LOUISIANA DEPARTMENT OF EDUCATION

LOUISIANA VISION SCREENING GUIDELINES

PROCEDURES FOR VISION SCREENING IN LOUISIANA SCHOOLS

2020 First Edition

DEPARTMENT of EDUCATION
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Contents

ACKNOWLEDGMENTS

AUTHORIZATION PROVIDED FROM THE FOLLOWING:

INTRODUCTION

Vision in young children represents a profound intersection between early development and learning success. Overall, research has repeatedly shown that healthy sight plays a role in reducing poverty, improving reading readiness, increased graduation rates, attainment of developmental milestones, and positive social relationships (Atkinson et al., 2002; Basch, 2011; Davidson & Quinn, 2011; Maples, 2003; VIP-HIP Study Group, 2016; Wen et al., 2011). Unfortunately, children and their parents/caregivers may be unaware of reduced visual functioning; thus, routine vision screening and follow-up eye examinations, when necessary, are vitally important to detect problems before the child's development (and potentially their future) is compromised.

Vision problems can begin well before a child attends school. Vision impairments caused by refractive error, amblyopia, strabismus, and/or astigmatism are common conditions among young children, affecting 1 to 6% of all children younger than 5 years old. Amblyopia is present in 1 to 4 % of preschool-aged children and an estimated 4% of these children have myopia and 20% have hyperopia (U.S. Preventive Services Task Force [USPSTF], 2017). A recent study has projected that the prevalence of vision problems in preschool-aged children will increase 26% by the year 2060, with a majority of the prevalence (69%) being due to visual impairment from uncorrected refractive error (Varma et al., 2017). Varma et al. (2017) also suggests minority children will be disproportionately impacted, with Hispanic white children accounting for the largest number and proportion of cases, followed by African American children.

Early detection and intervention for vision problems are incorporated into national goals and health care standards. The USPSTF recommends vision screening at least once between the ages of 3 and 5 years (2017). National pediatric preventive care guidelines include vision assessment guidelines for children younger than age 3 years and promotes vision screening by pediatricians yearly at ages 3 through 6 years, and then at regular intervals through late adolescence (Bright Futures/American Academy of Pediatrics, 2017; Hagan et al., 2017). Finally, a report from the National Academies of Science, Engineering, and Medicine promotes a comprehensive public health approach to vision, one that incorporates evidence-based vision screening procedures along with access to comprehensive eye care for those who fail a vision screening (2016).

While vision screenings and eye examinations are complementary approaches to assessing the eye problems of a child, a screening is used to identify a child at risk for vision problems and does not replace a comprehensive examination performed by an eye care professional. Eye care professionals include optometrists, pediatric optometrists, ophthalmologists, and pediatric ophthalmologists. Additionally, vision screenings provide a critical bridge from detection to eye care for families that may not regularly access health or eye care services, may need financial assistance to afford care, or those that may not fully understand the impact an undiagnosed and untreated vision problem might have on the rest of their child's life.

Vision screening and eye health should be an integral part of the coordinated school health program. The goal of the screening program for school-aged children shifts from a primary focus on prevention of amblyopia and detection of amblyopia risk factors, as is the primary target in very young children, to detection of refractive errors and other eye conditions that could potentially impact the students' ability to learn or to affect their academic performance. Vision screening using recommended tools, protocols, and procedures is a cost-effective method to identify children in need of evaluation and treatment by an eye care professional. When properly implemented, a system of vision health for students includes screenings in infancy, early childhood, and school-age years to facilitate early identification of vision impairment and the initiation of intervention services.

The final but most important aspect of the vision health system is follow-up intervention. The child who does not pass vision screening should receive an examination by an eye care professional. If the children referred do not receive professional attention, the vision screening program has not accomplished its mission.

The overarching goal of these guidelines is the ongoing promotion of an evidence-based vision screening and eye health program for Louisiana children, and youth – a program that includes early detection, referral, communication with parents and caregivers, follow-up eye examinations and interventions, adhering to treatment plans, collaboration among stakeholders, documentation, and program evaluation. In addition, the guidelines provide instruction and discussion regarding state required and national recommendations. The guidelines are meant for all school-aged children in public schools.

The objectives of the Louisiana vision screening program are to:

- provide uniform screening guidelines, referral criteria, and resources throughout Louisiana;

- assist with early detection and identification of suspected vision disorders in children with appropriate referral for diagnosis;

- provide follow-up guidance for all referrals, encourage maintenance of visual screening records of all students;

- promote collaboration with community providers for intervention and treatment of identified visual concerns; and

- encourage education on vision health and vision-related impairment for children, families, educational staff, childcare providers, and community members.

The 1st Edition of the Louisiana Vision Screening Requirements and Guidelines presents a comprehensive approach, separates screening information not only by age of the student being screened, but also by special needs. Groupings are presented in the following order:

LEGAL REQUIREMENTS BY PROGRAM

LOUISIANA SCHOOL SCREENINGS

Louisiana schools, are required by law to provide basic vision screening to school-aged children at least 1 time every 2 years. Basic vision screening equates to using optotype-based screening (e.g., charts), or any other system or method of screening that would be equal to or better, according to the school board. The laws specifically read as follows:

Vision Screening

A. General Guidelines

In compliance with Louisiana Statutes §17:2112, 17:391.1, the school RN will conduct the following vision screening procedures:

1. During the first semester of the school year, the school RN shall test the sight, including color screening for all first grade students, and hearing of each and all pupils under their charge, except those pupils whose parent or tutor objects to such examination, as provided for in R.S. 17:156. Such testing shall be completed in accordance with the schedule established by the American Academy of Pediatrics. The State Board of Elementary and Secondary Education may convert the age equivalent as provided by the American Academy of Pediatrics schedule to the academic year equivalent which corresponds to that age. Students may also be tested upon referral or requests of teachers and/or parents. In addition, children should be screened upon evaluation and entrance for a special education program.

2. Vision screening tests should include the following:

   a. Optotype-based screening for distance visual acuity repeat 1-2 years (PreK, K and 1, every year, and every 2 years thereafter, unless problem.) *Optional near acuity screening.

   b. Color vision deficiency screening (1st grade), also, *optional for PreK or first enterers.

   c. Recommended (*Optional) external scan stereoacuity screening, and referral for:

   d. Ensuring both eyes work together to see a 3-D object.

3. Screening can only be performed by the school RN or designated persons under their supervision if volunteers or other school personnel are used. Acuity and color perception are the only screening tests that can be delegated.

4. Prior to screening the school RN should conduct an external scan of both eyes. Visible abnormalities should be referred immediately, even when students pass vision screening. Suspected eye infections must be cleared by a physician before screening ensues.

5. If the student fails any part of the vision screening, he/she must be screened a second time.

6. Rescreening should be done the same day, no later than 6 months, using the same tool.

7. The school RN shall keep a record of all screenings, shall be required to follow up on the deficiencies within sixty days, and shall notify in writing the parent or tutor of every pupil found to have any defect of sight. *R.S. 17:2112.

B. Purpose

1. Early detection and treatment of visual problems.

2. To identify students with vision disorders that affect learning and/or complicate normal daily living.

3. To minimize the number of students with vision loss.

4. To provide for individual educational needs of students with vision impairment.

C. Personnel

   1. School RN

   2. Designated school personnel trained and supervised by a formally trained and certified school RN

D. Recommended screening equipment, procedures, and referral criteria

   Note: Vision screening is not diagnostic. Students who fail the initial screening test and the rescreening test must be referred to an eye specialist for a diagnostic examination. Screening will not identify every student who needs eye care, nor will every student who is referred require treatment.

QUALIFICATIONS AND TRAINING OF VISION SCREENERS

Vision screeners, when conducting vision screening, screen for risk factors and reasons to refer children to eye care professionals. Vision screening is not diagnostic and does not replace a comprehensive eye examination conducted by an eye care professional trained and experienced with working with children. Thus, it is important for vision screeners to follow guidelines, including the referral guidelines. Vision screeners are not to try to interpret findings, but, instead, assist families with access to an eye care professional.

Prevent Blindness, a national non-profit organization, dedicated to preventing blindness and preserving sight, offers an online vision screening certification program for those screening preschool- and school-aged children. The Prevent Blindness Children's Vision Screening Certification Course provides participants with certification in the most current, evidence-based vision screening and eye health best practices for preschool- and school-aged children. Participants will learn:

- common vision disorders in children,

- how to use evidence-based and age-appropriate tools for vision screening,

- how to enhance screening programs to improve follow-up to eye care for referred children, and

- how to gain access to several educational resources.

As part of professional training, the vision screener will:

- describe common vision disorders,

- demonstrate how to arrange a screening environment,

- demonstrate procedures for using recommended vision screening tools and procedures, and

- describe ways to follow up with parents when children do not pass vision screening.

The online course approach includes self-paced online modules, module assessments, instructional videos, and culminates with a person-to-person video chat to analyze the trainee's screening skills. Successful completion of the course will result in a 3-year nationally recognized certification in Children's Vision Screening provided by Prevent Blindness. For more information visit: **https://www. preventblindness.org/prevent-blindness-childrens-vision-screening-certification-course**

Ideally, a registered nurse, who has completed a vision screening training program, provides the overall supervision of the school and health department vision screening programs ensuring the implementation of:

- screening and referral criteria according to these guidelines, and

- coordinated follow-up for individual children and adolescents to access needed services.

The staff member supervising school vision screenings is responsible for ensuring volunteers and other personnel assisting with screenings are adequately trained (e.g., attended a vision screening training or certification program). Eye care professionals naturally serve as vision referral sources and are also invited to serve as screening consultation support. In some situations, referrals are coordinated through children's medical homes (e.g., insurance requires a medical home referral to an eye care professional). Eye care professionals provide comprehensive eye examinations using dilation drops, diagnose, and provide treatment plans, as needed.

Parent/Guardian Consent/Refusal for Vision Screening

A parent or guardian has the right to refuse vision screening for children under his/her legal custody. A written, signed statement or documentation of a verbal request from the parent/guardian indicating refusal is recommended for school screenings.

School districts are encouraged to inform parents of the vision screening process prior to its occurrence in the school. This information can be provided through the classroom/school newsletter, electronic communication or other media, and/or a letter to each student's family. Providing information about an upcoming school-screening program prior to its occurrence gives parents/guardians the opportunity to decide whether or not to allow the screening to be performed on their children. Vision screening follows an opt-out process. Unless parents or guardians indicate refusal for screening, vision screening will be conducted.

COLLABORATION OF SYSTEMS

Children enrolled in Medicaid should receive both vision and hearing screenings at each well-child visit as part of the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) benefit. Collaboration with local primary care providers who work with children within existing systems of health care, including those covered under Medicaid, is essential to prevent duplication and replication of health screenings and lessen fragmentation of health care. Likewise, primary care providers within systems of care need assistance with outreach and access to children of families enrolled in their programs to promote utilization of the services offered through their system of care.

Children who are already being screened, or examined, and followed within a system of care do not need to be re-screened. However, the school system is burdened with the duty of assurance that vision screening is completed according to the law. A system for communicating vision screening results to school personnel must be mutually agreed upon by the agencies in the community serving children and adolescents within Health Insurance Portability and Accountability Act (HIPAA) compliance of those collaborating entities. All agencies must guard all individually identifiable health information as confidential and only transfer information following informed, signed permission from the parent or guardian or, in the school system, under the pact of an interagency agreement, which existence is also communicated to the parent or guardian.

PRINCIPLES OF VISION SCREENING

THE IMPORTANCE OF VISION SCREENING

Vision screening is not diagnostic and does not replace a comprehensive eye examination with dilation drops. The importance of vision screening includes, at least, the following four reasons.

1. Undetected and uncorrected vision disorders can impair child development, lead to behavior problems in the classroom, interfere with early literacy and learning, and lead to permanent vision loss if not detected and treated early, preferably before age 5 years (Collins et al., 2017; NASEM, 2016; Peterseim et al., 2015; Ruderman, 2016; VIP-HIP Study Group, 2016).

2. Visual functioning is a strong predictor of academic performance in school-aged children (Basch, 2011; Collins et al., 2017; Gracy et al., 2018; Maples, 2003; Harvey et al., 2016).

3. Undetected and uncorrected childhood vision disorders may continue to affect health and well-being throughout the adult years (Davidson & Quinn, 2011).

4. Early detection and treatment of vision disorders is critical (Atkinson, et al., 2002; Ibironke et al., 2011; Roch-Levecq et al., 2008; USPSTF, 2017; Wen et al., 2011).

12 COMPONENTS OF A STRONG VISION HEALTH SYSTEM OF CARE

Evidence-based vision screening is one piece of a strong vision health system of care. The National Center for Children's Vision and Eye Health (NCCVEH) at Prevent Blindness partnered with the National Association of School Nurses (NASN) to provide guidance for school nurses, and others, involved in vision screening. The partnership involved creating a webpage organized according to the 12 Components of a Strong Vision Health System of Care (NASN, 2017). Resources are provided for each component. Review the NASN/NCCVEH website for updates to the 12 Components of a Strong Vision Health System of Care (**https://www.nasn.org/nasn-resources/practice-topics/vision-health**). The 12 components are

1. Ensure that all parents/caregivers receive culturally relevant and literacy-level appropriate educational material about the importance of:

    a. good vision for their child now and in the future, and

    b. scheduling and attending an eye exam when their child does not pass vision screening.

2. Ensure that parent's/caregiver's written approval for vision screening includes permission to

    a. share screening results with the child's eye doctor and primary care provider;

    b. receive eye exam results for their child's file to share with the screening program to ensure the treatment plan is followed at school, Head Start, or other locations;

    c. talk with the child's eye doctor for clarification of eye exam results and prescribed treatments, and

    d. share eye exam results with the child's primary care provider.

3. Screen vision with age-appropriate and evidence-based tools and procedures, including optotypes (pictures) and/or instruments.

    a. Follow national guidelines for rescreening and referrals.

    b. Include vision screening training for your staff that leads to certification in evidence-based vision screening procedures.

c. Ensure that contracted screening organizations use evidence-based tools and procedures, use national referral and rescreening guidelines, and clearly state that a screening does not replace an eye exam nor provide a diagnosis.

4. Create policies for screening or direct referral for children with special health care needs.

5. Rescreen or refer difficult-to-screen (untestable) children.

    a. Research suggests that untestable children are at least twice as likely to have a vision problem than children who pass a vision screening.

    b. If you have reason to believe that the child may perform better on another day, consider rescreening the child within 6 months. Otherwise, refer untestable children for an eye exam.

6. Provide parents/caregivers with vision screening results in easy-to-understand language, which respects cultural and literacy needs and provides steps to take for prompt follow up with an eye care provider.

    a. Provide written and verbal results.

7. Create a system for following up with parents/caregivers to help ensure the eye exam occurs.

    a. Identify and remove barriers to follow up to eye care, such as transportation or a lack of knowledge of what will occur during the eye exam.

    b. Consider ways to engage parents in peer-to-peer conversations to encourage follow up to eye care and adherence to prescribed treatments.

