



*American Association for
Pediatric Ophthalmology
and Strabismus*

PEDIATRIC VISION SCREENING

**GUIDELINES FOR PRIMARY CARE
PROVIDERS AND SCHOOL NURSES**



American Association for
Pediatric Ophthalmology
and Strabismus

Learning Objectives

- “ Appreciate the importance of vision screening during childhood.
- “ Understand methods that enhance the accuracy of visual acuity screening.
- “ Appreciate new technologies that can identify signs of potential vision problems.



*American Association for
Pediatric Ophthalmology
and Strabismus*

PEDIATRIC VISUAL ACUITY SCREENING



American Association for
Pediatric Ophthalmology
and Strabismus

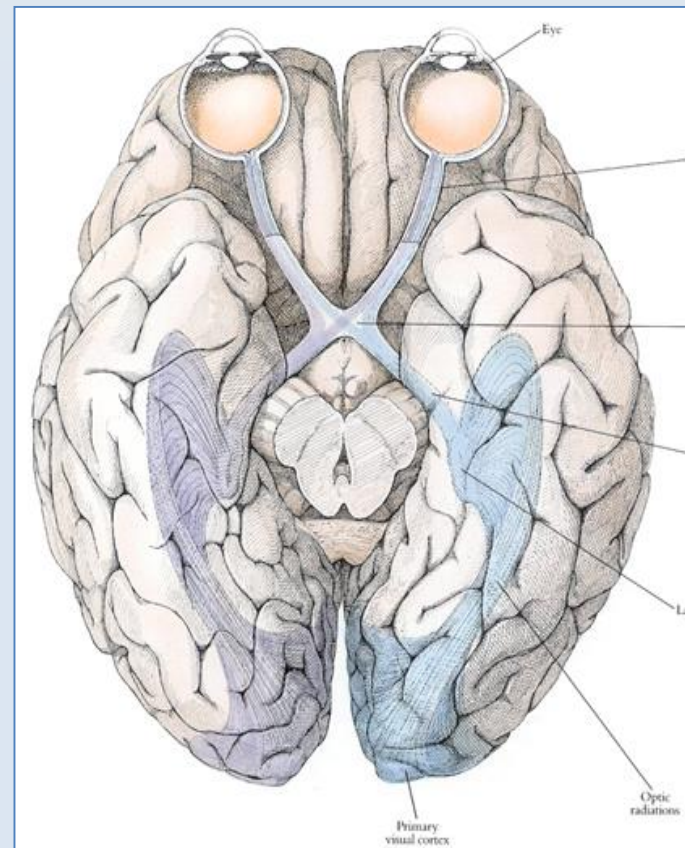
Why Perform Vision Screening?

- “ Primary Care Providers and School Nurses:
 - . The first line of defense to detect preventable vision loss in children.
- “ Recommended as part of the American Academy of Pediatrics [Bright Futures Periodicity](#) schedule.
- “ Why do children lose vision?
 - . **Amblyopia**: commonly referred to as “lazy eye”

A screenshot of the Bright Futures Periodicity Schedule, a comprehensive chart used by pediatricians to guide preventive health care. The chart is organized into columns for different age groups: Newborn, Infancy, Toddlerhood, and School Age. Each column contains a grid of recommended services, such as physical exams, immunizations, and vision screenings, with specific frequency intervals (e.g., 'at birth', '12 months', '18 months'). The chart is color-coded by age group: Newborn (green), Infancy (yellow), Toddlerhood (pink), and School Age (blue).

Amblyopia

- “ Amblyopia is a decrease in vision development that happens when the brain does not get normal stimulation from the eye(s).
- “ Abnormal development of vision results when one or both eyes send a blurred or distorted image to the brain.
- “ The brain is unable to “learn” to see clearly with that eye, even when glasses are used.





American Association for
Pediatric Ophthalmology
and Strabismus

Amblyopia

- “ Only children can get amblyopia. If it is not treated in childhood, it results in permanent loss of vision.
 - . The most common cause of vision loss in adults 20 - 70 years of age is untreated childhood amblyopia.
- “ Amblyopia is most commonly caused by untreated refractive errors, strabismus, or defects within the eye (e.g. cataract).



American Association for
Pediatric Ophthalmology
and Strabismus

Screening Early is Best

School-aged vision screening may occur too late:

- “ Amblyopia starts becoming refractory to treatment after 5 years of age.
- “ Permanent vision loss occurs by 7 years of age.



