



# EARLY CHILDHOOD VISUAL DEVELOPMENT

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Pediatric Optometrist



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## LEARNING: SIGNIFICANCE OF VISION

- Vision is a dominant process in the growth, development, and performance of children
- Eighty percent (80%) of what children learn is acquired through the visual processing of information



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## LEARNING: SIGNIFICANCE OF VISION

- Vision affects every aspect of a child's development:
  - Gross and fine motor skills
  - Language skills
  - Imitation and repetition
  - Interaction and social skills



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## LEARNING: SIGNIFICANCE OF VISION

- Vision affects every aspect of a child's learning:
  - Reading a book
  - Copying from the blackboard
  - Interacting in the playground & with gym equipment
  - Playing sports



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## VISION SKILLS THAT DEVELOP BEFORE A CHILD'S 1ST BIRTHDAY...

- Eye Movements: 2-3 months
- Accommodation: 2-3 months
- Contrast sensitivity: 2-3 months
- Colour vision: 3-4 months
- Stereopsis: 6 months
- Visual acuity: 8 months
- Refractive error: 12 months



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## RISK FACTORS FOR VISION PROBLEMS

- Pre-natal infections and trauma
- Premature birth
- Complications during delivery (long labour, oxygen deprivation)
- Childhood illnesses (viral diseases, high fever)
- Developmental / genetic syndromes
- Cerebral palsy
- Hearing impairment
- Family history of high refractive error, strabismus, amblyopia



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## VISUAL MILESTONES

By age...	Your child should...
Birth to 1 month	Fixate briefly on bright lights or faces, although one or both eyes may wander out of position
1-3 months	Watch your face when being talked to Follow moving objects horizontally Look towards new sounds
3-5 months	Begin to reach for nearby objects Look at items held in his/her hand

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## VISUAL MILESTONES

By age...	Your child should...
5-7 months	Begin to look for more distant objects and people around the room Have eyes straight most of the time
7-12 months	Use accurate focusing, eye tracking and depth perception to locate, recognize and crawl towards objects of interest Attend to books and/or television for longer periods Imitate social gestures (smiling, waving, etc.)

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## VISUAL MILESTONES

By age...	Your child should...
12-18 months	Play hide-and-seek or peek-a-boo Point to pictures in books Build a tower of up to 4-5 cubes Circular strokes with a crayon
18 months – 2 years	Hold a crayon with an adult grasp, and make vertical and horizontal strokes easily Walk across changes in flooring (carpet to floor, stairs, inclines) without difficulty

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## VISUAL MILESTONES

By age...	Your child should...
2-3 years	Run, jump, hop, and skip with fewer trips or falls Begin to cut paper with scissors
3-5 years	Draw simple forms, print letters, colour within lines, cut and paste simple shapes Demonstrate visual experience by telling about places, objects or people seen elsewhere



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## PREVALENCE OF VISION PROBLEMS IN CHILDREN

- 10% of preschoolers
- 25% of children in grades K-6
- Higher prevalence in children at-risk:
  - Over 30% of aboriginal children
  - Up to 40% of deaf children
  - 50-75% of children with cerebral palsy
  - 50-80% of children with global developmental delay
  - Up to 90% of children with Down Syndrome



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## Children with vision problems...

- A. May have speech delays.
- B. May crawl or walk late.
- C. May have difficulty interacting with others.
- D. May have a short attention span for age.
- E. All of the above.



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## SIGNS OF VISION PROBLEMS

- White pupil
- Droopy eyelid covering pupil
- Eye(s) misaligned or constant eye movement
- Squints or tilts head to one side
- Closes/covers one eye
- Rubs eyes; excessively sensitive to light
- Watery eyes; frequent eye infections
- Fails to reach visual/developmental milestones



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## SIGNS OF VISION PROBLEMS

- Difficulty with puzzles, building blocks/toys
- Difficulty recognizing letters, numbers
- Irregular sizing, spacing of printing
- Makes number, letter, word reversals
- Skips words or lines when reading
- Difficulty copying
- Extra effort to complete written work
- Blurred vision, double vision, headaches



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## When vision problems remain undetected...

- Reduced class participation
- Poorer problem solving abilities
- Limited use of information
- More concentration / behaviour issues
- Difficulties with conflict resolution

(TDSB studies)



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## When vision problems remain undetected...