8. Link parents/caregivers for an eye examination with an eye doctor who specializes in the care and treatment of young children (Optometrist or Pediatric Ophthalmologist).

9. Receive eye exam results for your files.

10. Send a copy of eye exam results to the child's primary care provider.

11. Ensure that the eye doctor's treatment plan is followed.

    a. Develop a plan to assist with eye patching and/or glasses, as recommended by the eye care provider.

12. Evaluate the effectiveness of your vision health program annually.

    a. Compare screening results to eye exam outcomes.

    b. Identify variations in referral rates among screeners.

    c. Monitor screening procedures to ensure they follow current recommendations.

    d. Monitor follow up to eye care for children who do not pass vision screening or who were untestable.

    e. Identify common barriers in follow up to eye care and develop and implement solutions.

SCREENING VISION WITH EVIDENCE-BASED TOOLS AND PROCEDURES

As stated in the previous section, the third component of a Strong Vision Health System of Care is centered around screening vision with evidence-based tools and procedures. The below information distinguishes between optotype-based and instrument-based screening, as well as provides information on guidelines for eye chart design. For a more complete discussion of the 12 components refer to Kansas 6th edition document, Chapter 2, Principles of Vision Screening (**http://www.ksno. org/wp-content/uploads/2018/10/6th-Edition-Kansas-Vision-Screening-Requirements-and-Guidelines-01.23.2019.pdf**).

- Vision screening has two approaches of optotype-based and instrument-based. Optotype is the name of the symbol or letter a child is to identify. Instruments are devices that automatically analyze digital images of the eyes to provide immediate information about refractive error and misaligned eyes.

- Individuals conducting optotype- and instrument-based vision screening should be trained or certified to ensure uniformity across procedures.

Optotype-based screening (Nottingham Chaplin & Bradford, 2011)

- Optotype-based screening (eye charts or computer monitors that display optotypes) measures visual acuity as interpreted by the brain.

  Visual acuity is defined as the quantifiable measurement of the sharpness or clearness of vision when identifying black optotypes on a white background using specific optotype sizes at a standardized distance.

- Optotype-based screening should be conducted with evidence-based tools.

  » The choice and arrangement of optotypes can significantly affect the visual acuity score obtained (Bailey, 2012). See Table 1.

  » Refer to Appendix B for recommended evidence-based screening tools;

  » Refer to Appendix C for tools that are not recommended.

Table 1	National and International Eye Chart Design Guidelines
1.	Optotypes should be of approximate equal legibility.
2.	Each line on an eye chart should have the same number of optotypes.
3.	Horizontal spacing between optotypes should be equal to the width of the optotypes on the line.
4.	Vertical spacing between lines should be the height of the optotypes in the next line down.
5.	The size of the optotypes should progress geometrically up or down a chart by approximately 0.1 log units.
6.	Optotypes should be black on a white background under good lighting conditions.

Source: Committee on Vision (1980), International Council of Ophthalmology (1984); World Health Organization (2003). Recommendations are to help achieve eye chart standardization.

CHILDREN WITH SPECIAL CONSIDERATIONS

CHILDREN WHO ARE UNABLE TO BE SCREENED

Children who are unable or refuse to participate in the vision screening are to be referred for a comprehensive eye examination conducted by an eye care professional (e.g., optometrist or ophthalmologist). These children are more likely to have vision problems than testable children. The same individuals who are difficult to screen may be difficult to examine when referred for professional eye care. Screeners may need to assist the parents in locating an eye care professional who has experience examining difficult-to-screen students. Once the child is under the care of an eye care professional, parents or caregivers should be encouraged to continue periodic comprehensive eye examinations per the eye care professional's recommended schedule.

CHILDREN AT HIGH RISK OF VISION AND EYE DISORDERS

Many conditions interfere with normal visual development. The most common conditions are described in the paragraphs below. Children diagnosed with these conditions should not be screened. Instead, a relationship with an eye care professional should be established and schedule of periodic eye examinations maintained as set by the eye care professional.

Genetic Syndromes

Some vision problems are part of a group of conditions (syndrome). Some syndromes, such as Marfan and Usher, run in the student's family. Other syndromes, such as Down syndrome, are caused by a genetic problem that occurs at the time of conception.

- **Marfan syndrome** is a disorder that affects connective tissue in the body of varied onset. It can affect vision by causing a dislocated lens in one or both eyes (National Institutes of Health [NIH], 2018).

- **Usher syndrome** is a disorder that causes hearing and vision loss that continues to worsen over time. This disorder causes the retina to deteriorate with night vision loss typically being the first sign followed by blind spots, tunnel vision, and sometimes cataract formation. The retina deterioration is caused by retinitis pigmentosa or retina deterioration (NIH, 2017).

- **Down syndrome** is a chromosomal condition associated with intellectual disability, cognitive delays, characteristic facial appearance, and increased risk for development of a variety of medical conditions including vision problems. Examples include a wide range of visual acuity errors, amblyopia, strabismus, nystagmus, lid anomalies and infections, cataracts, and other various visual concerns (NIH, 2012).

Prenatal Exposures and Illnesses and Perinatal Conditions of Consideration for Early Childhood Children

When performing intake evaluations on early childhood children, parent/guardian mention of certain prenatal exposures and illnesses or prematurity warrant consideration to recommend a vision exam. For example, certain chemical exposures and/or medications taken during pregnancy may lead to cataracts in children. Vitamin deficiency or Fetal Alcohol Syndrome can lead to nystagmus. Likewise, some illnesses that a mother may have while she is pregnant can cause vision problems. Examples include toxoplasmosis, rubella (e.g., German or three-day measles), cytomegalovirus, genital herpes, syphilis, and Zika.

- **Toxoplasmosis** is caused by congenital or acquired infection with a protozoan intracellular parasite called Toxoplasma gondii. Symptoms for congenital cases may include retinal scarring, strabismus, microphthalmia, cataract, optic atrophy, and nystagmus. Acquired cases are typically from animal feces, most often from cats (American Association for Pediatric Ophthalmology and Strabismus [AAPOS], 2016f).

- **Congenital rubella** is a viral infection acquired by the mother during pregnancy that may cause cataracts and retinopathy (Caserta, 2015b).

- **Congenital and perinatal cytomegalovirus (CMV)** is a viral infection acquired prenatally or perinatally causing many symptoms including chorioretinitis or may be asymptomatic without concerns. Although hearing loss is the most common impairment in otherwise asymptomatic neonates, vision disturbances can be an eventual symptom (Caserta, 2015a).

- **Herpes simplex virus type 2 (Genital)** is a common virus that can be passed from the mother to the newborn causing central nervous system and other organ threats including vision problems and corneal scarring (AAPOS, 2018).

- **Congenital syphilis** is an infection transmitted through the placenta to the fetus that can cause optic atrophy sometimes leading to blindness (Caserta, 2015c).

- **Zika** is a virus that can be transmitted during pregnancy causing microcephaly and eye abnormalities (Levison, 2016).

Problems that occur around the time a child is born, perinatal conditions, can cause difficulties with vision. Some examples of perinatal problems are prematurity, low birth weight, problems that cause a child not to get enough oxygen at birth, or being on a ventilator which may lead to the development of retinopathy of prematurity (ROP). ROP is defined as an abnormal development of retinal blood vessels in premature infants that can cause retina damage and blindness.

ROP increases risk for:

- amblyopia,

- strabismus,

- development of visual acuity concerns,

- retinal concerns, and

- cortical visual impairment (AAPOS, 2016e).

Family History

A child's family history of vision problems assists in determining which preschool-aged children should be automatically referred for an eye examination by an eye care professional. Typically, family is interpreted as a first-degree relative (e.g., parents and siblings). Family history of any one or more of the following warrants a referral:

- a parent wearing glasses before the age 6 years,

- a sibling wearing glasses,

- amblyopia,

- congenital cataract,

- congenital glaucoma,

- retinoblastoma (a malignant intraocular tumor), and

- strabismus (American Academy of Ophthalmology, 2017; Cotter et al., 2015; Donahue et al., 2016).

Other Conditions/Illnesses

Several conditions/illnesses place children at greater risk for vision problems. As mentioned in the introduction to this section, children with these conditions/ illnesses should **not** be screened. Instead, a relationship with an eye care provider should be established and a schedule of periodic eye examinations should be maintained as set by the provider.

Some of these conditions/illnesses include:

- autism spectrum disorders,

- birth anomaly of head or face,

- cerebral palsy,

- cognitive impairments,

- developmental disabilities/delays (e.g., global speech delay),

- droopy eye lid (ptosis),

- hearing impairment,

- neurodevelopmental disabilities (e.g., hydrocephalus, nystagmus, seizures),

- parents/caregivers who believe their child has a vision-related problem, and

- systemic diseases (e.g., diabetes, meningitis/encephalitis) or using medications known to cause eye disorders (Children's Cranial Facial Association, 2011-2019; Cotter et al., 2015).

Injuries

Eye injuries can include an injury directly to the eye or eye socket, as well as severe head injuries. Such injuries place the individual at risk for retinal detachment, although retinal detachment can also be caused by high myopia, as well as other health conditions (Boyd, 2016).

Retinal detachment occurs when part of the retina separates from the back of the eye and loses its source of nourishment. Blindness may develop in the area of the visual field directly related to the part of the retina that is separated. Surgery, as recommended, is performed to restore vision.

Children with Special Health Care Needs

The importance of healthy vision for children and youth with disabilities cannot be overemphasized. Some consider vision the most important sensory modality surrounding childhood development (Salt & Sargent, 2014). Children with complex or multiple disabilities have a substantially higher percentage of vision problems than the general population of students (Salt & Sargent).

Vision screenings conducted on children and youth with developmental disabilities, with the exception of those at high risk of eye problems discussed earlier in this chapter, should follow the same vision screening procedures and referral criteria recommended for use with their typically developing peers. Any individual whose mental and/or physical disabilities prevent them from performing standard screening tests **are to be referred** for a comprehensive eye examination conducted by an eye care professional.

Additionally, screeners can provide suggestions to teachers, parents, and other caregivers to prepare students with disabilities for an upcoming eye examination. Once the student is under the care of an eye care professional, parents or caregivers should be encouraged to continue periodic comprehensive eye examinations per the eye care professional's recommended schedule. The screener or the education team may need to provide additional follow-up services for the students with disabilities, including training programs for the wearing and care of glasses or connecting families and caregivers to low vision services for children with identified vision loss. Finally, the eye care professional may need to explain the results of an eye examination to teachers, parents, and other caregivers so that they can better plan for the developmental and educational needs of students with disabilities.

EARLY CHILDHOOD – AGES 3, 4, AND 5 YEARS

PROCEDURE GUIDANCE

Recommended procedures for preschool-aged screening are based on the following guidelines or documents:

- A 2016 joint statement from the American Academy of Pediatrics, the American Association for Pediatric Ophthalmology and Strabismus, the American Academy of Ophthalmology, and the American Association of Certified Orthoptists (Donahue et al., 2016).

- A 2017 Preferred Practice Pattern paper for pediatric eye evaluations in primary care and community settings from the American Academy of Ophthalmology (American Academy of Ophthalmology, 2017).

- A 2016 paper with recommendations for screening children ages 3, 4, and 5 years from the National Expert Panel to the National Center for Children's Vision and Eye Health at Prevent Blindness (Cotter et al., 2015).

In addition to the legal requirement for distance visual acuity, the following screenings are recommended for this age group. Refer to Appendix A, Document 2, for a matrix of tool choices for vision screening procedures. School nurses should also review local district requirements.

1. ABCs of Vision
2. Distance Visual Acuity - Optotype-Based Screening
3. Optional: Near Visual Acuity – Optotype-Based Screening
4. Instrument-Based Screening
5. Stereoacuity Screening
6. Optional: Color Vision Deficiency Screening

1. ABCs of Vision

Purpose:
- To check for signs of a possible vision problem.

Screening Location:
- Well-lit room free from distractions.

Equipment Needed:
- ABCs of Vision Checklist (Appendix D)

Procedure:
- Observe student using ABCs of Vision Checklist.
- Continue to screen the student's vision, whether or not the student exhibits any of the signs on the checklist.

Pass:
- No signs of possible vision disorders from the checklist.

Refer for comprehensive eye examination that includes dilating drops:
- Student exhibits signs of possible vision disorders from the checklist, even if the student passes vision screening.

2. Distance Visual Acuity – Optotype-Based Screening

Notes:

- Attempt optotype-based (visual acuity) screening at age 3 years. If unsuccessful or unable to screen a child, use instrument-based screening. Note: Current preference for this age is optotype-based screening. Instrument screening, if available, is acceptable as an alternative (Donahue et al., 2016).

- Review use of evidence-based charts, appropriate occluders, how to point correctly at optotypes if necessary, room arrangement, positioning of student, along with other principles of vision screening.

- For children ages 3, 4, and 5 years, LEA SYMBOLS® or HOTV letters (Figure 1 and 2) are the preferred optotypes (Cotter et al., 2015; Donahue et al., 2016).

FIGURE 1   **FIGURE 2**
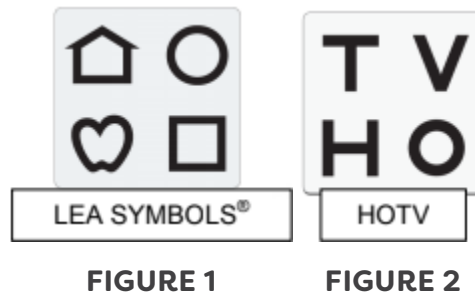
- Preferred tools are designed for a screening distance of 5 or 10 feet.

- See Appendix C for vision screening tools that are not recommended for this age group.

Purpose:

- To check visual acuity at distance.

Screening Location:

- Well-lit room that is free from distractions.

Equipment Needed (Refer to Appendix A, Document 2, for examples of tools):

- A distance visual acuity screening tool from one of the 7 options:

  » Option 1: EyE Check Screener with LEA SYMBOLS®

  - 20/50 Flipbook for 3-Year-Old Children

  - 20/40 Flipbook for 4- and 5-Year-Old Children

  » Option 2: Sight Line Kit

  » Option 3: AAPOS Basic Vision Screening Kit – Threshold Screening chart

  » Option 4: AAPOS Basic Vision Screening Kit – Critical Line chart

  » Option 5: LEA SYMBOLS® Proportionally Spaced Chart

  » Option 6: HOTV Proportionally Spaced Chart

  » Option 7: EyeSpy 20/20TM Computerized Vision Screening

- Appropriate occluders

  » LEA SYMBOLS® HOTV

Procedure:

- Each of the 7 options describes how to arrange the environment and use the tool.

Pass:

- Each of the 7 options describes passing criteria. **Refer for comprehensive eye examination that includes dilating drops:**

  » Each of the 7 options describes referral criteria.

Option 1: EyE Check Screener with LEA SYMBOLS® – 5 Feet

252100 20/40 EyE Check   252111 20/50 EyE Check   Fun Frames may vary

Set Includes:

- 20/50 Booklet for 3-year-old children.