American Association for
Pediatric Ophthalmology
and Strabismus

Vision Screening in the United States

- “ National Eye Institute (NEI)
 - . Amblyopia affects 2 - 3% of children in the United States
 - “ An estimated 4.5 million children with preventable vision loss.



American Association for
Pediatric Ophthalmology
and Strabismus

Visual Acuity Screening is the Current Gold Standard

“ In cooperative children, direct measurement of visual acuity using visual acuity charts remains the gold standard for vision screening.



American Association for
Pediatric Ophthalmology
and Strabismus

Barriers to Screening

- “ Poor cooperation of young children
- “ Takes too long to perform
- “ Staff not adequately trained
- “ Poor reimbursement for providers



*American Association for
Pediatric Ophthalmology
and Strabismus*

Visual Acuity Screening Guidelines

Age-Dependent Thresholds



American Association for
Pediatric Ophthalmology
and Strabismus

Newborn to 35 Months (0-3 years)

- “ Take a health history, including eye problems in close relatives.
- “ Check vision (tracking), eye movement, and ocular alignment.
 - . Corneal light reflexes or cover testing
- “ Examine the eyes, eyelids, and pupils and red reflexes.



American Association for
Pediatric Ophthalmology
and Strabismus

36 Months to 47 Months (3–4 years)

Measure Visual Acuity

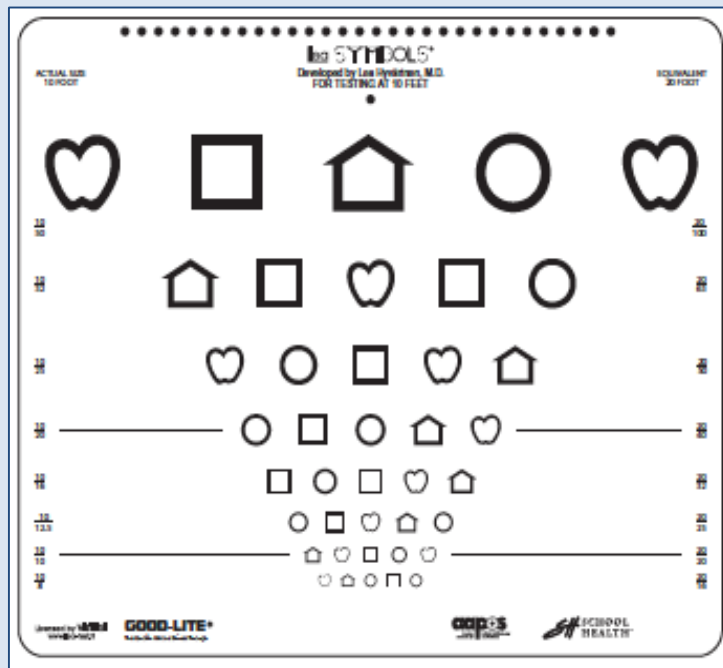
- “ Must be able to identify the majority of the 20/50 line optotypes with each eye.
- “ Testing should be done at 10 feet.
- “ Opposite eye must be effectively covered.