- Frustration with learning
- Failure to learn at rate of peers
- Negative self image
- Possible special education
- Discipline problems/young offender risk
- Drop out



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The percentage of children identified as having reading difficulties who have an uncorrected or unidentified vision problem is:

- 1%
- 10%
- 25%
- 60%



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## DISTINCTION BETWEEN EYESIGHT AND VISION

*Eyesight* is the ability to see objects clearly

*20/20 eyesight* simply means that, from a distance of twenty feet, a child can clearly see letters which are 1 cm in height



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### DISTINCTION BETWEEN EYESIGHT AND VISION

**VISION** is the ability to comfortably see and process visual information, and involves:

- Eyesight
- Eye teaming
- Eye focusing
- Eye motility
- Eye health
- Perception



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### CONDITIONS OF THE EYE



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### NEARSIGHTEDNESS

- Nearsighted children typically see well up close, but have difficulty seeing far away



Nearsighted Eye



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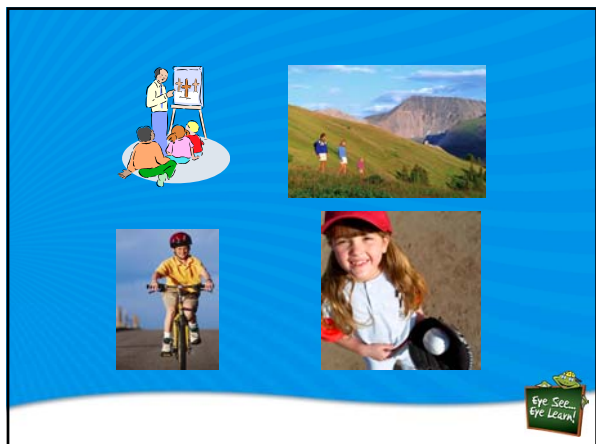
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## FARSIGHTEDNESS

- Farsighted adults typically see well far away, but have difficulty seeing up close
- Farsighted children may see well at all distances but strain their eye muscles to focus



Farsighted Eye



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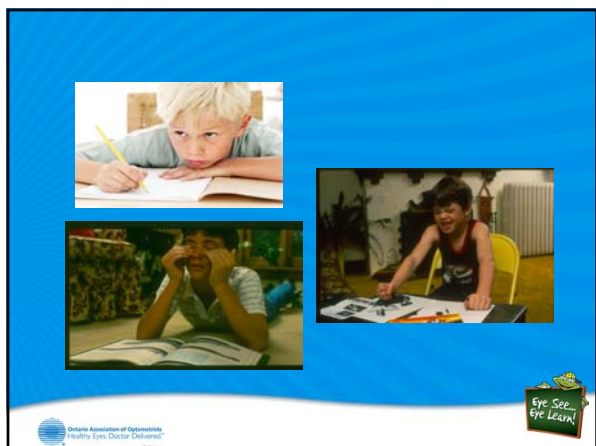
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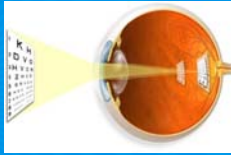
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## ASTIGMATISM



- In an eye with Astigmatism, the cornea has an oval shape, like a football
- Can occur along with nearsightedness and farsightedness



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Original	Compromise
aio	aio
Horizontal Focus	Vertical Focus
aio	aio



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## BINOCULAR VISION (EYE CO-ORDINATION)

- Eye Teaming:
  - Strabismus
- Visual Efficiency Skills:
  - Focusing – accommodation
  - Motility – vergence, eye tracking, nystagmus



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### STRABISMUS: ESOTROPIA



The diagram shows two eyes where the right eye is turned inward. The top photo shows a child with the right eye turned inward. The bottom photo shows a child with the left eye turned inward. A small sign in the bottom right corner says "Eye See... Eye Learn!".

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### STRABISMUS: EXOTROPIA



The diagram shows two eyes where the right eye is turned outward. The photo shows a child with the right eye turned outward. A small sign in the bottom right corner says "Eye See... Eye Learn!".

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### VISUAL EFFICIENCY SKILLS



The collage includes: a child reading a book, a child writing at a desk, a woman helping a child with schoolwork, and a cartoon of a person tripping over a pencil. A small sign in the bottom right corner says "Eye See... Eye Learn!".

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## EYE HEALTH

- Common problems:
  - excessive tearing or blinking
  - crusty eyes
  - rubbing, itching eyes
  - red or swollen eyelids
  - frequent infection or styes



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## EYE HEALTH

- Some systemic diseases and/or their medications can affect the eyes...
  - diabetes
  - cerebral palsy
  - muscular dystrophy



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## EYE HEALTH

- Some serious eye conditions can exist without pain or any noticeable symptoms
- Only a trained eye doctor can diagnose:
  - congenital diseases
  - cataracts
  - retinoblastoma (tumours)



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### EYE HEALTH



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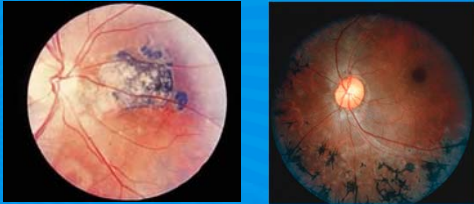
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### EYE HEALTH



Eye See... Eye Learn!

