5mos - 5 Years	0 - 0.75D

AGE	Normal
5mos - 5 Years	No myopia

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## Preschool Children 2-5 Yrs

Fine tuning visual motor skills  
 Continue developing new skills

- Building blocks stacking
- Playing with balls
- Drawing and Coloring



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## Amblyopia

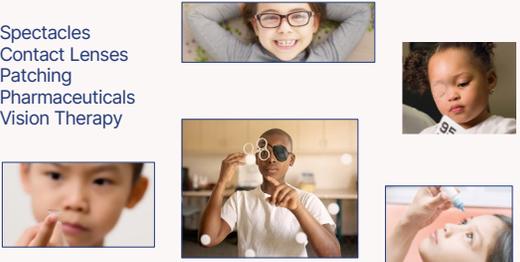
Refractive Error	Diopters
Isometropia	
Astigmatism	>2.50 D
Hyperopia	>5.00 D
Myopia	>8.00 D
Anisometropia	
Astigmatism	>1.50 D
Hyperopia	>1.00 D
Myopia	>3.00 D

Amblyopia "lazy eye" = a unilateral or bilateral condition in which the best corrected visual acuity is poorer than 20/20 in the absence of any obvious structural anomalies or ocular disease.

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## Amblyopia Treatments

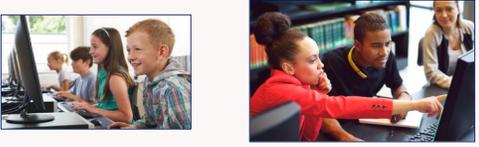
- Spectacles
- Contact Lenses
- Patching
- Pharmaceuticals
- Vision Therapy



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## School Age Children 6-18 Yrs

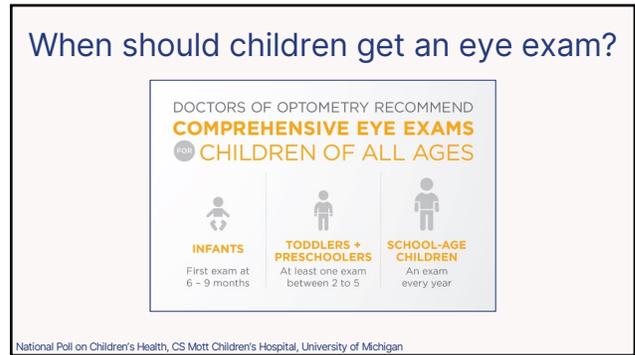
- Reading
- Writing
- Computers
- Sports
- Good visual acuity at distance and near
- Focusing ability
- Binocular vision/Eye tracking
- Eye-hand coordination
- Visual perception



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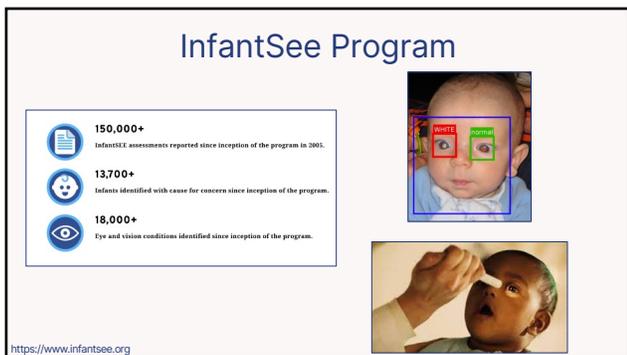
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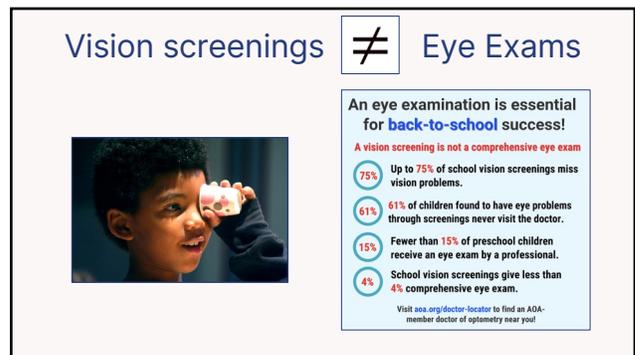
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## RESOURCES

InfantSee  
Affordable Care Act (ACA)  
Managed Vision Care (MVC) programs






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## Pediatric Visual Demands



Near work



Sports



Computers



Digital devices

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## Visual Skills

Skills needed for academic and athletic success:

- Visual Acuity
- Accommodation
- Eye Teaming and Tracking
- Eye Hand Coordination
- Visual Perception

**Eye teaming problems** look like seeing double.

Memorize an difficulty seeing clearly at all distances.