American Association for
Pediatric Ophthalmology
and Strabismus

36 Months to 47 Months (3-4 years) Recommended Chart Types

Lea Symbols



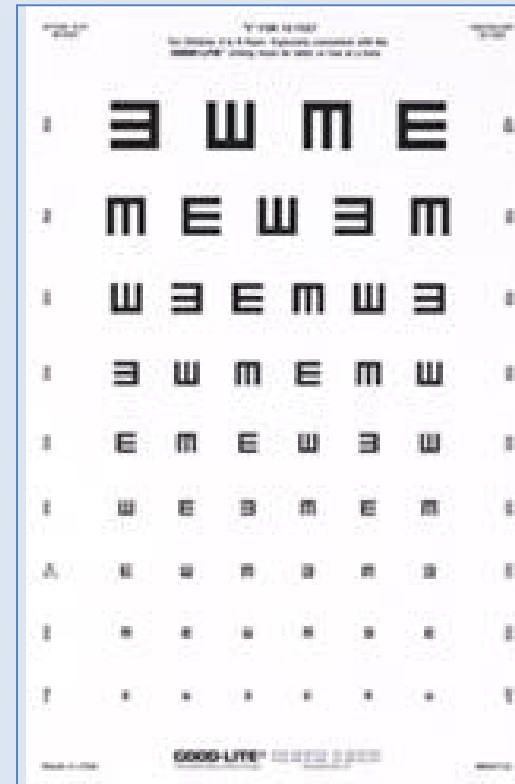
HOTV Letters





American Association for
Pediatric Ophthalmology
and Strabismus

Less than Ideal Chart Choices Not Recommended for Children

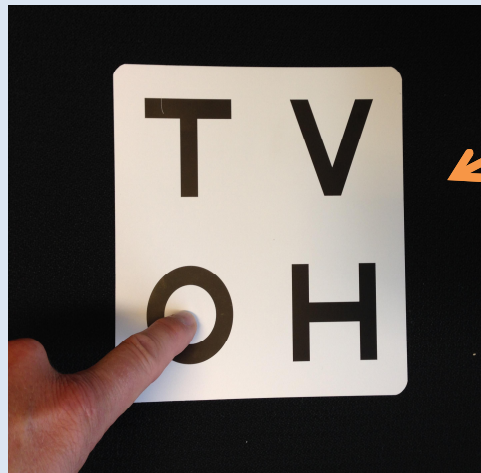
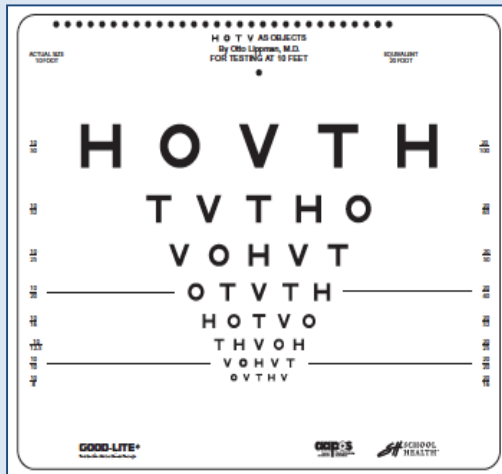




American Association for
Pediatric Ophthalmology
and Strabismus

48 Months to 59 Months (4-5 years)

“ Must be able to identify the majority of the 20/40 line optotypes with each eye.



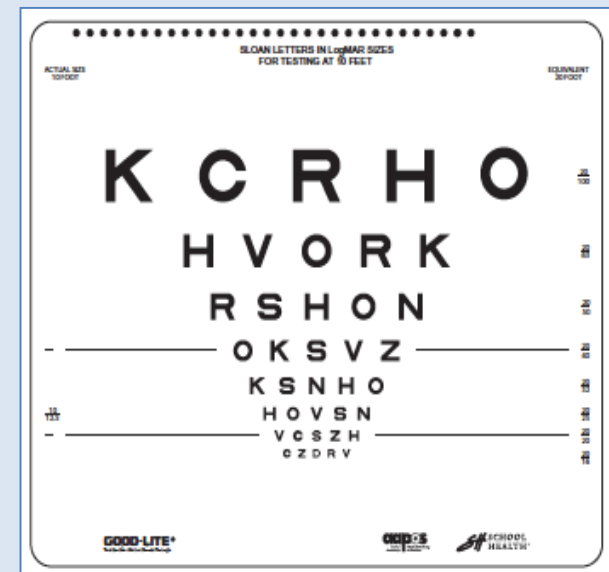
HOTV
Match Card



American Association for
Pediatric Ophthalmology
and Strabismus

60 Months and Older (5+ years)

- “ Must be able to identify the majority of the 20/32 (or 20/30)* line with each eye.
- “ Sloan letters (shown)
 - Preferred over Snellen Letters
 - Snellen charts have a 20/30 line*
- “ Repeat testing:
 - Every 1-2 years



Sloan letter chart



American Association for
Pediatric Ophthalmology
and Strabismus

AAPOS Vision Screening Kit

Conforms to AAPOS/AAO/AACO/AAP Visual
Acuity Standards



Contents:

Occluder patches

Occluder glasses

Occluder paddle

10 ft. measuring cord

Match response card

Acuity charts:

- Sloan letters

- Available with choice of Lea symbols or HOTV letters

Two instructional DVDs

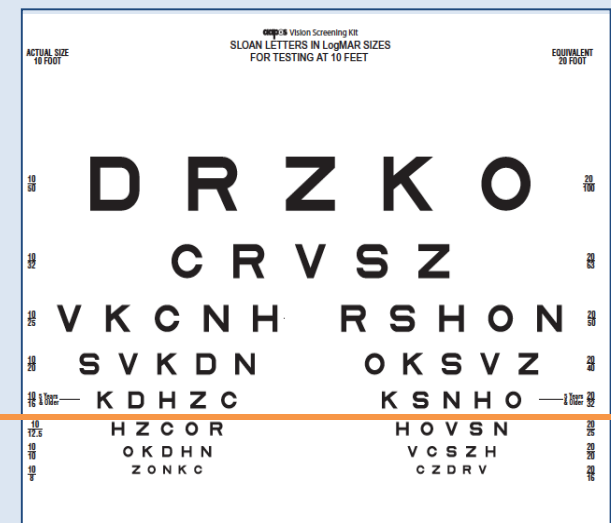
[AAPOS Vision Screening Kit](#)



American Association for
Pediatric Ophthalmology
and Strabismus

Threshold Screening

- “ Reading down the eye chart until a **Threshold line** is crossed...
 - . e.g. 20/32 for age 5+ years
- “ Or as far down as possible.
 - . Allows for inter-ocular comparison between the two eyes.
 - . Refer children with a two-line difference between eyes.

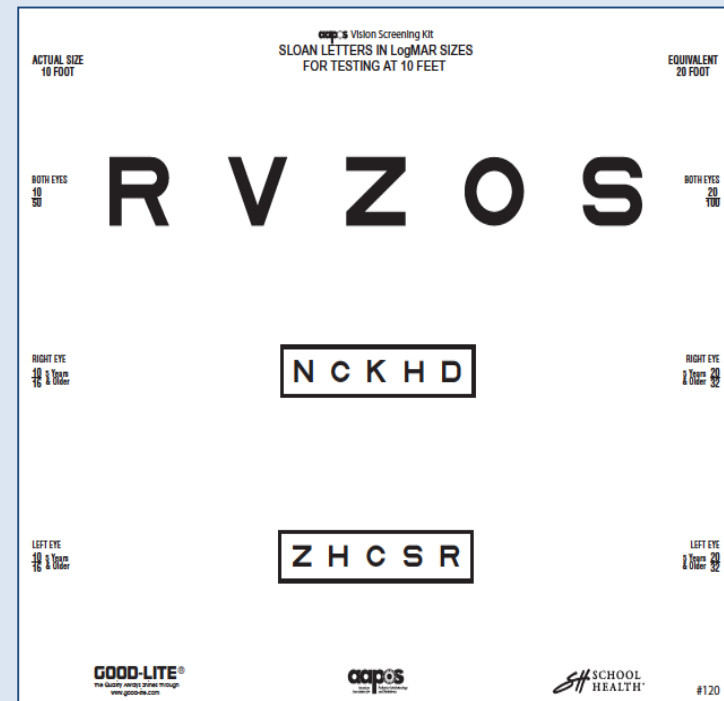
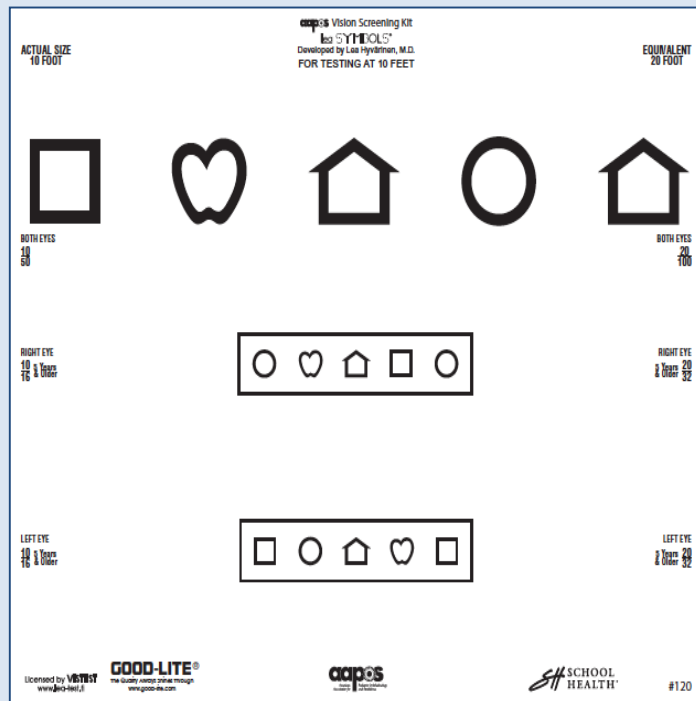




American Association for
Pediatric Ophthalmology
and Strabismus

Critical Line Screening is *Faster*

Only read a single “critical” line with each eye



Each chart has two boxed critical lines: one for each eye.