- 20/40 Booklet for 4- and 5-year-old children.

- Response panel for matching.

- Individual cards for matching.

- Adhesive eye patches.

- 1 set of occluder glasses.

Instructions for 20/50 Flipbook for 3-Year Old Children

Use the 20/50 vision screening flipbook with children aged 3 years; a separate 20/40 flipbook is available for children ages 4 and 5.

- Measure a 5-foot screening distance between flipbook and child's eyes using the attached cord.

  » Begin by familiarizing the child with the screening task.

    - Hold the flipbook 16 inches from child's face.

- With child's eyes uncovered, ask child to name the symbols (pictures) on cards 1 through 4.

  » Accept whatever name the child uses to identify each symbol.

- Occlude child's left eye, using an adhesive patch or specially constructed occluder glasses included in the kit. (Ensure child does not peek if using occluder glasses.)

  » At 5 feet, and with child's left eye occluded, present flipbook at child's eye level.

- Ensure flipbook cards do not have glare from nearby windows or other light sources.

- Beginning with flipbook card 5, ask child to identify (by verbally naming or matching) each symbol on flipbook cards 5 through 8.

- If matching, the child can use the lap card or the four individual cards to select the optotype that corresponds with the optotype to identify. Cards can be placed on a tabletop or on the floor in front of the child and child can point to, or lift the tabletop cards or step on the card on the floor.

- Circle correct responses, and mark an "X" through incorrect responses on the 3-Year-Old (20/50) Vision Screening Results Recording Form

  » Patch the child's right eye (with same adhesive patch) or switch occluder glasses.

  » Repeat screening and recording steps for the left eye, using flipbook cards 9 through 12.

Pass:

- Correct identification of 3 or 4 symbols with each eye.

Refer (or rescreen the same day, as soon as possible, or no later than 6 months):

- Correct identification of only 0, 1, or 2 symbols with either or both eyes.

Instructions for 20/40 Flipbook for 4- and 5-Year Old Children

Use this 20/40 vision screening flipbook with children aged 4 and 5 years; a separate 20/50 flipbook is available for children aged 3 years.

- Measure a 5-foot screening distance between flipbook and child's eyes using the attached cord.

  » Begin by familiarizing the child with the screening task.

    - Hold the flipbook 16 inches from child's face.

- With child's eyes uncovered, ask child to name the symbols (pictures) on cards 1 through 4.

  » Accept whatever name the child uses to identify each symbol.

- Occlude child's left eye, using an adhesive patch or specially constructed occluder glasses included in the kit (Ensure child does not peek if using occluder glasses).

  » At 5 feet, and with child's left eye occluded, present flipbook at child's eye level.

- Ensure flipbook cards do not have glare from nearby windows or other light sources.

- Beginning with flipbook card 5, ask child to identify (by verbally naming or matching) each symbol on flipbook cards 5 through 8.

- If matching, the child can use the lap card or the four individual cards to select the optotype that corresponds with the optotype to identify. Cards can be placed on a tabletop or on the floor in front of the child and child can point to, or lift, the tabletop cards or step on the card on the floor.

- Circle correct responses, and mark an "X" through incorrect responses on the Vision Screening Results Recording Form

  » Patch the child's right eye (with same adhesive patch) or switch occluder glasses.

  » Repeat screening and recording steps for the left eye, using flipbook cards 9 through 12.

Pass:

- Correct identification of 3 or 4 symbols with each eye individually.

Refer (or rescreen the same day or within 6 months):

- Correct identification of only 0, 1, or 2 symbols with either or both eyes.

Option 2: Sight Line Kit – 10 Feet *(See Appendix A for kit in chart)

Set Includes:

- Booklet with 20/50 critical lines for children ages 3 years, 20/40 for ages 4 and 5 years, 20/32 for age 6 years.

- Parrot Frosted Occluder Glasses.

- Kay Pictures Sunflower Occluder Glasses.

- Response panel for matching.

- Four individual cards for matching.

- Cord to measure 10-foot distance.

Instructions

- This Sight Line flipchart is a "critical line" test of recognition visual acuity, which means each eye is screened separately using only the line a child should pass according to the child's age. Results are recorded as pass/refer.

- Use the 20/50 cards for screening children ages 3 years and the 20/40 cards for children ages 4 and 5 years (**Note:** the flipchart includes a 20/32 card for 6 years and older).

- Select a screening location that is at least 12 feet in length, and is quiet, free of distractions, and evenly lit.

- Measure 10 feet between the flip chart and the child's eyes with the cord included in the kit.

- If placing a mark on the floor to maintain the 10-foot screening distance, ensure the child stands with the arch of his or her feet on the mark (Figure 3).

- If using a chair, measure 10 feet to the back of the chair seat and ensure the child is seated with their back against the back of the chair (Figure 4).

FIGURE 3   **FIGURE 4**

» Begin by familiarizing the child with the screening task.

- Hold the flipbook 16 inches from the child's face.

- With the child's eyes uncovered, ask the child to name the symbols on the 20/100 card.

» Accept whatever name the child uses to identify each symbol.

- Occlude the child's left eye, using a set of the specialty constructed occluder glasses included in kit (Figure 5).

  » Sunflower occluder glasses can be used for smaller faces.

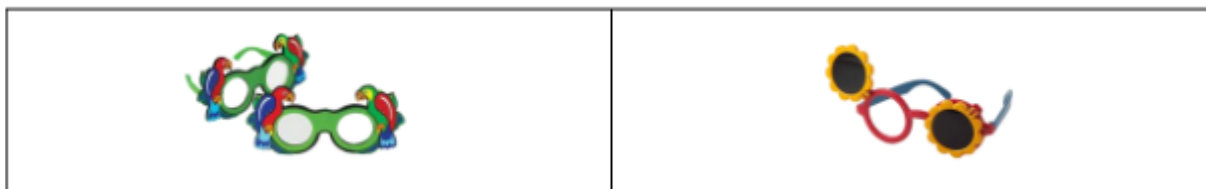- If the child is wearing prescription glasses, the occluder glasses go over the prescription glasses.

FIGURE 5

- Turn the flipbook to the RIGHT EYE card that matches the child's age (e.g. 20/50 or 20/40 right eye card).

- At 10 feet, and with the child's left eye occluded, present the flipbook at the child's eye level.

- Ensure the flipbook cards do not have glare from nearby windows or other lighting sources.

- Hold the flipbook perpendicular to the floor. Do not tilt the flipbook up or down (Figure 6).

FIGURE 6

- Ask the child to identify (by verbally naming or matching on the provided lap card) each symbol on the *right* eye card that matches the child's age (e.g., 20/50 if 3 years of age or 20/40 card if 4 years of age).

- Alternatively, the child can use the four individual cards to select the optotype that corresponds with the optotype to identify (Figure 7).

- Cards can be placed on a tabletop or on the floor in front of the child and child can point to, or lift, the tabletop cards or step on the card on the floor.

- Switch occluder glasses so that the child's *right* eye is occluded.

- Turn the flipbook to the *left* eye card that matches the child's age (i.e. 20/50 if 3 years of age or 20/40 card if 4 years of age).

FIGURE 7

- Ask the child to identify (by verbally naming or matching) each symbol on the left eye card that matches the child's age.

  » Record the results as pass or refer.

Pass:

- Correct identification of 3, 4, or 5 of 5 symbols with each eye individually.

Refer (or rescreen the same day, as soon as possible, or no later than 6 months):

- Correct identification of only 0, 1, or 2 symbols with either or both eyes.

Options 3 and 4 – AAPOS Basic Vision Screening Kit – 10 Feet – Threshold or Critical Line Formats *(See Appendix A for kit in chart)

Kit Includes:

- LEA SYMBOLS® for children ages 3, 4, and 5 years in threshold and critical line formats.

- Sloan Letters for children beginning at ages 6 or 7 years, depending on when children can identify letters out of sequence, in threshold and critical line formats.

- Cord to measure 10 feet between chart and child's eyes.

- Occluder glasses.

Instructions for Option 3

LEA SYMBOLS® – Threshold Screening Note:

- 10/xx on left side of chart is screening distance; 20/xx on right side of chart is the visual acuity value to record.

- Use with preschoolers beginning at age 3 years, until children can identify letters out of sequence, in threshold and critical line formats.

AAPOS Basic Vision Screening Kit

- Use 10-foot cord from Kit to measure screening distance between chart and child's eyes.

- Child may stand during screening or sit on a chair.

  » If placing a mark on the floor to maintain the 10-foot screening distance, ensure the child stands with the arch of his or her foot on the mark (Figure 8).

  » If child sits in a chair, the 10-foot distance from the chart is the back of the chair and child sits with back against the back of the chair. (Figure 9)

FIGURE 8   **FIGURE 9**

- Hold, or hang, chart at child's eye level.

- With both eyes uncovered, ask child to identify symbols on the 20/100 line to ensure child understands the screening task

- Accept whatever name the child uses to identify the LEA SYMBOLS® (e.g., circle may be a hula-hoop, etc.).

- If child says "I don't know", screener can provide two choices and ask child to select one. For example, for the circle, the screener could say, "Some children think this is a circle; others think it is a ball. What do you think?"

- Children may use response panel to match symbols by pointing at the symbol, matching the symbol to correspond with the optotype on the chart.

- Cover *left* eye with adhesive patch. Use occluder glasses only if patches are unavailable or are not tolerated.

- Starting at the top line, ask child to identify the first symbol on the *right* side of each line and move down the chart until a symbol is missed.

  » Avoid pointing to, and holding pointer, at the symbols to be identified.

- Isolating an optotype with a pointer, or masking all optotypes but one on a line, can lead to under-referrals or missing children who should be referred because the optotype is easier for the child to identify.

- Instead, briefly point to the symbol and quickly remove pointer.

- When child misidentifies a symbol, return to the line above the missed symbol and ask child to identify each symbol on that line.

- Continue asking child to identify each optotype on each lower line until child misses 3 optotypes on one line (continue asking child to identify the full line even when 3 or more are missed, but stop screening after this line).

- Always say "good job" or other supportive words, even when child responds incorrectly.

- Repeat with right eye covered, using the first symbol on the left side of each line.

Visual acuity score:
- The last line on which the child correctly identified 3 of 5 symbols.

Age Pass Refer or Rescreen Within 6 Months
- **3 years:** Correctly identifying 3 of 5 symbols on the 20/50 line with each eye separately

  Missing 3 or more symbols on the 20/50 line, or any line above the 20/50 line, with either eye

- **4 & 5 years:** Correctly identifying 3 of 5 symbols on the 20/40 line with each eye separately

  Missing 3 or more symbols on the 20/40 line, or any line above the 20/40 line, with either eye

- **≥6years:** Correctly identifying 3 of 5 symbols on the 20/32 line with each eye separately

  Missing 3 or more symbols on the 20/32 line, or any line above the 20/32 line, with either eye 3, 4, and ≥6 years

  Two-line difference between the eyes, even within the passing range – e.g., 10/10 (20/20) and 10/16 (20/32)

Instructions for Option 4: LEA SYMBOLS® – Critical Line Screening
- Use with preschoolers beginning at age 3 years, until children can identify letters out of sequence, in threshold and critical line formats.

- Select the chart to match the child's age; one chart is for ages 36-47 months, one is for ages 48-59 months, and one is for ages 5 years and older.

- Use 10-foot cord from Kit to measure screening distance between chart and child's eyes.

- Child may stand during screening or sit on a chair.

» If placing a mark on the floor to maintain the 10-foot screening distance, ensure the child stands with the arch of his or her foot on the mark (Figure 10).

» If child sits in a chair, the 10-foot distance from the chart is the back of the chair and child sits with back against the back of the chair (Figure 11).

FIGURE 10

FIGURE 11

- Hold, or hang, chart with critical passing line at child's eye level.

- With both eyes uncovered, ask child to identify symbols on the 20/100 line to ensure child understands the screening task (Figure 12).

- Accept whatever name the child uses to identify the LEA SYMBOLS®
  (e.g., circle may be a hula-hoop, etc.).

- If child says "I don't know", screener can provide two choices and ask the child to select one. For example, the screener could say, "Some children think this is a circle; others think it is a ball. What do you think?"

FIGURE 12

- Children may use response panel to match symbols by pointing at the symbol matching the symbol to correspond with the optotype on the chart.

- Cover *left* eye with patch and bottom boxed line on chart with your hand or paper. Use occluder glasses only if patches are unavailable or are not tolerated.

- Ask child to identify symbols on top boxed line on chart.

- Avoid pointing to, and holding pointer, at the symbols to be identified.

- Isolating an optotype with a pointer, or masking all optotypes but one on a line, can lead to under-referrals or missing children who should be referred because the optotype is easier for the child to identify.

- Instead, briefly point to the symbol and quickly remove pointer.

- Repeat with *right* eye covered and top boxed line covered. Ask child to identify symbols on lower boxed line on chart.

Age Pass Refer or Rescreen Within 6 Months

- **3 years:** Correctly identifying 3 of 5 symbols on the 20/50 line with each eye separately

  Missing 3 or more symbols on the 20/50 line with either eye

- **4 & 5 years:** Correctly identifying 3 of 5 symbols on the 20/40 line with each eye separately

  Missing 3 or more symbols on the 20/40 line with either eye

- **≥6 years:** Correctly identifying 3 of 5 symbols on the 20/32 line with each eye separately

  Missing 3 or more symbols on the 20/32 line with either eye

Options 5 and 6 – LEA SYMBOLS® or HOTV Proportionally Spaced Charts, 10 Feet
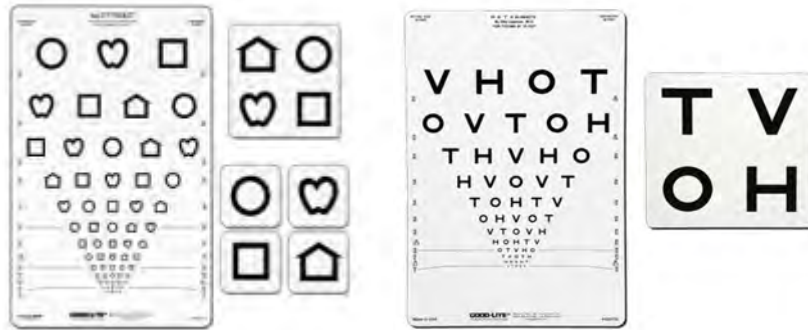
Instructions for Either Chart

- 10/xx on left side of chart is screening distance; 20/xx on right side of chart is the visual acuity value to record. Use with children beginning at age 3 years, if possible, and ages 4 and 5 years, or until children can identify letters out of sequence, and, then, switch to a Sloan Letters chart.

- Hang the chart, in a quiet, undistracted, well-lit area, with the 20/40 line at child's eye level.

- Measure 10 feet between the chart and the child's eyes with the cord included in the kit.

- If placing a mark on the floor to maintain the 10-foot screening distance, ensure the child stands with the arch of his or her foot on the mark (Figure 13).