Eye tracking results in difficulty following a moving object or lines of printed text.

Accommodative dysfunction is difficulty shifting focus from near to far.

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## What to Look For

Signs and symptoms of a potential vision problem:

- Complaints of discomfort and fatigue
- Frequent eye rubbing or blinking
- Short attention span
- Avoiding reading and other close activities
- Frequent headaches
- Covering one eye
- Tiltting the head to one side
- Holding reading materials close to the face
- An eye turning in or out
- Seeing double
- Losing place when reading
- Difficulty remembering what he or she read
- Difficulty with motor skills








Complete list: American Optometric Association: Eye Health for Life

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## Treatment Options

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## Frames

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### Visual Solutions

What do parents want?

1. Durability
2. Warranty
3. Cost

What do kids want?

1. Fashion trends
2. Variety of colors
3. Familiar Brands






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### Frames: Zero to 5 Years Old







- Safe
- Proper fit
- Durable

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### Frames: 6 to 9 Years Old








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### Frames: 10 Years Old and Up








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### Proper Frame Fit



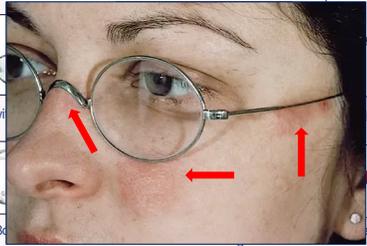


- Proper frame width
- Eyes centered
- Well fit bridge design
- Appropriate temple length and style

Select a frame with the proper fit to avoid excess adjustments on dispense to and the need to re-select a different frame after the lenses have been made.

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### Frame Anatomy







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## Sports Eyewear






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## Sports Related Eye Injuries

Sport	Total Injuries	0-14 years old	15+ years old
* Basketball	4,597	985	3,632
* Water/Pool activities	4,565	2,637	2,198
*Guns: air, gas, spring, BB	3,612	1,632	1,980
Baseball/Softball	2,109	1,121	988
Football	959	483	476
Bicycling	2,495	668	1,827
Soccer	1,618	404	1,214

Sports injuries by age 2020, Prevent Blindness.org \* = Top 3 sports injuries

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## The Right Protection

**ASTM F803**

- Baseball/Softball
- Basketball
- Field Hockey
- Lacrosse
- Racquet sports
- Soccer

**ASTM F513: Face Mask on Helmet**

- Ice Hockey
- Street Hockey
- Swim Goggles
- Water Polo

American Society for Testing and Materials (ASTM)  
American National Standards Institute (ANSI)





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## Resources



REC SPECS







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# Lenses

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## Lens Material



Safety First

Lens Type	Index	Abbe	Specific Gravity	Impact Resistance	UV Protection
Glass	1.523	59	2.54	poor	No
CR-39	1.498	58	1.32	good	No
Trivex	1.530	46	1.11	excellent	Yes
Polycarbonate	1.586	30	1.20	excellent	Yes

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### Lens Treatments



**No ARC vs. ARC**



**Blue Blockers**

- Reduces glare
- Allows others to see eyes and reactions
- Extended warranty

- Coating vs Filter
- Clear vs slight yellow vs bluish purple reflection
- Prescribe?