American Association for
Pediatric Ophthalmology
and Strabismus

Supplemental AAPOS Vision Screening Kit

Basic kit plus

- Stereo testing
- Color vision testing
- Near acuity charts for testing at 16 inches.



[AAPOS Supplemental Screening Package](#)



American Association for
Pediatric Ophthalmology
and Strabismus

Computerized Eye Charts

- “ Apps for tablets / phones
- “ Desk and Laptop programs
- “ On-line programs





American Association for
Pediatric Ophthalmology
and Strabismus

AAPOS Vision Screening App. for iPad



[AAPOS Vision Screening App for iPad available in iTunes Store](#)



American Association for
Pediatric Ophthalmology
and Strabismus

On-line Visual Acuity Screening

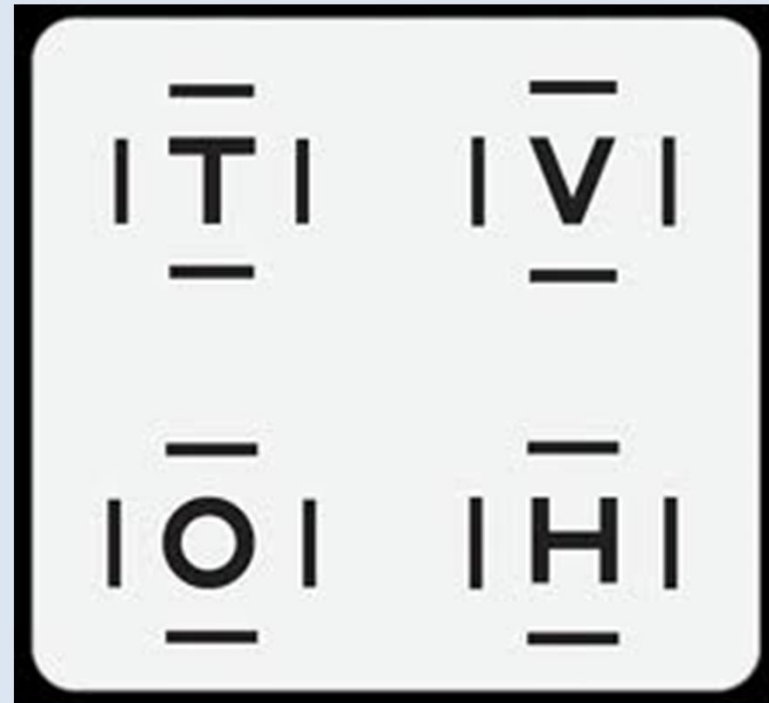
- ” The **Jaeb Center for Health Research** is a nonprofit center for clinical trials and epidemiologic research in ophthalmology and diabetes.
 - . Pediatric Eye Disease Investigator Group (PEDIG)
- ” JVAS (Jaeb Visual Acuity Screener) is free for Windows PCs. [JVAS](#)
 - . Pediatric visual acuity screener meant for non-ophthalmic health care professionals.



American Association for
Pediatric Ophthalmology
and Strabismus

JVAS (Jaeb Visual Acuity Screener)

- “ Free Test distance 5 feet (1.5 m)
- “ [JVAS](#) also has an HOTV matching card PDF available for download



[JVAS HOTV matching card](#)



American Association for
Pediatric Ophthalmology
and Strabismus

Reimbursement for Acuity Screening

CPT 99173

- “ Use with screening tests of visual acuity
- . Wall charts
 - . Computerized eye charts
 - . AAPOS Vision Screening Kit



*American Association for
Pediatric Ophthalmology
and Strabismus*

PEDIATRIC PHOTOSCREENING



American Association for
Pediatric Ophthalmology
and Strabismus

Instrument-Based Screening: Commonly Called “Photoscreening”

- “ Photoscreeners, autorefractors, and other devices **do not replace visual acuity screening with eye charts.**
- “ Particularly helpful in children ages 1-5 years.



PlusOptix S12c



American Association for
Pediatric Ophthalmology
and Strabismus

Visual Acuity Screening is the Current Gold Standard

“ Direct measurement of visual acuity using vision charts is the current gold standard for vision screening, unless the child is not reliably able to perform such a test



American Association for
Pediatric Ophthalmology
and Strabismus

What is the Difference Between Vision Screening with Eye Charts and Vision Screening Devices?