- If using a chair, measure 10 feet to the back of the chair seat and ensure the child is seated with their back against the back of the chair (Figure 14).

FIGURE 13

FIGURE 14

- Explain the screening task to child and say you are playing a game instead of saying you are testing their eyes.

- Place the lap card (square with all 4 optotypes) at 16 inches from child and ask child to name optotypes (Figure 15).

- If using LEA Symbols, accept whatever name the child uses to identify each symbol. The "square", for example, could be a box or the "circle" a ball.

- Cover left eye with adhesive patch or fun frames occluder glasses and return to chart (Figure 16).
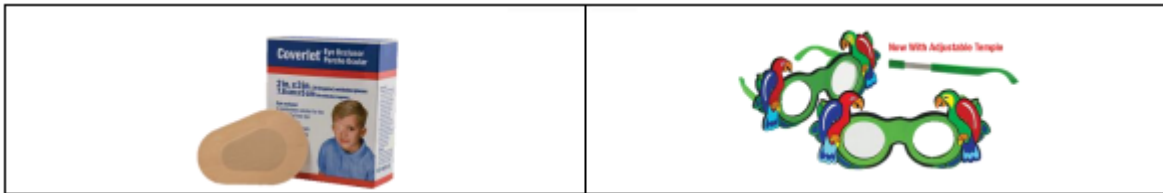

FIGURE 15

FIGURE 16

- For children wearing prescription glasses, the adhesive patch goes over the left eye first and beneath prescription glasses and the same adhesive patch may be used to cover the right eye. If using occluder glasses, place the occlude glasses over the child's prescription glasses.

- Screen one eye at a time (monocularly); do not screen with both eyes open and uncovered.

- Starting at the top line on the right side of the chart, as child faces chart, ask child to identify the first optotype on the right side of each line and move down the chart until an optotype is missed (Figure 17).

- Avoid pointing to, and holding pointer, at the optotypes to be identified.

- Isolating an optotype with a pointer, or masking all optotypes but one on a line, can lead to under-referrals or missing children who should be referred because the optotype is easier for the child to identify. (Figure 17)

FIGURE 17

  » Instead, briefly point beneath the optotype and quickly remove pointer.

- Children may use the lap card (4 optotypes on one card) as a matching game (Figure 18).

- Alternatively, the child can use the four individual cards to select the optotype that corresponds with the figure 19.

FIGURE 18 **FIGURE 19**

- Cards can be placed on a tabletop or on the floor in front of the child and child can point to, or lift, the tabletop cards or step on the card on the floor.

- When the child misidentifies an optotype, return to the line above the missed optotype and ask child to identify each optotype on that line, reading *left to right*.

- Continue asking child to identify each optotype on each lower line until child misses 3 optotypes on one line (continue asking child to identify the full line even when 3 or more are missed, but stop screening after this line).

- The smallest line of optotypes where at least 3 optotypes were identified correctly is the visual acuity value for that eye.

- On lines 20/125 and 20/160, the individual must correctly identify each optotype.

- Record your screening results for the right eye, using the 20/XX measurement.

- Occlude the *right* eye and begin screening the left eye.

- Starting at the top line on the *left* side of the chart, as child faces chart, ask child to identify the first optotype on the *left* side of each line (Figure 20).

- When the child misidentifies an optotype and returns to the line above the missed optotype to read the full line, the child identifies symbols from *left to right*.

- Record your screening results for the left eye, using the 20/XX Figure 40 measurement.

FIGURE 20

Visual acuity value:

- The smallest line of optotypes on which the child correctly identified at least 3 of 5 optotypes.

- Acuity values are written separately for each eye.

Age Pass Refer or Rescreen Within 6 Months

- **3 years:** Correctly identifying 3 of 5 symbols on the 20/50 line with each eye separately

  Missing 3 or more symbols on the 20/50 line, or any line above the 20/50 line, with either eye

- **4 & 5 years:** Correctly identifying 3 of 5 symbols on the 20/40 line with each eye separately

  Missing 3 or more symbols on the 20/40 line, or any line above the 20/40 line, with either eye

- **≥6 years:** Correctly identifying 3 of 5 symbols on the 20/32 line with each eye separately

  Missing 3 or more symbols on the 20/32 line, or any line above the 20/32 line, with either eye 3, 4, and ≥6 years

  Two-line difference between the eyes, even within the passing range – e.g., 10/10 (20/20) and 10/16 (20/32)

  Note: To ensure appropriate illumination, this chart can be used with an ESV1200 LED- illuminated cabinet, which can be placed on a stand with casters or mounted on a wall (Figure 21).
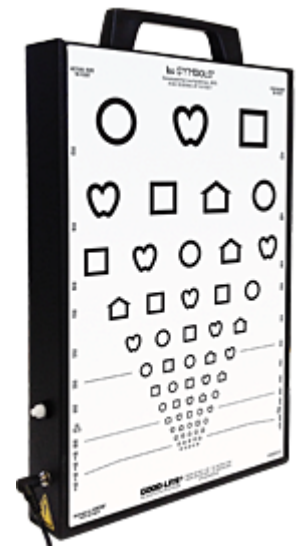

FIGURE 21

Option 7: EyeSpy 20/20TM Computerized Vision Screening, 10 Feet

Notes:

- Children play a 3-minute video matching game.

- Provides report with vision screening results in English or Spanish.

- Integrates with electronic medical records.

Instructions

- Available at: **https://www.good-lite.com/downloads/EyeSpyUserGuide.pdf**

3. **Optional: Near Visual Acuity – Optotype-Based Screening**

   Notes:

   - Near vision screening should include charts with attached 16-inch cords to ensure the screening distance is maintained.

     » The 16-inch cord should remain near the student's temple during screening.

   - The 16-inch cord should remain tight during screening to ensure the screening distance is maintained.

   - Because no national guidelines are available for near vision screening, screeners may choose between 2 options:

     » Monocular threshold screening, or

     » Binocular critical line screening.

   Purpose:

   - To check visual acuity at near.

   Screening Location:

   - Well-lit room, free from distractions.

   Equipment Needed:

   - Screening tool from 2 options:

     1. LEA SYMBOLS® or HOTV Near Charts – Monocular Threshold Screening.

     2. LEA SYMBOLS® or HOTV Near Charts – Binocular Critical Line Screening.

   - Appropriate occluders.

   Procedure:

   - Each of the 2 options describes how to arrange the environment and use the tool.

   Pass:

   - Each of the 2 options describes passing criteria.

   Refer for comprehensive eye examination that includes dilating drops:

   - Each of the 2 options describes referral criteria.

Option 1: LEA SYMBOLS® or HOTV Near Charts – Monocular Threshold Screening

Notes:

- *20/xx on right side of chart is Snellen equivalency and the number to record.*

- Use with preschoolers beginning at age 3 years until children can identify letters out of sequence and can participate with a Sloan Letters chart.

  » Student may stand or sit in a chair during screening.

- Use the attached cord to measure 16 inches between the chart and the temple near the student's right eye.

- With both eyes uncovered, ask the student to identify the symbols on the 20/200 line to ensure the student understands the screening task.

- Accept whatever name students call the optotypes (e.g., circle may be a ball or a hula-hoop, etc.).

- Students may point to the 4 symbols at the bottom of the chart as a matching game or use individual cards if included with the chart.

- Cover the student's *left* eye with adhesive patch. Use occluder glasses if patches are unavailable or are not tolerated.

- Starting at the 20/100 line, ask the student to identify the first optotype on the *right* side of each line, from the child's perspective, and move down the chart until a symbol is missed.

  » Avoid pointing to, and holding pointer, at the optotypes to be identified.

- Isolating an optotype with a pointer, or masking all optotypes but one on a line, can lead to under-referrals or missing children who should be referred because the optotype is easier for the child to identify.

  » Instead, briefly point to the optotype and quickly remove pointer.

- When the student misidentifies an optotype, return to the line above the missed optotype and ask the student to identify each optotype on that line.

- Continue asking child to identify each optotype on each lower line until child misses 3 optotypes on one line (continue asking child to identify the full line even when 3 or more are missed, but stop screening after this line).

  » Repeat with *right* eye covered, using the first symbol on the left side of each line.

Visual acuity value for each eye:

- The last line on which child correctly identified 3 of 5 optotypes.

Age Pass Refer or Rescreen Within 6 Months

- **3 years:** Correctly identifying 3 of 5 symbols on the 20/50 line with each eye separately

  Missing 3 or more symbols on the 20/50 line, or any line above the 20/50 line, with either eye

- **4 & 5 years:** Correctly identifying 3 of 5 symbols on the 20/40 line with each eye separately

  Missing 3 or more symbols on the 20/40 line, or any line above the 20/40 line, with either eye

- **≥6 years:** Correctly identifying 3 of 5 symbols on the 20/32 line with each eye separately

  Missing 3 or more symbols on the 20/32 line, or any line above the 20/32 line, with either eye

Option 2: LEA SYMBOLS® or HOTV Near Charts – Binocular Critical Line Screening

- Use with preschoolers beginning at age 3 years until children can identify letters out of sequence and can participate with a Sloan Letters chart.

- Student may stand or sit in a chair during screening.

- Use the attached cord to measure 16 inches between the chart and the temple near the student's right eye.

- With both eyes uncovered, ask the student to identify the symbols on the 20/200 line to ensure the student understands the screening task.

- Accept whatever name the students call the optotypes (e.g., circle may be a ball or a hula-hoop, etc.).

- Students may point to the 4 symbols at the bottom of the chart as a matching game or use individual cards if included with the chart.

- With both eyes open, ask the student to identify the optotypes on the line that matches the student's age:

  » Aged 3 years = 20/50 line.

  » Aged 4 & 5 years = 20/40 line.

  » Aged 6 years and older = 20/32 line.

Age Pass Refer or Rescreen Within 6 Months

- **3 years:** Correctly identifying 3 of 5 symbols on the 20/50 line

  Missing 3 or more symbols on the 20/50 line

- **4 & 5 years:** Correctly identifying 3 of 5 symbols on the 20/40 line

  Missing 3 or more symbols on the 20/40 line

- **≥6 years:** Correctly identifying 3 of 5 symbols on the 20/32 line.

  Missing 3 or more symbols on the 20/32 line

4. **Instrument-Based Screening**

   Notes:

   - Instruments do not provide information about visual acuity or vision functioning.

     » Instrument-based screening can be used as an option to optotype-based for children ages 3, 4, and 5 years, and that screeners are not required to do optotype-based AND instrument-based screening, but should have an eye chart from the list as a backup if a reading cannot be captured.

       - Screen with glasses on.

     » Instrument results may not be converted to visual acuity values (e.g., 20/20).

     » Rescreening is not required when an instrument reading recommends an eye exam.

       - If wheel continues to spin without generating a reading, and unable to pass screening with optotype chart, refer.

   - The printed refractive error estimate is not a formal prescription for eyeglasses and cannot be used to produce lenses.

   - Hold instrument at the child's eye level; the child's head should be straight and level.

   - Once instrument results are displayed, use the instrument's referral criteria.

   - Instruments for this manual have been vetted by the National Center for Children's Vision and Eye Health at Prevent Blindness (National Center for Children's Vision and Eye Health, n.d.), meaning they have sufficient research to support usage with this age group.

     » Monitor the NCCVEH website for updates on instruments (**https://nationalcenter. preventblindness.org/recommended-tools-and-tests**).

   Tips:

   - When receiving "pupils too small" message:

     » Reduce room lighting, if possible.

     » Hold a magazine at child's forehead to reduce lighting over child's eyes.

   - If the child wears glasses screen with glasses on and lower the child's head about 1 inch to prevent instrument lights from reflecting off glasses.

   - If a screener successfully captured readings on 10 or 15 students, the "wheel" on the instrument's results screen continues to spin on the 11th or 16th student, no error message appears on the screen (e.g., pupils too small), and the device times out, refer the student. Something about the eye may be preventing the instrument from receiving information from the eye (Nottingham Chaplin et al., 2018).

   Purpose:

   The goal of instrument-based screening is to identify amblyopia risk factors:

   - Significant refractive error (e.g., hyperopia, myopia, and astigmatism).

   - Anisometropia.

   - Eye misalignment.

   Screening Location:

   - Examination room or screening area.

Equipment Needed:

- Instrument.

- Magazine.

Procedure:

- Refer to the manufacturer instruction links provided below, as instructions could change.

- Links to instructions for two instruments are provided because the two instruments are currently approved by the National Center for Children's Vision and Eye Health at Prevent Blindness (NCCVEH, n.d.).

- Monitor this website because the list of approved instruments could change as additional research emerges: **https://nationalcenter.preventblindness.org/instrument-based-vision- screening**

- Currently approved instruments include:

  » **Welch Allyn® SpotTM Vision Screener**

  - Instructions – Welch Allyn® SpotTM Vision Screener: **https://www.welchallyn.com/content/dam/welchallyn/documents/sap- documents/LIT/80019/80019495LITPDF.pdf**

  » **Plusoptix S12C Vision Screener**

  - Instructions – Plusoptix S12C Vision Screener: **https://plusoptix.com/images/support-%20downloads/user-manual-s12c-s12r-english.pdf**

Pass:

- Instrument results indicate all readings are within the normal range

Refer for comprehensive eye examination:

- Instrument results will indicate if an eye examination is recommended.

5. Stereoacuity Screening

Pass Test 2 – Preschool Assessment of Stereopsis with a Smile

Tool includes:

- Card A = Demonstration card with smiling face.

- Card B = Ages 3 and 4 years.

- Card C = Ages 5 years and older.

- Blank card.

- Small polarized glasses.

- Intermediate polarized glasses.

- Measuring cord.

- Carrying pouch.

Notes:

- Conduct the stereoacuity screening only in conjunction with optotype-based screening.

  » Stereoacuity screening is not required if doing instrument-based screening.

- The arrow on the back of each card must point upward.

  » If cards are dirty or smudged, clean the cards with a soft, damp, lint-free cloth.

    - Dampen cloth with glass cleaner or mild detergent and water.

  » Handle cards with fingertips on edges of cards.

- Store the stereo test in a cool dry place when not in use. High heat and humidity may cause the test to fade.

- This screening tool is included in recommendations from the National Expert Panel to the National Center for Children's Vision and Eye Health at Prevent Blindness (Cotter et al., 2015).

Purpose:

- To determine if both eyes work together.

Screening Location:

- Well-lit area with no distractions.

  » Prior to screening, the screener should ensure area to be used is free of glare by standing or sitting where the student will stand or sit during screening and holding a blank card and either card B or C at a 10-degree angle (top of cards away from eyes) at eye level. If a glare is present, select a different location.

    - Inspect all cards to ensure each card is clean and free of smudges.

Procedure:

- Use the 16-inch string to measure the distance between the student's eyes and where the cards will be held during screening.

  » Place the polarized glasses on the child.

- If the student is wearing glasses, place polarized glasses over the student's glasses.

- If the student cannot point to Card B during screening while wearing prescription glasses beneath the polarized glasses, remove prescription glasses and rescreen with the student wearing only the polarized glasses.