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### Photochromatic Lenses




**4 Style Colors**

SAPPHIRE



AMETHYST



AMBER



EMERALD



**Performance study:**

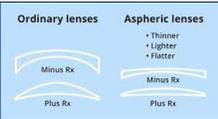
- n= 50 children ages 10-15 y.o.
- 88% chose to continue to wear photochromic
- Clear = Photochromic indoor activities
- Photochromatic better for outdoor activities

Evaluation of the performance of photochromic spectacle lenses in children and adolescents aged 10 to 15 years; Clin Exp Optom

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### Single Vision Lens Design

**Ordinary lenses**



**Aspheric lenses**

- Thinner
- Lighter
- Flatter



**Field of Perfectly Clear Vision Comparison**

	Best Form Pol.	Aspheric Pol.	Atoric Pol.
Rx +4.00 -1.00			
Rx -4.00 -1.00			

- Spherical - low Rx's
- Aspheric - +/-4.00
  - 35-45% thinner, lighter, flatter
  - More beneficial for plus lenses
  - Some benefits for minus lenses
- Atoric- high plus and minus cylindrical lenses
  - Wider field of view
  - Thinner, lighter
  - Decreases off axis effects with eye movements



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### Single Vision Lenses

#### Vertical Fitting Height Measurements

Vertical Fitting Height = The measurement in millimeters  
From the center of the pupil to the lowest/deepest part of the visible lens



**When to specify VFHs**

- Freeform / Digital
- Anisometropia

**Martin's Rule of Tilt**

Lower OC 1mm for every 2° of Panto tilt  
Frame angle default = 8° angle

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## Multifocals

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### Accommodative and BV Disorders

Condition	Treatment
Insufficiency	(+) Lenses @ Near
Infacility	VT (+) Lenses @ Near
Spasm	VT (+) Lenses @ Near
Ill-Sustained	(+) Lenses @ Near
Exophoria	Prism, VT
Esophoria	(+) Lenses, Prism
Gross Convergence Insufficiency	VT
Convergence Excess	(+) Lenses, Prism
Vertical Phoria	Prism



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### Lens Designs for Rxing Near Plus

Lenses	Benefits	Limitations
Single Vision Near	Wide Field of View	Distance Blur
Bifocal	Wide Field of View	Cosmesis Image Jump
PAL ( Short Corridor)	Cosmesis	Small Reading Area Narrow Corridor Cost
SV Distance with Near Power Boost	Wide Field of View Cosmesis Lower Cost	(Practically None)

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### Multifocals: Segmented/Lined

Proper fit

VFH:  
Preschool=Fit at bottom of pupil  
School Age=2 mm above lower lid

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### Variable Power Lens Designs

- Lens Design
  - Dual vs All Back Surface
- Progressive
  - Short Corridor
  - Fixed Corridor
- Powerboost/Anti-fatigue

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### Dual Surface (DS) vs All Back Surface (ABS)

Dual Surface

#### Spherical lens forms

- Meniscus (Nitsche and Gunter)
- More Bent with +/- 6.00D BC
- Plus Rx: Base Curve = -4.00 Ds on the back
- Minus Rx: Base Curve = +6.00 Ds on the front

BC = -4.00      BC = +6.00

All Back Surface

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### Multifocals: Progressive Lenses

Hoya	Zeiss	Shamir
ID LifeStyle3 Urban, Indoor, Outdoor 11,12,13,14,VL	SmartLife Individual Balanced, Intermediate, Near Short 14 Medium 16 Long 18	Autograph Intelligence 11,13,15,18,V
Dual Surfaced	All Back Surface	All Back Surface
Array 2 BKS 11,13,15,17,VL		
All Back Surface		

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### Multifocals: Powerboost/Anti-fatigue

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Multifocals: Powerboost Lenses/Anti-fatigue

Power Boost Lenses	Boost at the Bottom
Digital 500 Digital 750 Digital 1000 Digital 1250	+0.50 +0.75 +1.00 +1.25
Eyezen +1 Eyezen +2 Eyezen +3 Eyezen +4	+0.40 +0.60 +0.85 +1.10
Hoya Sync 5 Hoya Sync 9 Hoya Sync 13	+0.57 +0.95 +1.32
Relieve 50 Relieve 70	+0.50 +0.70