- “ Vision screening with eye charts tests the actual visual acuity (20/20 etc.)
- “ Vision screening devices typically do not test visual acuity directly.
 - . Screening devices test for eye conditions or risk factors that may cause decreased vision or amblyopia



American Association for
Pediatric Ophthalmology
and Strabismus

What is a Photoscreener or Autorefractor?

- “ An instrument that takes a photographic image of the eye’s red reflex, or some other measurement, to estimate the refractive error.
 - “prescription” of the eye
- “ Also may detect ocular misalignment and other conditions degrading or blocking line of sight (cataract).



PlusOptix S09 Screenshot



American Association for
Pediatric Ophthalmology
and Strabismus

Common Photoscreeners and Autorefractors



Welch Allyn SureSight



Righton
Retinomax



iScreen



PlusOptix S12R



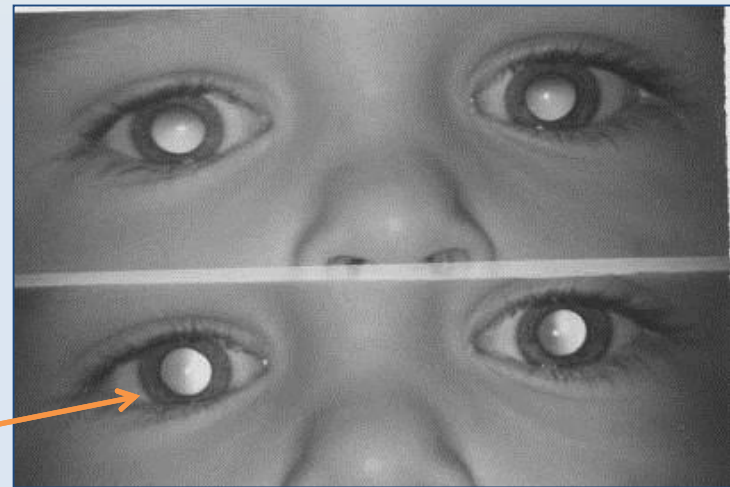
Welch Allyn
Spot+



American Association for
Pediatric Ophthalmology
and Strabismus

Photoscreeners

These photos reveal that this child has farsightedness (hyperopia) indicated by the characteristics of the crescent formed in the red reflex (seen as a white crescent in this B&W photo)



MTI Photoscreener





American Association for
Pediatric Ophthalmology
and Strabismus

Typical Photoscreeners in Use





*American Association for
Pediatric Ophthalmology
and Strabismus*

Other Vision Screening Devices



American Association for
Pediatric Ophthalmology
and Strabismus

Diopsys “Enfant”

- ” Diopsys “Enfant” VEP vision test.
- ” Tests the entire visual pathway: “front to back”
 - . Eye
 - . Optic nerve
 - . Visual cortex





American Association for
Pediatric Ophthalmology
and Strabismus

EyeSpy 20/20

- “ Automated computer software
- “ Tests:
 - Visual acuity
 - Stereopsis
 - Color vision
- “ Runs on a standard laptop or desktop computer