- If the student cannot point to Card B during screening wearing only the polarized glasses and not prescription glasses, rescreen within 6 months or refer.

  » Show the student Card A (demonstration card with smiling face).

    - The back of each card is labeled.

    - Arrows on back of cards must point upward.

    - Hold cards with edges of fingertips.

  » Tell the student a picture is "popping" off the card.

  » Ask the student to name the picture.

  » Ask the student to point to the picture on the card.

- After showing the student the demonstration card, show both the blank card and Card A (the demonstration card).

- Hold Card A and the blank card in front of the student, 16 inches from the students eyes, and at a 10-degree angle (top of cards tilted toward the screener).

- Hold the blank card and the card with the stereo image at the exact same distance from the student, but allowing a space of about one inch between cards to assist in determining which card the student selects as having the smile face.

- Ask the student to point to the card with the smiling face.

- Watch the student's eyes to determine if the student is looking at both cards before identifying the card with the smiling face.

- If necessary, remind the student each time to look at both cards before pointing.

- Present the blank card and Card B.

- Tell the student the image is hiding in one of the cards.

- Ask the student to point to the card with the smiling face (or name the student used for the smiling face [e.g., moon]).

- If the student cannot point to Card B, stop screening and either rescreen within 6 months or refer.

- Present Card B and the blank card a maximum of 5 times.

- Shuffle cards behind back before each presentation.

- Avoid creating patterns of presentation (e.g., right, left, right, left, or right, right, left, left).

- For students aged 5 years and older, if the student correctly identifies Card B 4 of 4 or 4 of 5 presentations, replace Card B with Card C, and repeat the screening steps.

Age Pass Refer or Rescreen Within 6 Months

- **3 and 4 years:**

  » Correctly identifies the smiling face 4 of 4 or 4 of 5 presentations with Card B.

  » Does not correctly identify the smiling face 4 of 4 or 4 of 5 presentations with Card B ≥5 years.

  » Correctly identifies the smiling face 4 of 4 or 4 of 5 presentations with both Cards B and C

  » Does not correctly identify the smiling face 4 of 4 or 4 of 5 presentations with both Cards B and C

6. **Optional: Color Vision Deficiency Screening Notes:**
   - Color vision deficiency disorders are usually hereditary.

   - The early detection of color vision deficiency disorders is important because many classrooms use color-oriented and/or color-coded learning activities and educational supplies.

   - A color vision deficiency disorder is not treatable.

   - Awareness of color vision deficiency disorders is helpful for parents and teachers to make accommodations for the home and classroom, if required.

   - Awareness of color vision deficiency disorders can help students choose careers that do not rely on normal color vision.

   - Use paintbrush or cotton-tipped swab for tracing; oil from fingertips will desaturate colors.

   - When not in use, store color vision deficiency screening books in a dark area (e.g., cabinet drawer).

   - Color vision deficiency screening books should be replaced every 5 to 7 years because colors desaturate over time.

   Purpose:
   - To check for color vision deficiencies that may interfere with the child's learning.

   Screening Location:
   - Well-lit room, free from distractions, and with supplemental lighting.

   - To ensure accurate color vision screening results, use natural daylight lamps, such as the Foldi™ LED Lamp, a Color Test Daylight Illuminator, or a Twist Portable Lamp.

   - Do not use lights that give off a yellow tinted illumination.

Equipment Needed:

- Screening tool from 2 options:

    » ColorCheck Complete Vision Screener.

    » HRR Standard Pseudoisochromatic Test, 4th Edition.

- Table.

- Chair.

- Paintbrush or cotton-tipped swab for tracing symbols or numbers.

- Color Vision Deficiency Screening Results Letter for Parents/Caregivers

Option 1: Color Check Complete Vision Screener

Notes:

- Includes LEA SYMBOLS® for young students and LEA NUMBERS® for older students.

- Plates are numbered at the bottom left and upper right corners of each page.

- Plates 19-26 are pediatric symbols to use with children who do not know their numbers.

- Plate 19 is a demonstration card and all children should be able to identify 3 symbols on the demo plate, regardless of whether a student has a color vision deficiency.

- Plates 1-8 are numbers to use with students who know their numbers.

- Plate 1 is a demonstration card and all individuals being screened should be able to identify the number on the demo card, regardless of whether a color vision deficiency is present.

- Plates 9-15 are optional and used for additional screening.

- Plate 16 is optional and screens for severity of color vision deficiency.

- Plates 17 and 18 are optional to help screen for the tritanopia type of color vision deficiency (confusing blue with green and yellow with violet).

- Store the cards in a dark drawer when not in use.

Procedure:

- Hold plates 24-30 inches from the face and at a right angle to the child's line of sight.

- Allow 3 seconds for the child to identify each plate.

- Hesitation is an indication the child may have a color vision deficiency.

- Students may verbally identify the symbols or numbers, or trace symbols or numbers with a small paint brush or cotton swab.

    » Do not trace symbols or numbers with fingers; oil from fingertips will desaturate colors.

Pass Refer or Rescreen Within 6 Months

- **Pediatric – 19-26:**

    » Correctly identifying all symbols on plates 19-26

    » Incorrectly identifying or not seeing all symbols on plates 19-26 Number – 1-8

    » Correctly identifying all numbers on plates 1-8

    » Incorrectly identifying or not seeing all numbers on plates 1-8

Option 2: HRR Standard Pseudoisochromatic Test, 4th Edition

Notes:

- Includes 24 plates.

- 4 demonstration plates.

- 6 screening plates.

- 14 diagnostic plates.

- Use the 4 demonstration and 6 screening plates for color vision deficiency screening.

Procedure:

- Show the first 4 plates to the child demonstrating how the screening tool works.

- Starting with the first of the 6 screening plates:

- Hold plates 24-30 inches from the child's face at a right angle to the line of sight.

- Allow 3 seconds for the child to identify each plate.

- Hesitation is an indication that the child may have a color vision deficiency.

- Students may verbally identify the symbols, or trace symbols with a small paint brush or cotton swab.

- Do not trace the numbers or symbol plates with fingers; oil from fingertips will desaturate colors.

Plates Pass Refer or Rescreen Within 6 Months (4 Demonstration Plates)

- Correctly identifying 4 demonstration plates

- Incorrectly identifying symbols on 4 demonstration plates 6 Screening plates

- Correctly identifying all symbols on 6 screening plates

- Incorrectly identifying or not seeing all symbols on 6 screening plates

6 YEARS AND OLDER

Instrument-based screening is **not** recommended for children ages 6 years and older unless children cannot participate in optotype-based screening (Donahue et al., 2016).

PROCEDURE GUIDANCE

Recommended procedures for school-age screening are based on the following guidelines or documents:

- A 2016 joint statement from the American Academy of Pediatrics, the American Association for Pediatric Ophthalmology and Strabismus, the American Academy of Ophthalmology, and the American Association of Certified Orthoptists (Donahue et al., 2016).

- A 2017 Preferred Practice Pattern paper for pediatric eye evaluations in primary care and community settings from the American Academy of Ophthalmology (American Academy of Ophthalmology, 2017).

- A 2015 position statement from Prevent Blindness on school-based vision screening and eye health programs (Prevent Blindness, 2015).

Procedure (Examples of tools are in Appendix A, Document 2)

In addition to the legal requirement for distance visual acuity, the following screenings are recommended for this age group (School nurses should also review local district requirements.):

1. ABC's of Vision.

2. Distance Visual Acuity – Optotype-Based Screening.

3. Optional: Near Visual Acuity – Optotype-Based Screening.

4. Instrument-Based Screening – Only for children who cannot participate in optotype-based screening.

5. Stereoacuity Screening.

6. Optional: Color Vision Deficiency Screening.

1. ABCs of Vision

   Purpose:
   - To check for signs of a possible vision problem.

   Screening Location:
   - Well-lit room free from distractions.

   Equipment Needed:
   - ABCs of Vision Checklist

   Procedure:
   - Observe student using ABCs of Vision Checklist (Appendix D)

   - Continue to screen the student's vision, whether or not the student exhibits any of the signs on the checklist.

   Pass:
   - No signs of possible vision disorders from the checklist.

   Refer for comprehensive eye examination that includes dilating drops:
   - Student exhibits signs of possible vision disorders from the checklist, even if the student passes vision screening

2. **Distance Visual Acuity – Optotype-Based Screening**

   Notes:

   - Evidence-based charts should be used during optotype-based screening because the design of the chart can significantly affect visual acuity scores (Bailey, 2012).

   - Review use of evidence-based charts, occluders, how to point correctly at optotypes if necessary, room arrangement, positioning of student, along with other principles of vision screening.

   - For children ages 6 years and older, Sloan Letters are the preferred optotypes (Donahue et al., 2016; American Academy of Ophthalmology, 2017).

   - The preferred screening distance in this age group is 10 feet.

   - See Appendix C for vision screening tools that are **not** recommended.

   Purpose:

   - To check visual acuity at distance.

   Screening Location:

   - Well-lit room, free from distractions.

   Equipment Needed:

   - Screening tool from 4 options:

     » Option 1: Sloan Letters Proportionally Spaced logMAR Chart 20/50.

     » Option 2: AAPOS Basic Vision Screening Kit – Threshold Screening chart.

     » Option 3: AAPOS Basic Vision Screening Kit – Critical Line chart.

     » Option 4: EyeSpy 20/20TM Computerized Vision Screening.

   - Appropriate occluders.

   Procedure:

   - Each of the options describes how to arrange the environment and use the tool.

   Pass:

   - Each of the options describes passing criteria

   Refer for comprehensive eye examination:

   - Each of the options describes referral criteria.

Option 1: Sloan Letters Proportionally Spaced logMAR Chart

Notes:

- 10/xx on left side of chart is screening distance; 20/xx on right side of chart is Snellen equivalency and the number to record.

- Use when children recognize letters out of sequence and with adolescents and adults.

- Hang the chart, in a quiet, undistracted, well-lit area, with the 20/32 line at the individual's eye level.

- Measure 10-feet between chart and individual's eyes.

- Individual may stand during screening, or sit on a chair.

  » If the individual stands on a line, position the arch of each foot on the line (Figure 22)

  » If seated, measure 10 feet to the back of the chair seat and ensure the individual sits with his or her back against back of chair (Figure 23).
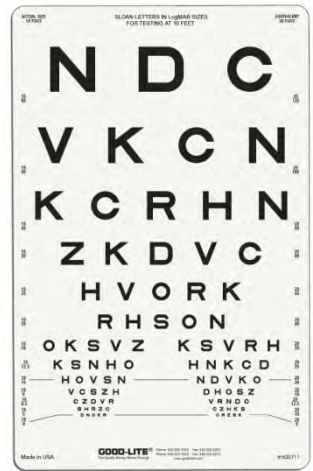
FIGURE 22   **FIGURE 23**

- Explain the screening task to the individual.

- Tell the individual you are checking their eyes one at a time to make sure they can see well with each eye.

- Depending on the age of the individual, words such as, "I will cover one of your eyes at a time and ask you to name the letters on the chart" could be used.

- Cover *left* eye with adhesive patch, tape, or occluder glasses before age 10 years and either a "lolly pop" or a "Mardi Gras mask" occluder for ages 10 year and older to screen the right eye (Figure 24).

  » If the individual is wearing prescription glasses:

    - The occluder glasses go over the glasses,

    - The "lollypop" occluder goes over the eye beneath prescription glasses, and

    - The "Mardi Gras mask" goes over glasses.
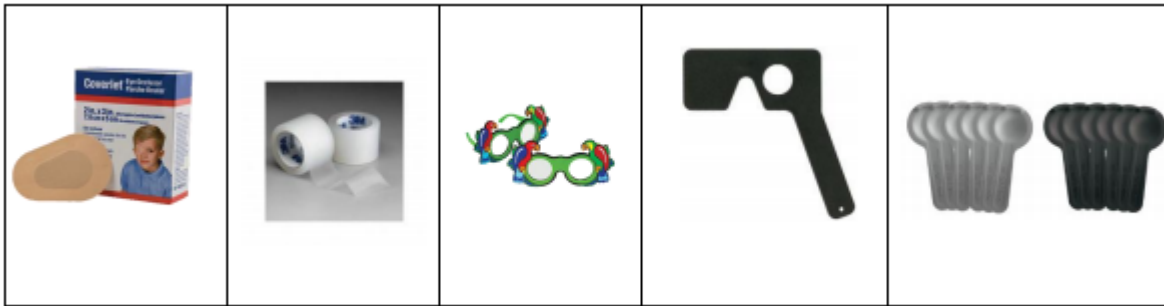
FIGURE 24

- Screen one eye at a time (monocularly); do not screen with both eyes open and uncovered.

- Starting at the top line on the *right* side of the chart, from the child's perspective, ask the individual to identify the first letter on the *right* side of each line and move down the chart until a letter is missed (Figure 25).

- Avoid pointing to, and holding pointer, at the letters to be identified.

- Isolating an optotype with a pointer, or masking all optotypes but one on a line, can lead to under- referrals or missing children who should be referred because the optotype is easier for the child to identify.

  » Instead, briefly point beneath the letter and quickly remove pointer (Figure 45).

FIGURE 25

- When the individual misidentifies a letter with the right eye, return to the line above the missed letter and ask the individual to identify each letter on that line, reading *left to right*.

- If the individual correctly identifies the first letter on the last line of the chart, ask the individual to identify all letters on that line of the chart. If the individual correctly identifies at least 3 of 5 letters, 20/10 is the visual acuity value for that eye.

- If the individual misses 3 or more letters on the 20/10 line of the chart, move to the next line up, the 20/12.5 line, and ask the individual to identify each letter on that line.

- If the individual misses 3 or more letters on the 20/12.5 line, move up to the 20/16 line.

- Continue moving up a line until the individual correctly identifies at least 3 of 5 letters. That line is the visual acuity value for that eye.

- On lines 20/125 and 20/160, the individual must correctly identify each letter.

- Record screening results for the right eye, using the 20/XX measurement.

- Occlude the *right* eye and begin screening the left eye.

- Starting at the top line on the *left* side of the chart, as individual faces chart, ask the individual to identify the first letter on the *left* side of each line (Figure 26).

FIGURE 26

- When the individual misidentifies a letter and returns to the line above the missed letter to read the full line, the individual identifies letters from *left to right*.

- Record screening results for the left eye, using the 20/XX measurement.

  Note: On the 20/40 line, the lines split into 2 smaller Figure 46 charts, or columns, of 5 optotypes (Figure 27).

- Use the *right* column for the *right* eye, as individual faces the chart, and the *left* column for the *left* eye.

- **Example:** When the left eye is covered and the individual misidentifies the first letter on the *right* side of the 20/25 line of the *right* column, move up to the 20/32 line and ask the individual to identify all 5 letters on that line, reading *left to right*.

- **Example:** When the right eye is covered and the individual misidentifies a letter on the *left* side of the 20/25 line of the *left* column, move up to the Figure 47 20/32 line and ask the individual to identify all 5 letters, reading *left to right*.