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### EYE HEALTH



Eye See... Eye Learn!

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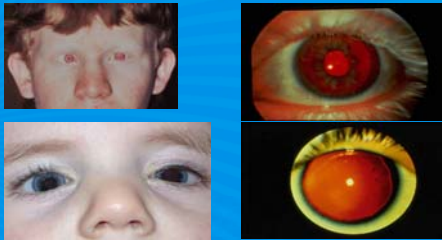
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## EYE HEALTH



Eye See... Eye Learn!

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## AMBLYOPIA (LAZY EYE)

- Failure for vision to develop in one or both structurally normal eyes due to previously uncorrected vision problems
- Occurs within the first 4 years of life (critical period)
- Most common causes:
  - large difference in focusing ability between the two eyes
  - constant strabismus
  - deprivation due to cataract, ptosis, etc.



Eye See... Eye Learn!

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## Amblyopia

- 4th most common disability in children\*
- 15,000 three-year-olds develop amblyopia yearly in Canada
- Responsible for loss of vision in more people under age 45 than all other ocular diseases and trauma combined
- Half of all children with amblyopia are diagnosed after age five when therapy is less effective

\*Source: National Society to Prevent Blindness



Eye See... Eye Learn!

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### What is the leading cause of vision loss in children?

- A. Disease and pathology
- B. Trauma
- C. Hockey
- D. Amblyopia (Lazy Eye)



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### TREATMENT: GLASSES



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### TREATMENT: CONTACT LENSES



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### TREATMENT: PATCHING

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### TREATMENT: VISION THERAPY

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### TREATMENT: LOW VISION AIDS

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It is important to distinguish between a **Comprehensive Vision Examination** and a **Vision Screening**



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### VISION SCREENINGS

- Limited process – some screenings check distance vision only
- No national standards established
- Unreliable for children under the age of four
- **As many as 43% of children with vision problems can pass a vision screening!**



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### VISION SCREENINGS

- Can give parents a false sense of security
- When a screening reports that a child is seeing well, parents often assume that no further exam is required and fail to EVER take their child for a comprehensive eye exam



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## VISION SCREENINGS

- Fewer than 50% of children identified as needing further professional eye and vision care ever receive that care
- Of those that do, the average time between the screening and the exam is 18 months!



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## COMPREHENSIVE EYE EXAMS

Include assessment of:

- Ocular and health history
- Near vision for reading and writing
- Distance vision
- Refractive error
- Binocular vision
- Accommodation/focusing
- Motility and eye tracking
- Eye health



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## HISTORY

- Birth history (prematurity, complications during delivery)
- Achieving developmental milestones
- Progress at school
- Family history
- What signs / symptoms have been noticed?



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# VISUAL ACUITY



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# REFRACTION



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# BINOCULAR VISION



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## OCULAR HEALTH



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## DISPELLING THE MYTHS

Myth #1:  
“My child will tell me if he can't see well.”

**Fact:** Young children don't always know they see any differently than other children. They have nothing to compare to.

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## DISPELLING THE MYTHS

Myth #2:  
“My child is doing fine in school. She doesn't need an eye exam.”

**Fact:** Many children find ways to work extra hard to overcome vision problems. Children may reach their **full** potential if a undetected problem is found and corrected.

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## DISPELLING THE MYTHS

Myth #3:

"I will have to wait until my child can read letters before he can do an eye examination."

Fact: An infant as young as six months of age can be examined. Many objective tests are used to check vision and eye health.



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## DISPELLING THE MYTHS

Myth #4:

"My child will be intimidated by the instruments and may not want to be examined."

Fact: Many optometrists have child-friendly tests including videos, fun shapes and colours that help children feel comfortable.



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## WHO CAN CHECK A CHILD'S VISION?

- Optometrists and ophthalmologists have special training and equipment to diagnose and treat eye conditions
- Optometrists provide primary eye care, ophthalmologists provide secondary and surgical care



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## WHO CAN CHECK A CHILD'S VISION?

- Some family doctors and pediatricians do partial eye examinations
- Opticians make and fit glasses and contact lenses; cannot perform eye examinations or write prescriptions



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## FREQUENCY OF CHILDREN'S EYE EXAMINATIONS

- The OAO's Recommended Guideline for Frequency of Children's Eye Exams:
  - At 6 months of age
  - Before starting school
  - Every 12-24 months as recommended by an optometrist



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### What percentage of children start school without ever having had a comprehensive eye exam?