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Case Examples

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CASE 1

Dr. Brown Eyes  
123 Sunshine St.  
Amazing, CA 98765



NAME Annie DATE \_\_\_\_\_  
ADDRESS \_\_\_\_\_

**Rx**

		SPHERICAL	CYLINDRICAL	AXIS	PRISM	BASE
D.V.	O.D.	+1.00	DS			
	O.S.	+1.00	DS			
N.V.	O.D.	+1.00				
	O.S.	+1.00				

Remarks \_\_\_\_\_  
DR. \_\_\_\_\_

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Multifocals: Powerboost Lenses/Anti-fatigue

Power Boost Lenses	Boost at the Bottom
Digital 500 Digital 750 Digital 1000 Digital 1250	+0.50 +0.75 <b>+1.00</b> <b>+1.25</b>
Eyezen +1 Eyezen +2 Eyezen +3 Eyezen +4	+0.40 +0.60 +0.85 <b>+1.10</b>
Hoya Sync 5 Hoya Sync 9 Hoya Sync 13	+0.57 <b>+0.95</b> <b>+1.32</b>
Relieve 50 Relieve 70	+0.50 +0.70

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Dr. Brown Eyes  
123 Sunshine St.  
Amazing, CA 98765



NAME Annie DATE \_\_\_\_\_  
ADDRESS \_\_\_\_\_

**Rx**

		SPHERICAL	CYLINDRICAL	AXIS	PRISM	BASE
D.V.	O.D.	+1.00	DS			
	O.S.	+1.00	DS			
N.V.	O.D.					
	O.S.					

Remarks Zeiss Digital 1000  
DR. \_\_\_\_\_

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CASE 2

Dr. Brown Eyes  
123 Sunshine St.  
Amazing, CA 98765



NAME Sophie DATE \_\_\_\_\_  
ADDRESS \_\_\_\_\_

**Rx**

		SPHERICAL	CYLINDRICAL	AXIS	PRISM	BASE
D.V.	O.D.	-0.75	-0.50	010		
	O.S.	-1.00	-0.50	170		
N.V.	O.D.	+0.75				
	O.S.	+0.75				

Remarks \_\_\_\_\_  
DR. \_\_\_\_\_

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### Multifocals: Powerboost Lenses/Anti-fatigue

Power Boost Lenses	Boost at the Bottom
	Digital 500 +0.50 Digital 50 +0.75 Digital 1000 +1.00 Digital 1250 +1.25
	Eyezen +1 +0.40 Eyezen +2 +0.60 Eyezen +3 +0.85 Eyezen +4 +1.10
	Hoya Sync 5 +0.57 Hoya Sync 9 +0.95 Hoya Sync 13 +1.32
	Relieve 50 +0.50 Relieve 70 +0.70

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### CASE 2

Dr. Brown Eyes  
123 Sunshine St.  
Amazing, CA 98765



NAME: Sophie  
ADDRESS: \_\_\_\_\_ DATE: \_\_\_\_\_

**Rx**

D.V.	O.D.	SPHERICAL	CYLINDRICAL	AXIS	PRISM	BASE
	O.D.	-0.75	-0.50	010		
	O.S.	-1.00	-0.50	170		
	N.V.					
	O.S.					

Remarks: Eyezen +3  
DR: \_\_\_\_\_

FM-1075

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### Appeal to the Kids





- Kid friendly waiting area
  - Toys
  - Books
  - Treasure Chest

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### Displaying the Frames





- Display at a lower level
- Include Sports and Sun eyewear
- Promote second pair sales
  - General Wear
  - Sports
  - Sun

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### Communication is Key





- Speak directly to the child
- Explain the Rx to parent and child
- Consider bundling or free lenses with 2nd pair
- Discuss Warranty

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### Dispensing is the Key to Success

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### Key Takeaways

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### Take Home Points

**Untreated vision problems lead to:**

- Poor school performance
- Low self-esteem, emotion and antisocial behavior
- Incarceration

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### Take Home Points

**Healthy Habits:**

- Balanced diet
- Outdoor time
- UV protection/ Safety eyewear
- Monitor screen time/ 20-20-20 Rule

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### Everyone WINS!

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### THANK YOU!

Thank you very much

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