FIGURE 27

Visual acuity value:

- The smallest line of letters on which the individual correctly identified at least 3 of 5 letters. The acuity value is written for each eye.

Pass:

- Correctly identifying at least 3 of 5 letters on the 20/32 line, or any line below the 20/32 line, with each individual eye.

Refer:

- Missing 3 or more letters on the 20/32 line, or any line above the 20/32 line, with either eye,

OR

- two-line difference between the eyes, even within the passing range (e.g., 20/20 and 20/32).

Options 2 and 3 – AAPOS Basic Vision Screening Kit – Threshold or Critical

Line Formats

Note: The AAPOS kit is listed in Chapters 5 and 6 because this kit is for all ages. Charts with LEA SYMBOLS® are for children ages 3, 4, and 5 years or until they know their letters out of sequence and are ready for Sloan Letters. This chapter describes Sloan Letters.

- Includes Sloan Letters for children ages 5 years and older in threshold and critical line screening formats. Begin using Sloan Letters only when children know their letters out of sequence.

Option 2: Sloan Letters – Threshold Screening

- *10/xx on left side of chart is screening distance; 20/xx on right side of chart is Snellen equivalency and the number to record*

- Use with children beginning at age 6 years or when children comfortably recognize letters out of sequence.

- Use 10-foot cord from Kit to measure screening distance between chart and child's eyes.

- Child may stand during screening or sit on a chair.

  » If child stands, position the arches of the feet on the line 10-feet from the chart (Figure 28).

  » If child sits in a chair, measure 10 feet from the chart to the back of the chair and ensure the child sits with their back against the back of the chair (Figure 29).

FIGURE 28

FIGURE 29

- Hold, or hang, chart with the 20/32 line at the child's eye level.

- Cover left eye with adhesive patch. Use occluder glasses only if patches are unavailable or are not tolerated. Use black occluder ("Mardi Gras" mask) in kit only for children aged 10 years and older (Figure 30).
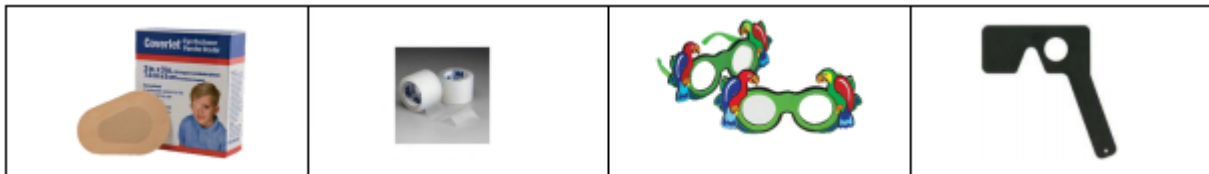
FIGURE 30

- Starting at the top line, ask child to identify the first optotype on the right side of each line, from the child's perspective, and move down the chart until an optotype is missed.

- Avoid pointing to, and holding pointer, at the optotypes to be identified.

- Isolating an optotype with a pointer, or masking all optotypes but one on a line, can lead to under-referrals or missing children who should be referred because the optotype is easier for the child to identify.

  » Instead, briefly point to the optotype and quickly remove pointer.

- When child misidentifies an optotype, return to the line above the missed optotype and ask child to identify each optotype on that line.

- Continue asking child to identify each optotype on each lower line until child misses 3 optotypes on one line (continue asking child to identify the full line even when 3 or more are missed, but stop screening after this line).

- Always say "good job" or other supportive words, even when child responds incorrectly.

- Repeat with right eye covered, using the first optotype on the left side of each line, from the child's perspective.

Visual acuity score:

- The last line on which the child correctly identified 3 of 5 symbols.

Pass:

- **Ages 6 years and older:** correctly identifying 3 of 5 symbols on the 20/32 line, or any line below the 20/32 line, with each eye.

Refer:

- **Ages 6 years and older:** Missing 3 or more symbols on the 20/32 line, or any above the 20/32 line, with either eye

OR

- two-line difference between the eyes, even within the passing range – e.g., 10/10 (20/20) and 10/16 (20/32).

Option 3: Sloan Letters – Critical Line Screening *Use when children know their letters.

- Select chart for children ages 6 years and older.

- Use 10-foot cord from Kit to measure screening distance between chart and child's eyes.

- Child may stand during screening or sit on a chair.

  » If child stands, position the arches of the feet on the line 10-feet from the chart (Figure 31).

  » If child sits in a chair, measure 10 feet to the back of the chair and ensure the child sits with back against the back of the chair (Figure 32).

FIGURE 31   **FIGURE 32**

- Hold, or hang, chart with critical passing line at child's eye level.

- Cover left eye with patch and bottom boxed line on chart with your hand or paper. Use occluder glasses only if patches are unavailable or are not tolerated. Use black ("Mardi Gras" mask) occluder in kit only for children aged 10 years and older (Figure 33).

FIGURE 33

- Ask child to identify optotypes on top boxed line on chart.

- Avoid pointing to, and holding pointer, at the optotypes to be identified.

- Isolating an optotype with a pointer, or masking all optotypes but one on a line, can lead to under-referrals or missing children who should be referred because the optotype is easier for the child to identify.

  » Instead, briefly point to the symbol and quickly remove pointer.

- Repeat with right eye covered and top boxed line covered. Ask child to identify symbols on lower boxed line on chart.

Pass:

- **Ages 6 years and older:** Correctly identifying 3 of 5 symbols on the 20/32 line with each eye.

Refer:

- **Ages 6 years and older:** Missing 3 or more symbols on the 20/32 line with either eye.

Option 4: EyeSpy 20/20TM Computerized Vision Screening (with Sloan Letters)
*(Refer to Appendix A, Document 2, for examples of tools)

Notes:

- Children play a 3-minute video matching game.

- Provides report with vision screening results in English or Spanish.

- Integrates with electronic medical records.

Instructions:

- Available at: **https://www.good-lite.com/downloads/EyeSpyUserGuide.pdf**

3. **Optional: Near Visual Acuity – Optotype-Based Screening**

   Notes:

   - Near vision screening should include charts with attached 16-inch cords to ensure the screening distance is maintained.

     » The 16-inch cord should remain near the student's temple during screening.

     » The 16-inch cord should remain tight during screening to ensure the screening distance is maintained.

   - Because no national guidelines are available for near vision screening, screeners may choose between 2 options:

     » Monocular threshold screening, or

     » Binocular critical line screening.

   - If conducting monocular threshold screening, the following occluders are recommended:

     Occluders

     - Recommendations are based on occluders included with a vision screening kit created with the American Association for Pediatric Ophthalmology and Strabismus – adhesive patches, occluder glasses, and black mask.

     - Donahue et al. (2016) and the American Academy of Ophthalmology (2017) recommend adhesive eye patches and tape.

     - Recommended occluders for children ages 6, 7, 8, and 9 years include (Figure 34):

       » Adhesive patches,

       » 2-inch wide, hypoallergenic surgical tape, and

       » Occluder glasses

FIGURE 34

- Recommended occluders for children ages 10 years and older include (Figure 35):

  » "Mardi Gras" mask occluder, or

  » "Lollypop" occluders (held with handle pointing toward temple).
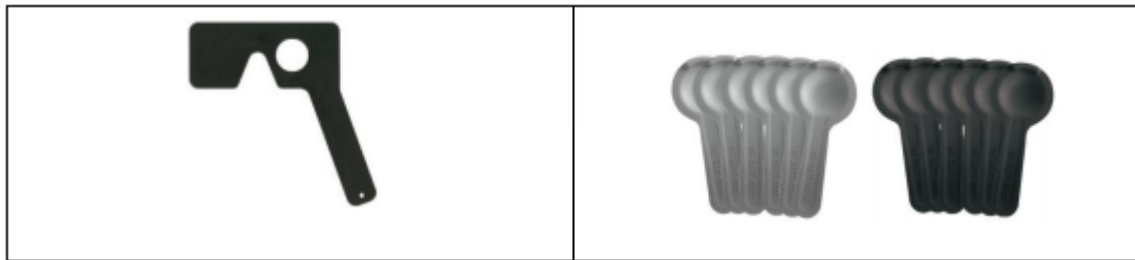
FIGURE 35

Purpose:

- To check visual acuity at near.

Screening Location:

- Well-lit room, free from distractions.

Equipment Needed:

- Sloan Letters Near Card with cord.

- Appropriate occluder.

Procedure:

- Two options for using the Sloan Letters Near Card describe how to arrange the environment and use the tool.

Pass:

- Each of the 2 options for using the Sloan Letters Near Card provides passing criteria.

Rescreen within 6 months or refer:

- Each of the 2 options for using the Sloan Letters Near Card describes referral criteria.

Option 1 – Sloan Letters – Monocular Threshold Screening

Notes:

- 20/xx on right side of chart is Snellen equivalency and the number to record.

- Use when children can recognize letters out of sequence.

- Student may stand or sit in a chair during screening.

- Use the attached cord to measure 16 inches between the chart and the temple near the student's right eye.

- Cover *left* eye with adhesive patch, tape, or occluder glasses before age 10 years and either a "lolly pop" or a "Mardi Gras mask" occluder for ages 10 year and older to screen the right eye (Figure 36).

  » If the individual is wearing prescription glasses:

    - The occluder glasses go over the glasses,

    - The "lolly pop" occluder goes over the eye beneath prescription glasses, and

    - The "Mardi Gras mask" goes over glasses.
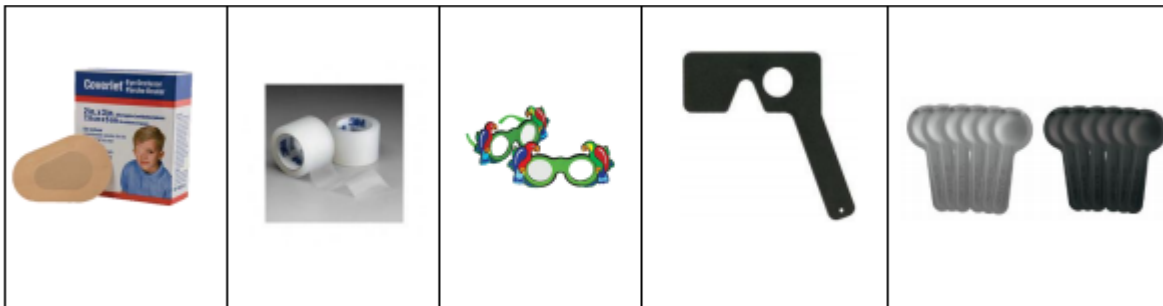
FIGURE 36

- Starting at the 20/100 line, ask the student to identify the first optotype on the *right* side of each line, from the child's perspective, and move down the chart until a symbol is missed.

- Avoid pointing to, and holding pointer, at the optotypes to be identified.

- Isolating an optotype with a pointer, or masking all optotypes but one on a line, can lead to under-referrals or missing children who should be referred because the optotype is easier for the child to identify.

  » Instead, briefly point to the optotype and quickly remove pointer.

- When the student misidentifies an optotype, return to the line above the missed optotype and ask the student to identify each optotype on that line.

- Continue asking child to identify each optotype on each lower line until child misses 3 optotypes on one line (continue asking child to identify the full line even when 3 or more are missed, but stop screening after this line).

- Repeat with *right* eye covered, using the first symbol on the *left* side of each line from the child's perspective.

Visual acuity value for each eye:

- The last line on which child correctly identified 3 of 5 optotypes.

Pass:

- **Ages 6 years and older:** Correctly identifying 3 of 5 optotypes on the 20/32 line with each eye.

Rescreen within 6 months or refer:

- **Ages 6 years and older:** Missing 3 or more optotypes on the 20/32 line, or any line above the 20/32 line, with either eye.

Option 2 – Sloan Letters – Binocular Critical Line Screening

- Use when students can recognize letters out of sequence.

- Student may stand or sit in a chair during screening.

- Use the attached cord to measure 16 inches between the chart and the temple near the student's right eye.

- With both eyes open, ask the student to identify the optotypes on the 20/32 line with both eyes open.

Pass:

- **Aged 6 years and older:** Correctly identifying 3 of 5 optotypes on the 20/32 line.

Rescreen within 6 months or refer:

- **Aged 6 years and older:** Missing 3 or more optotypes on the 20/32 line.

4. **Instrument-Based Screening – Only for children who cannot participate in optotype-based screening**

   Notes:

   - Instruments do not provide information about visual acuity or vision functioning.

   - Instrument results may **not** be converted to visual acuity values (e.g., 20/20).

   - The printed refractive error estimate is **not** a formal prescription for eyeglasses and cannot be used to produce lenses.

   - Hold instrument at the child's eye level; the child's head should be straight and level.

     » Once instrument results are displayed, use the instrument's referral criteria.

   - Instruments for this manual have been vetted by the National Center for Children's Vision and Eye Health at Prevent Blindness (National Center for Children's Vision and Eye Health, n.d.), meaning they have sufficient research to support usage with this age group.

   - Monitor the NCCVEH website for updates on instruments (**https://nationalcenter. preventblindness.org/recommended-tools-and-tests**).

   Tips:

   - When receiving "pupils too small" message:

     » Reduce room lighting, if possible.

     » Hold a magazine at child's forehead to reduce lighting over child's eyes.

   - If the child wears glasses screen with glasses on and lower the child's head about 1 inch to prevent instrument lights from reflecting off glasses.

- If a screener successfully captured readings on 10 or 15 students, the "wheel" on the instrument's results screen continues to spin on the 11th or 16th student, no error message appears on the screen (e.g., pupils too small), and the device times out, refer the student. Something about the eye may be preventing the instrument from receiving information from the eye (Nottingham Chaplin et al., 2018).

Purpose:

- The goal of instrument-based screening is to identify amblyopia risk factors:

  » Significant refractive error (e.g., hyperopia, myopia, and astigmatism).

  » Anisometropia.

  » Eye misalignment.

Screening Location:

- Examination room or screening area.

Equipment Needed:

- Instrument.

- Magazine.

Procedure:

- Refer to the manufacturer instruction links provided below, as instructions could change.

- Links to instructions for two instruments are provided because the two instruments are currently approved by the National Center for Children's Vision and Eye Health at Prevent Blindness (NCCVEH, n.d.).

- Monitor this website because the list of approved instruments could change as additional research emerges: **https://nationalcenter.preventblindness.org/instrument-based-vision- screening**

- Currently approved instruments include:

  » **Welch Allyn® SpotTM Vision Screener**

  - Instructions – Welch Allyn® SpotTM Vision Screener: **https://www.welchallyn.com/content/dam/welchallyn/documents/sap- documents/LIT/80019/80019495LITPDF.pdf**

  » **Plusoptix S12C Vision Screener**

  - Instructions – Plusoptix S12C Vision Screener: **https://plusoptix.com/images/support-downloads/user-manual-s12c-s12r-english.pdf**

Pass:

- Instrument results indicate all readings are within the normal range.

Refer for comprehensive eye examination:

- Instrument results will indicate if an eye examination is recommended.