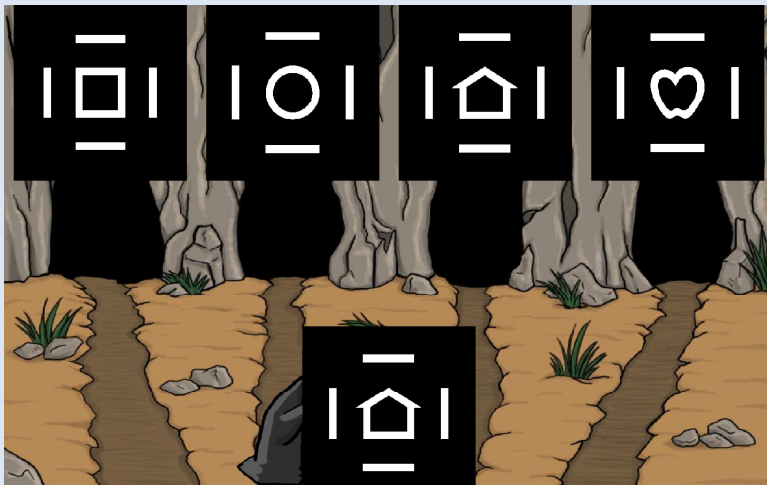





American Association for
Pediatric Ophthalmology
and Strabismus

EyeSpy 20/20

After testing the visual acuity of each eye, the program generates a report



 <p>IMPORTANT - DO NOT DISCARD! VISION SCREENING REPORT PREPARED EXCLUSIVELY FOR YoungDemo LadyDemo - Age 6 - DOB 05/06/2007 Teacher: Demo Mode - Grade: 1</p> <p>Provided 01:51:08 PM - Monday, May 8, 2010 by VisionQuest 20/20 (www.visionquest2020.org) in partnership with Demo Mode and VisionQuest 20/20 Demonstration School</p> <p>OVERALL VISION EVALUATION (without glasses) Your child's vision screening was normal.</p> <p>Annual vision screenings are important to protect your child's vision but do not replace professional eye examinations.</p> <p>VISUAL ACUITY (Patching w/ LEA) Both Eyes Open: PASS (20/25 or better) Right Eye: PASS (20/25 or better) Left Eye: PASS (20/25 or better)</p> <p>STEREOPSIS (Depth Perception) PASSED nearest</p> <p><small>This vision screening was provided thanks to the generous support of... VISIONQUEST 20/20 - A 501 (C)(3) NON-PROFIT ORGANIZATION ORGANIZED BY: VISIONQUEST 20/20 - 1001 WILSON ST. SUITE 1000, NEW YORK, NY 10014</small></p> <p>PROTECT CHILDREN'S VISION WHILE PROMOTING YOUR BUSINESS!</p> <p><small>USA: 1-800-455-6222 For more information please contact Richard Trendl @ 888-887-1020 Years: 1-800-455-6222 USA: 1-800-455-6222 and email: r.trendl@visionquest2020.org © 2010 VisionQuest 20/20 - www.visionquest2020.org 1001 W. 101 St., NY, NY</small></p>	<p>Screening is complete!</p> <p>Press the Enter key to print the screening report</p> <p>OR</p> <p>Press the spacebar to screen the next student</p> <p>Press the S key to show the report in Spanish</p>
--	---

With cloud-based storage, EyeSpy 20/20 can integrate and store data collected from other devices such as photoscreeners and school databases



American Association for
Pediatric Ophthalmology
and Strabismus

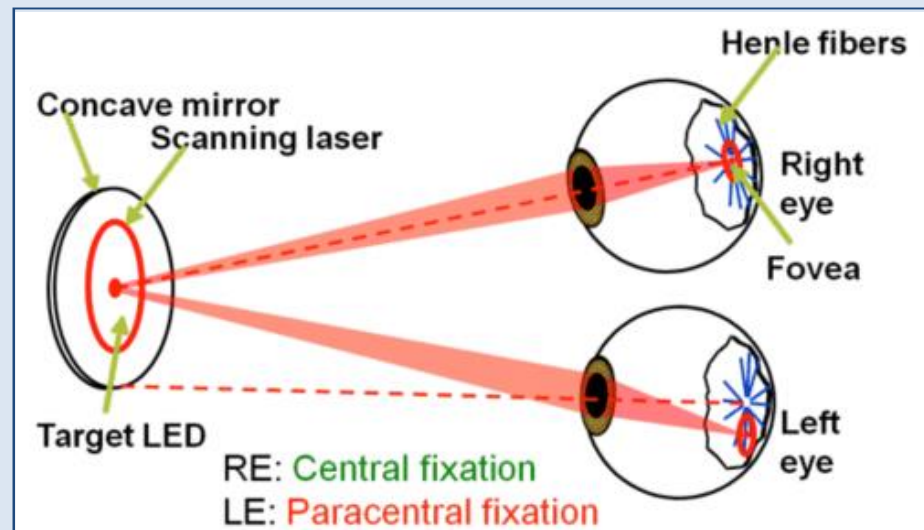
REBIScan Pediatric Vision Scanner

- ” Retinal birefringence technology.
- ” Tests for the amblyopia by detecting microstrabismus.



REBIScan Pediatric Vision Scanner

- “ Assesses foveal fixation.
- “ Amblyopic eyes are found to have abnormal fixation (microstrabismus).





American Association for
Pediatric Ophthalmology
and Strabismus

When to Photoscreen?