18%

36%

48%

85%



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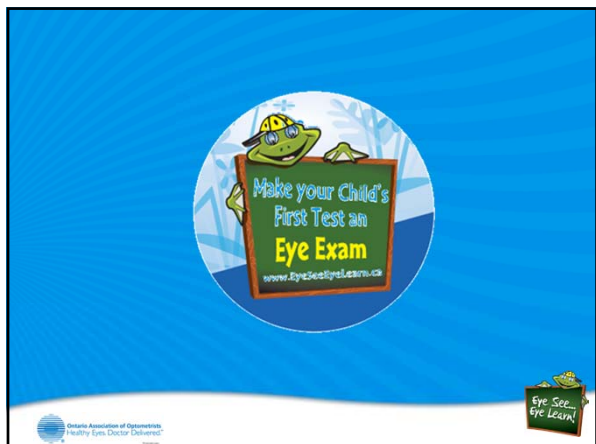
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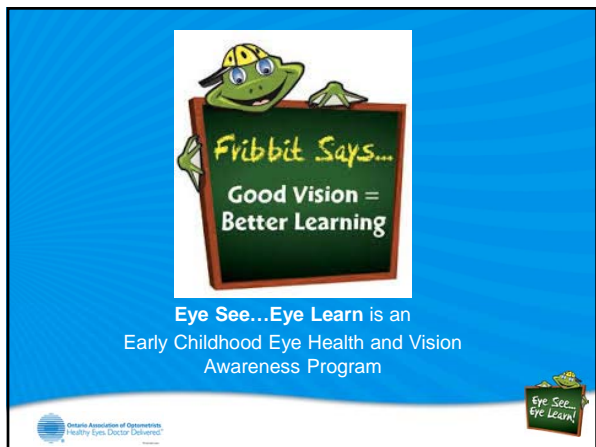
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Eye See...Eye Learn is an  
Early Childhood Eye Health and Vision  
Awareness Program

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### EYE SEE...EYE LEARN OBJECTIVES

- To detect, diagnose and treat children with vision problems before they begin grade one so that every child can see and learn to the best of his/her ability.
- To eliminate the barriers surrounding children's eye care by providing free eyeglasses to any child participating in the Eye See...Eye Learn program who requires them.

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## ZERO FINANCIAL BARRIERS

- All children 19 years of age and under are covered by OHIP for a comprehensive eye exam every 12 months
- Top quality frames and lenses have been donated by industry partners for children participating in the Eye See...Eye Learn program
- Optometrists are waiving all dispensing fees for children receiving Eye See...Eye Learn eyeglasses



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## A NATIONAL INITIATIVE

- Eye See...Eye Learn was first introduced in Elk Island, Alberta in 2004 as a pilot project
- As a result of the pilot the Alberta Government ensured that the Eye See...Eye Learn Program was implemented province-wide with funding and full endorsement from Alberta Education and Children's Services
- **The Eye See...Eye Learn program is now expanding into all provinces across Canada**



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## EYE SEE...EYE LEARN ONTARIO

- Eye See...Eye Learn information pamphlets are provided to all parents of JK children by the school teacher
- The pamphlets include general eye care information and a list of local optometrists
- In some schools, optometrists are present at Kindergarten registration nights to give further information to parents and teachers



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## EYE SEE...EYE LEARN EXPANSION

- The Eye See...Eye Learn program currently is in Brant-Haldimand-Norfolk, Dufferin-Peel, Grey-Bruce, Guelph-Wellington, Halton, Hamilton-Wentworth, Huron-Perth, Kitchener-Waterloo, London-Middlesex, Niagara, Peel, Sarnia-Lambton-Chatham-Kent, Simcoe-Muskoka, Thunder Bay, Windsor-Essex, York
- The Eye See...Eye Learn program will be expanding to include Toronto for the 2014-2015 school year


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## SPREAD THE WORD...

- Help spread the word about the importance of vision and the ESEL program to parents, caregivers, colleagues and friends
- Fewer children will begin school with undiagnosed vision problems
- Vision problems will not be a barrier to a child's educational success or learning ability
- We are investing in our future – OUR CHILDREN


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## FOR MORE INFORMATION ON THE EYE SEE...EYE LEARN PROGRAM

Contact:

Ontario Association of Optometrists  
855-424-ESEL (3735)

Canadian Association of Optometrists  
[www.opto.ca](http://www.opto.ca)

Resources Available Online:  
[www.EyeSeeEyeLearn.ca](http://www.EyeSeeEyeLearn.ca)





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**Questions about children's vision?**

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