5. Stereoacuity Screening

Pass Test 2 – Preschool Assessment of Stereopsis with a Smile

Tool includes:

- Card A = Demonstration card with smiling face.

- Card B = Ages 3 and 4 years.

- Card C = Ages 5 years and older.

- Blank card.

- Small polarized glasses.

- Intermediate polarized glasses.

- Measuring cord.

- Carrying pouch.

Notes:

- Conduct the stereoacuity screening only in conjunction with optotype-based screening.

  » Stereoacuity screening is not required if doing instrument-based screening.

- The arrow on the back of each card must point upward.

  » If cards are dirty or smudged, clean the cards with a soft, damp, lint-free cloth.

    - Dampen cloth with glass cleaner or mild detergent and water.

    - Handle cards with fingertips on edges of cards.

- Store the stereo test in a cool dry place when not in use. High heat and humidity may cause the test to fade.

- This screening tool is included in recommendations from the National Expert Panel to the National Center for Children's Vision and Eye Health at Prevent Blindness (Cotter et al., 2015).

Purpose:

- To determine if both eyes work together.

Screening Location:

- Well-lit area with no distractions.

  » Prior to screening, the screener should ensure area to be used is free of glare by standing or sitting where the student will stand or sit during screening and holding a blank card and either card B or C at a 10-degree angle (top of cards away from eyes) at eye level. If a glare is present, select a different location.

    - Inspect all cards to ensure each card is clean and free of smudges.

Procedure:

- Use the 16-inch string to measure the distance between the student's eyes and where the cards will be held during screening.

- Place the polarized glasses on the child.

- If the student is wearing glasses, place polarized glasses over the student's glasses.

- If the student cannot point to Card B during screening while wearing prescription glasses beneath the polarized glasses, remove prescription glasses and rescreen with the student wearing only the polarized glasses.

- If the student cannot point to Card B during screening wearing only the polarized glasses and not prescription glasses, rescreen within 6 months or refer.

  » Show the student Card A (demonstration card with smiling face).

    - The back of each card is labeled.

    - Arrows on back of cards must point upward.

    - Hold cards with edges of fingertips.

  » Tell the student a picture is "popping" off the card.

  » Ask the student to name the picture.

  » Ask the student to point to the picture on the card.

- After showing the student the demonstration card, show both the blank card and Card A (the demonstration card).

- Hold Card A and the blank card in front of the student, 16 inches from the students eyes, and at a 10-degree angle (top of cards tilted toward the screener).

- Hold the blank card and the card with the stereo image at the exact same distance from the student, but allowing a space of about one inch between cards to assist in determining which card the student selects as having the smile face.

- Ask the student to point to the card with the smiling face.

- Watch the student's eyes to determine if the student is looking at both cards before identifying the card with the smiling face.

- If necessary, remind the student each time to look at both cards before pointing.

- Present the blank card and Card B.

- Tell the student the image is hiding in one of the cards.

- Ask the student to point to the card with the smiling face (or name the student used for the smiling face [e.g., moon]).

- If the student cannot point to Card B, stop screening and either rescreen within 6 months or refer.

- Present Card B and the blank card a maximum of 5 times.

- Shuffle cards behind back before each presentation.

- Avoid creating patterns of presentation (e.g., right, left, right, left, or right, right, left, left).

- For students aged 5 years and older, if the student correctly identifies Card B 4 of 4 or 4 of 5 presentations, replace Card B with Card C, and repeat the screening steps.

Age Pass Refer or Rescreen Within 6 Months

- **3 and 4 years:**

  » Correctly identifies the smiling face 4 of 4 or 4 of 5 presentations with Card B.

  » Does not correctly identify the smiling face 4 of 4 or 4 of 5 presentations with Card B ≥5 years Correctly identifies the smiling face 4 of 4 or 4 of 5 presentations with both Cards B and C

  » Does not correctly identify the smiling face 4 of 4 or 4 of 5 presentations with both Cards B and C

6. Optional: Color Vision Deficiency Screening

Notes:

- Color vision deficiency disorders are usually hereditary.

- The early detection of color vision deficiency disorders is important because many classrooms use color-oriented and/or color-coded learning activities and educational supplies.

- A color vision deficiency disorder is not treatable.

- Awareness of color vision deficiency disorders is helpful for parents and teachers to make accommodations for the home and classroom, if required.

- Awareness of color vision deficiency disorders can help students choose careers that do not rely on normal color vision.

- Use paintbrush or cotton-tipped swab for tracing; oil from fingertips will desaturate colors.

- When not in use, store color vision deficiency screening books in a dark area (e.g., cabinet drawer).

- Color vision deficiency screening books should be replaced every 5 to 7 years because colors desaturate over time.

Purpose:

- To check for color vision deficiencies that may interfere with the child's learning.

Screening Location:

- Well-lit room, free from distractions, and with supplemental lighting.

- To ensure accurate color vision screening results, use natural daylight lamps, such as the FoldiTM LED Lamp, a Color Test Daylight Illuminator, or a Twist Portable Lamp.

  » Do not use lights that give off a yellow tinted illumination.

Equipment Needed:

- Screening tool from 2 options:

  » ColorCheck Complete Vision Screener.

  » HRR Standard Pseudoisochromatic Test, 4th Edition

- Table.

- Chair.

- Paintbrush or cotton-tipped swab for tracing symbols or numbers

- Color Vision Deficiency Screening Results Letter for Parents/Caregivers

Option 1: ColorCheck Complete Vision Screener

Notes:

- Includes LEA SYMBOLS® for young students and LEA NUMBERS® for older students.

- Plates are numbered at the bottom left and upper right corners of each page.

- Plates 19-26 are pediatric symbols to use with children who do not know their numbers.

- Plate 19 is a demonstration card and all children should be able to identify 3 symbols on the demo plate, regardless of whether a student has a color vision deficiency.

- Plates 1-8 are numbers to use with students who know their numbers.

- Plate 1 is a demonstration card and all individuals being screened should be able to identify the number on the demo card, regardless of whether a color vision deficiency is present.

- Plates 9-15 are optional and used for additional screening.

- Plate 16 is optional and screens for severity of color vision deficiency.

- Plates 17 and 18 are optional to help screen for the tritanopia type of color vision deficiency (confusing blue with green and yellow with violet).

- Store the cards in a dark drawer when not in use.

Procedure:

- Hold plates 24-30 inches from the face and at a right angle to the child's line of sight.

- Allow 3 seconds for the child to identify each plate.

- Hesitation is an indication the child may have a color vision deficiency.

- Students may verbally identify the symbols or numbers, or trace symbols or numbers with a small paint brush or cotton swab.

  » Do not trace symbols or numbers with fingers; oil from fingertips will desaturate colors.

Pass Refer or Rescreen Within 6 Months

- **Pediatric – 19-26:**

  » Correctly identifying all symbols on plates 19-26

  » Incorrectly identifying or not seeing all symbols on plates 19-26 Number – 1- 8

  » Correctly identifying all numbers on plates 1-8

  » Incorrectly identifying or not seeing all numbers on plates 1-8

Option 2: HRR Standard Pseudoisochromatic Test, 4th Edition

Notes:

- Includes 24 plates.

- 4 demonstration plates.

- 6 screening plates.

- 14 diagnostic plates.

- Use the 4 demonstration and 6 screening plates for color vision deficiency screening.

Procedure:

- Show the first 4 plates to the child demonstrating how the screening tool works.

- Starting with the first of the 6 screening plates:

- Hold plates 24-30 inches from the child's face at a right angle to the line of sight.

- Allow 3 seconds for the child to identify each plate.

- Hesitation is an indication that the child may have a color vision deficiency.

- Students may verbally identify the symbols, or trace symbols with a small paint brush or cotton swab.

  » Do not trace the numbers or symbol plates with fingers; oil from fingertips will desaturate colors.

Pass Refer or Rescreen Within 6 Months

- 4 Demonstration plates

  » Correctly identifying 4 demonstration plates

  » Incorrectly identifying symbols on 4 demonstration plates 6 Screening plates

  » Correctly identifying all symbols on 6 screening plates

  » Incorrectly identifying or not seeing all symbols on 6 screening plates

APPENDIX A – SUMMARY OF VISION SCREENING

1. Ages at Which Vision Screening Should Occur

No national guideline exists mandating ages at which vision screening should occur at school. Currently, Louisiana requires screening every 2 years (24 months).

The American Academy of Pediatrics and Bright Futures have a Periodicity Schedule recommending ages at which vision screening should occur during well-child visits in the medical home (Bright Futures/American Academy of Pediatrics, 2017).

For these guidelines, with regard to **birth up through age 5**, vision screening should occur minimally no less than 1 time from birth to 1st birthday and ages 1, 2, 3, 4 and 5 years.

School nurses could use the Periodicity Schedule as a template for determining when to screen at school for students ages 6 through 15 years. Recommended ages for screening **school age children** are as follows:

- 6 years,
- 8 years,
- 10 years,
- 12 years, and
- 15 years.

2. Summary of Vision Screening Procedures and Referral Criteria

Age	Type	Procedure or Tool	Referral
All	• Family history and External Observation	Pre-Screening	• Refer for any risk factor, missed vision development milestone, or appearance, behavior concerns, or complaints.
3 months to 3 years	• External Observation	Fixate	• Does not fixate on object or fixates with one eye only. • Eye drifting is abnormal.
3 months to 3 years	• External Observation	Tracking	• Eyes do not follow in unison or tracking is jerky or not present.
6 months to 3 years	• External Observation	Pupillary Reflex	• Either pupil dilates when light is shined on eye, remains the same in light and dark conditions, or pupil reaction to light is sluggish, jerky, or asymmetrical.
6 months to 3 years	• External Observation	Corneal Light Reflection (Hirschberg Test)	• Reflected light appears to be near the center of the pupil of one eye and displaced nasally, temporally, or vertically away from the pupil in the second eye.

Age	Type	Procedure or Tool	Referral
12 months to 6 years **≥6 years ONLY if student cannot do optotype-based screening**	• Instrument-Based Screening • Tool Choice 1	Welch Allyn® Spot™ Vision Screener 	• Instrument results on screen indicate when an eye examination is recommended.
12 months to 6 years **≥6 years ONLY if student cannot do optotype-based screening**	• Instrument-Based Screening • Tool Choice 2	Plusoptix S12C Vision Screener 	• Instrument results on screen indicate when an eye examination is recommended.
3, 4, and 5 years	• Distance Visual Acuity Screening • Tool Choice 1	EyE Check Screener with LEA 	• Refer (or rescreen the same day, as soon as possible, or no later than 6 months) = » Correct identification of only 0, 1, or 2 symbols with either or both eyes.
3, 4, 5, and 6 years	• Distance Visual Acuity Screening • Tool Choice 2	Sight Line Kit (10 feet) 	• Refer (or rescreen the same day, as soon as possible, or no later than 6 months) = » Correct identification of only 0, 1, or 2 symbols with either or both eyes.
3 years to 21 years	• Distance Visual Acuity Screening • Tool Choice 3 • Both threshold and critical line formats in same kit.	AAPOS Basic Vision Screening Kit *(threshold format – 10 feet)* 	• Refer (or rescreen no later than age 6 months) = » 3 years - Missing 3 or more symbols on the 20/50 line, or any line above the 20/50 line, with either eye. » 4 years - Missing 3 or more symbols on the 20/40 line, or any line above the 20/40 line, with either eye. » ≥6 years - Missing 3 or more symbols on the 20/32 line, or any line above the 20/32 line, with either eye. » All ages - Two-line difference between the eyes, even within the passing range – e.g., 10/10 (20/20) and 10/16 (20/32).

Age	Type	Procedure or Tool	Referral
3 years to 21 years	• Distance Visual Acuity Screening • Tool Choice 3 • Both threshold and critical line formats in same kit.	**AAPOS Basic Vision Screening Kit *(critical line format – 10 feet)*** 	• Refer (or rescreen no later than age 6 months) = » 3 years - Missing 3 or more symbols on the 20/50 line with either eye. » 4 years - Missing 3 or more symbols on the 20/40 line with either eye. » ≥5 years - Missing 3 or more symbols on the 20/32 line with either eye.
3, 4, and 5 years, or until children can identify letters out of sequence, and, then, switch to a Sloan Letters chart	• Distance Visual Acuity Screening • Tool Choices 4 and 5	**LEA SYMBOLS® or HOTV Proportionally Spaced Charts (10 feet)** 	• Refer (or rescreen no later than age 6 months) = » 3 years - Missing 3 or more symbols on the 20/50 line, or any line above the 20/50 line, with either eye. » 4 years - Missing 3 or more symbols on the 20/40 line, or any line above the 20/40 line, with either eye. » ≥6 years - Missing 3 or more symbols on the 20/32 line, or any line above the 20/32 line, with either eye. » All ages - Two-line difference between the eyes, even within the passing range – e.g., 10/10 (20/20) and 10/16 (20/32).
3 years to 21 years	• Distance Visual Acuity Screening • Tool Choice 6 • Optional color vision deficiency and stereoacuity screening available	**EyeSpy 20/20™ Computerized Vision Screening (10 feet)** 	• Software automatically captures screening results and determines when eye examination referrals should occur.