- “ Generally not before 1 year of age.
 - . Poor fixation behavior impedes measurement.
- “ The false positive rate is high.
- “ There is a low likelihood of ophthalmic intervention.
 - . Except for constant strabismus, cataract, glaucoma, retinoblastoma.
 - . Correction of refractive error typically delayed.



American Association for
Pediatric Ophthalmology
and Strabismus

Photoscreening is Useful For:

- ” Most children ages 1-3 years.
 - . Usually unable to perform visual acuity chart tests.
- ” Some children ages 3-5 years.
 - . Acuity chart testing is preferred, but...
 - . Photoscreening is the recommended alternative if the child is not reliably able to perform acuity chart testing.



American Association for
Pediatric Ophthalmology
and Strabismus

Photoscreening is Not Experimental

“ The United States Preventative Services Task Force (USPSTF) has recognized photoscreening as appropriate methodology for vision screening of children aged 3-5 years.

US Preventive Services Task Force. Vision screening for children 1 to 5 years of age: US Preventive Services Task Force Recommendation statement. *Pediatrics*. 2011;127:340-6.



American Association for
Pediatric Ophthalmology
and Strabismus

Photoscreening is Endorsed by the American Academy of Pediatrics

“ The American Academy of Pediatrics has issued a policy statement supporting the use of these technologies for preschool vision screening

Miller JM, Lessin HR, American Academy of Pediatrics Section on Ophthalmology; Committee on Practice and Ambulatory Medicine; American Academy of Ophthalmology; American Association for Pediatric Ophthalmology and Strabismus; American Association of Certified Orthoptists. Instrument-based pediatric vision screening policy statement. Pediatrics. 2012;983-6.



American Association for
Pediatric Ophthalmology
and Strabismus

Photoscreening May be Better (?)

“ A randomized, controlled, multi-centered cross-over study demonstrated photoscreening to be superior to direct testing of visual acuity for screening of well children ages 3-6 years in the pediatric office.

Salcido AA, Bradley J, Donahue SP. Predictive value of photoscreening and traditional screening of preschool children. J AAPOS 2005 Apr;9(2):114-20.



American Association for
Pediatric Ophthalmology
and Strabismus

Referral Criteria for Photoscreening

Considerations:

“ Age of patient

- . Passing criteria are more generous (higher thresholds) for younger children and more stringent (lower thresholds) for older children.

“ Sensitivity

- . High rate of detection but also high rate of referrals for false positives.

“ Specificity

- . Fewer false positives but will miss some at-risk kids.

TABLE 2

AMERICAN ASSOCIATION FOR PEDIATRIC OPHTHALMOLOGY AND STRABISMUS' RECOMMENDED AMBLYOPIA RISK FACTOR TARGETS

REFRACTIVE RISK FACTOR TARGETS

Age, months	Astigmatism	Hyperopia	Anisometropia	Myopia
12-30	>2.0 diopters	>4.5 diopters	>2.5 diopters	>-3.5 diopters
31-48	>2.0 diopters	>4.0 diopters	>2.0 diopters	>-3.0 diopters
>48	>1.5 diopters	>3.0 diopters	>1.5 diopters	>-1.5 diopters

NONREFRACTIVE RISK FACTOR TARGETS

All ages	Media opacity >1 mm Manifest strabismus >8 prism diopters in primary position
-----------------	--

From Donahue SP, et al.⁵



American Association for
Pediatric Ophthalmology
and Strabismus

Warning!

- “ There is a difference between the Refractive Risk Factor Target numbers on the preceding table and what the screening instrument settings should be.
- “ Children can accommodate tremendous amounts (change the focusing power of their eyes).
 - . this potentially affects some of the instrument readings
- “ Device manufacturers will have guidelines specific to your needs.



American Association for
Pediatric Ophthalmology
and Strabismus

Reimbursement for Photoscreening

CPT 99174

- ” Use with automated photoscreening and autorefraction:
- . Photoscreeners
 - . Autorefractors
 - . Fixation “Pediatric Vision Scanner”
 - . Do not use 99173 which is only for tests of actual visual acuity (eye charts)



American Association for
Pediatric Ophthalmology
and Strabismus

Thank You



“ For more information about the AAPOS vision screening kits, including how to order one please go to:

“ www.aapos.org

“ [AAPOS Screening Kit](#)

Authors: Daniel Neely, MD and Geoff Bradford, MS, MD on behalf of the AAPOS Vision Screening Committee. Updated 6/8/15