Age	Type	Procedure or Tool	Referral
6 years to 21 years (when children can identify letters out of sequence)	• Distance Visual Acuity Screening • Choice 1 in this format for this age group.	**Sloan Letters Proportionally Spaced logMAR Chart (10 feet)** 	• Refer (or rescreen no later than age 6 months) = » Missing 3 or more symbols on the 20/32 line, or any line above the 20/32 line, with either eye. » Two-line difference between the eyes, even within the passing range – e.g., 10/10 (20/20) and 10/16 (20/32).
3, 4, and 5 years, or until children can identify letters out of sequence, and, then, switch to a Sloan Letters chart	• Near Visual Acuity Screening – Monocular Threshold • Choices 1 and 2 • Can do both threshold and critical line screening with either tool.	**LEA SYMBOLS or HOTV Near Chart *(Monocular threshold format – 16 inches)*** 	• Refer (or rescreen no later than age 6 months) = » 3 years - Missing 3 or more » optotypes on the 20/50 line, or any line above the 20/50 line, with either eye. » 4 years - Missing 3 or more optotypes on the 20/40 line, or any line above the 20/40 line, with either eye. » ≥6 years - Missing 3 or more optotypes on the 20/32 line, or any line above the 20/32 line, with either eye.
3, 4, and 5 years, or until children can identify letters out of sequence, and, then, switch to a Sloan Letters chart	• Near Visual Acuity Screening – Binocular Critical Line • Choices 1 and 2 • Can do both threshold and • Critical line screening with either tool.	**LEA SYMBOLS® or HOTV Near Chart *(Binocular critical line format – 16 inches)*** 	• Refer (or rescreen no later than age 6 months) = » 3 years - Missing 3 or more optotypes on the 20/50 line. » 4 years - Missing 3 or more optotypes on the 20/40 line. » ≥5 years - Missing 3 or more optotypes on the 20/32 line.
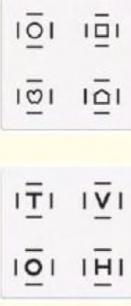
Age	Type	Procedure or Tool	Referral
6 years to 21 years (when children can identify letters out of sequence)	• Near Visual Acuity Screening – Monocular Threshold • Choice 1 • Can use for threshold or critical line screening.	**Sloan Letters** *(Monocular threshold format – 16 inches)*	• Refer (or rescreen no later than age 6 months) = » ≥6 years - Missing 3 or more optotypes on the 20/32 line, or any line above the 20/32 line, with either eye.
6 years to 21 years (when children can identify letters out of sequence)	• Near Visual Acuity Screening – Binocular Critical Line • Choice 1 • Can use for threshold or critical line screening.	**Sloan Letters** *(Binocular critical line format – 16 inches)*	• Refer (or rescreen no later than age 6 months) = » ≥6 years - Missing 3 or more optotypes on the 20/32 line.
3 years to 21 years	• Stereoacuity Screening	**PASS TEST 2 –** **Preschool Assessment of Stereopsis with a Smile** **(16 inches)**	• Refer (or rescreen no later than age 6 months) = » 3 and 4 years – Does not correctly identify the smiling face of 4 of 4 or 4 of 5 presentations with Card B. » ≥5 years – Does not correctly identify the smiling face of 4 of 4 or 4 of 5 presentations with both Cards B and C.
3 years to 21 years	• **Optional:** » Color Vision Deficiency Screening » Choice 1	**ColorCheck** **Complete Vision Screener**	• Refer (or rescreen no later than age 6 months) = » Incorrectly identifying all symbols on plates 19-26 for students who do not know their numbers. » Incorrectly identifying all numbers on plates 1-8 for students who know their numbers.
3 years to 21 years	• **Optional:** » Color Vision Deficiency Screening » Choice 2	**Optional:** **Color Vision Deficiency Screening HRR Standard Pseudoisochromatic Test, 4th Edition**	• Refer (or rescreen no later than age 6 months) = » Incorrectly identifying or not seeing all symbols on 4 demo and 6 » Screening plates

APPENDIX B - RECOMMENDED VISION SCREENING TOOLS

States, and even separate school districts within states, have varying vision screening procedures and protocols. The following information provides recommendations from currently available evidence-based sources, including the National Expert Panel to the National Center for Children's Vision and Eye Health, Prevent Blindness, and Bright Futures.

OPTOTYPE-BASED SCREENING APPROACH

TEST	AGES	TOOLS	OPTOTYPES	PASS	NOTES
Distance	3, 4, 5, and 6 years old	Tests of visual acuity: • Single, surrounded optotypes in wheels or flip charts at 5 feet. • Flip charts with crowded lines of 5 optotypes per page at 10 feet in critical line or full threshold formats. • Tests of visual acuity screening software with single, surrounded optotypes at 5 or 10 feet. EyeSpy 20/20™	LEA SYMBOLS® or HOTV letters 	3yo – 20/50 line 4 and 5yo – 20/40 line 6yo – 20/32 line	Screen annually. Screening distance is between chart and child's eyes. Place arch of the child's foot on the line when measuring proper distance. Screen one eye at a time. Rescreen – within 6 months with the same screening tool. Refer – to an eye care professional (pediatric optometrist, optometrist, pediatric ophthalmologist, or ophthalmologist) with training and experience examining young children.

OPTOTYPE-BASED SCREENING APPROACH (Continued)

TEST	AGES	TOOLS	OPTOTYPES	PASS	NOTES
Distance	6 years and older	Tests of visual acuity at 10 feet, using standardized format. If you draw a line around the outside of the optotypes, the line will resemble an upside down pyramid and not a rectangle. No more than 5 optotypes per line, unless using a 9" x 14" chart. Test of visual acuity should be 10 feet, not 20 feet, AND should contain 20/32 (10/16) line, not 20/30.	Sloan Letters or LEA NUMBERS® 	Majority of optotypes on 20/32 line with each eye	Bright Futures recommends vision screening for well-child medical visits at ages 8, 10, 12, and 15 years. Screening distance is between chart and child's eyes. Place arch of the child's foot on the line when measuring proper distance. Screen one eye at a time. Rescreen – Within 6 months with the same screening tool. Refer – to an eye care professional (pediatric optometrist, optometrist, pediatric ophthalmologist, or ophthalmologist) with experience examining children.

Instrument-based screening is appropriate for children ages 1 and 2 years, as an alternative to optotype-based screening for ages 3, 4, and 5 years, and ages 6 years and older **only for children who cannot participate** in optotype-based screening. This age range may expand as high quality, peer-reviewed, published research emerges. All individuals, including community groups, screening children ages 6 years and older should follow this guideline until such research emerges.

Donahue, S. P., Baker, C. N., & AAP Committee on Practice and Ambulatory Medicine, AAP Section on Ophthalmology, American Association of Certified Orthoptists, American Association for Pediatric Ophthalmology and Strabismus, American Academy of Ophthalmology (2016). Procedures for the evaluation of the visual system by pediatricians. *Pediatrics*, 137(1), e20153597. Retrieved from http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3597.full.pdf

INSTRUMENT-BASED SCREENING APPROACH

TEST	AGES	TOOLS	OPTOTYPES	PASS	NOTES
Estimates of refractive error and eye misalignment	1 year to 6 years old	Allyn Spot™ Vision Screener Welch Allyn SureSight® Vision Screener – Version 2.25 Plusoptix S12C Righton Retinomax	None	According to device settings	Vision screening instruments do not measure visual acuity. Consult local eye care provider for referral criteria settings in programmable devices. Insufficient data currently exists to support instrument-based screening for ages 6 years and older. Monitor the NCCVEH website for additional approved devices. https://nationalcenter.preventblindness.org/instrument-based-vision-screening

RECOMMENDATIONS FOR MISCELLANEOUS MANDATED SCREENING COMPONENTS

TEST	AGES	TOOLS	OPTOTYPES	PASS	NOTES
Near visual acuity	All	Near charts with 16-inch measuring cord. Sloan Letters near chart with cord. LEA SYMBOLS near chart with 16-inch measuring cord.	Ages 3 to 6 years: LEA SYMBOLS® or HOTV letters Ages 6 years and older: Sloan Letters or LEA NUMBERS®	3yo – majority of optotypes on 20/50 line with each eye separately or both eyes open 4yo – majority of optotypes on 20/40 line with each eye separately or both eyes open 5yo – majority of optotypes on 20/40 line with each eye separately or both eyes open 6yo and older – majority of optotypes on 20/32 line with each eye separately or both eyes open	Plus lens testing is _**not**_ a near visual acuity test. Can screen age/critical line with each eye individually or with both eyes open. Hold cord at child's temple. Ensure cord remains tight to prevent child from moving closer to or farther away from chart.

TEST	AGES	TOOLS	OPTOTYPES	PASS	NOTES
Stereoacuity	All	PASS Test™ 2	NA	3yo – pass Card B (no testing with Card C) 4yo – pass Card B (no testing with Card C) 5yo and older – pass Cards B and C	If student wears prescription glasses for distance viewing, remove prescription glasses and screen only with polarized glasses. If student wears prescription glasses for near viewing, or full time, place polarized glasses over prescription glasses when screening. you may need a larger set of polarized glasses. If student wears prescription glasses and you do not know the reason, place polarized glasses over prescription glasses when screening. you may need a larger set of polarized glasses. If the child cannot see the 3-D image, then try conducting the test without the child wearing their glasses. Ensure no glare or shadow on cards. Hold cards with edges of fingertips. Tilt cards slightly backward – about a 10-degree tilt.
Color Vision Deficiency Screening	Upon entry to school system	Book with pseudoisochromatic plates	Symbols and numbers	Follow manufacturer instructions	Replace book every 7 years; colors desaturate over time. Use cotton swab or brush for pointing or tracing the image as oil from fingertips will desaturate colors.
Occluders	3 to 10 years	Adhesive patches, 2-inch wide hypoallergenic surgical tape, or occluder glasses	NA	NA	*Unacceptable* occluders include: Tissues, hands, paper or plastic cups, paper occluders, adults holding occluders over child's eyes, and occluder paddles.
Occluders	10 years and older	"Lollypop" or "Mardi Gras mask" occluders	NA	NA	Hold "Lollypop" occluders with handle toward temple, not chin. *Unacceptable* occluders include: Tissues, hands, paper or plastic cups, paper occluders, adults holding occluders over child's eyes.

Characteristics of Tests of Recognition Visual Acuity for Screening the Vision of Children Ages 3, 4, and 5 Years Old (36 to <72 Months)

List of optotype-based tests that are **_NOT_** recommended at any distance for children aged 3, 4, and 5 years.

Chart Name	Image
Sailboat (Kindergarten Chart)	
Birthday cake (Allen Pictures)	
Allen Pictures as single, isolated optotypes	
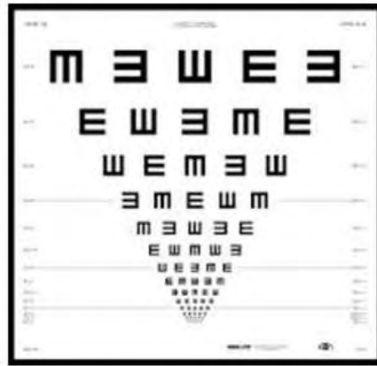
Tumbling E	
Landolt C	
Flying crows (Blackbird Wall Chart)	
Sjögren Hand Chart	
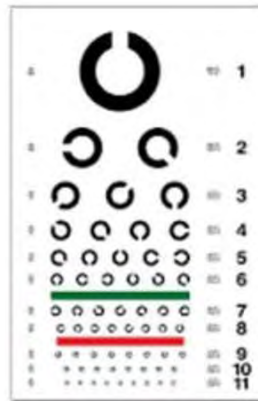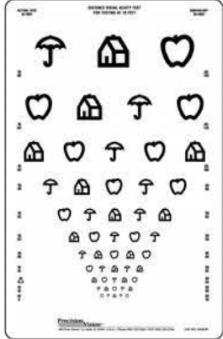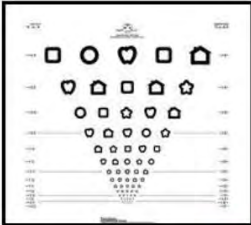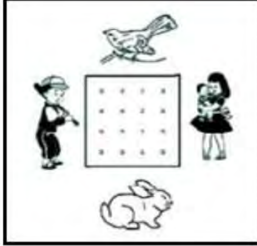
Wright figures©	
"House, Apple, Umbrella" (Lighthouse symbols)	
Snellen "E" Chart	
Broken Wheel Test	
Optotypes in Color	

Patti Pics Visual Acuity Chart	
Kay Pictures®	
Michigan Preschool Test	
Titmus Vision Screening Machine	
Optec® Vision Screeners	
Keystone Vision Screener	

The tests of visual acuity are not acceptable for children aged 36 to <72 months for one or more of the following reasons:

1. Machines prevent observation of the child's face and eyes and insufficient data exist to support using machines in this age group;
2. Charts do not adhere to national and international guidelines for standardized eye chart design;
3. Charts may meet the design standards but the optotypes require orientation and directional cognitive skills that are not yet developed in this targeted age group (i.e., Tumbling E);
4. The optotypes are not equal in discriminability; or
5. Some of the optotypes have a cultural bias and others are outdated, making the pictures not readily recognizable by all children.

National and International Eye Chart Design Guidelines recommend:

1. Optotypes should be of approximate equal legibility.
2. Each line on an eye chart should have the same number of optotypes.
3. The horizontal spacing between optotypes should be equal to the width of the optotypes on that line.
4. The vertical spacing between lines should be the height of the optotypes in the next line down.
5. The size of optotypes should progress geometrically up or down the chart by 0.1 log units between rows (20/32 vs. 20/30).
6. Optotypes should be black on a white background under good lighting conditions (luminance between 80 cd/m^2 and 160 cd/m^2).

References:

American National Standards, Inc., (2010). ANSI Z80.21-1992 (R2004). Approved May 27, 2010.

Candy, T. R., Mishoulam, S. R., Nosofsky, R. M., & Dobson, V. (2011). Adult discrimination performance for pediatric acuity test optotypes. *Investigative Ophthalmology & Visual Science*, 52(7), 4307-4313.

Committee on Vision. (1980). Recommended standard procedures for the clinical measurement and specification of visual acuity. Report of working group 39. Assembly of Behavioral and Social Sciences, National Research Council, National Academy of Sciences, Washington, DC. *Advances in Ophthalmology*, 41, 103–148.

Elkind, D. C. (1961). Children's conceptions of right and left: Piaget replication study IV. *The Journal of Genetic Psychology, 99*, 269-276.

International Council of Ophthalmology. (1984). Visual acuity measurement standard. Retrieved from http://www.icoph.org/dynamic/attachments/resources/icovisualacuity1984.pdf
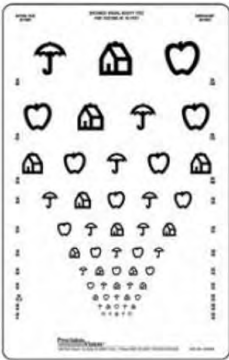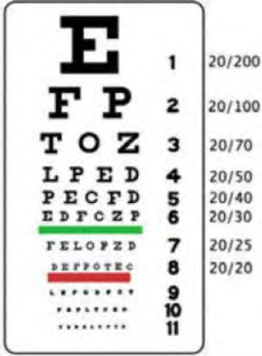
Nottingham Chaplin, P. K., & Bradford, G. E. (2011). A historical review of distance vision screening eye charts: What to toss, what to keep, and what to replace. *NASN School Nurse, 26*(4), 221-227.

World Health Organization. (2003). Consultation on development of standards for characterization of vision loss and visual functioning. Retrieved from http://whqlibdoc.who.int/hq/2003/WHO_PBL_03.91.pdf

List of optotype-based tests that are **_NOT_** recommended by the American Academy of Pediatrics, the American Association for Pediatric Ophthalmology, the American Academy of Ophthalmology, and the American Association of Certified Orthoptists for children of all ages (Donahue et al., 2016).

The joint statement reads, "Although the traditional Snellen chart remains in wide usage, Sloan letter charts present letters in a standardized fashion and should be used for acuity testing if they are available" (Donahue et al., 2016, p. 4).

Chart Name	Image
Sailboat (Kindergarten Chart)	
Birthday cake (Allen Pictures)	

Allen Pictures as single, isolated optotypes	
Tumbling E	
"House, Apple, Umbrella" (Lighthouse symbols)	
Snellen "E" Chart	

References:

Donahue, S. P., & Baker, C. N., AAP Committee on Practice and Ambulatory Medicine, AAP Section on Ophthalmology, American Association of Certified Orthoptists, American Association for Pediatric Ophthalmology and Strabismus, American Academy of Ophthalmology (2016). Procedures for the evaluation of the visual system by pediatricians. *Pediatrics, 137*(1), e20153597. Retrieved from http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3597.full.pdf

APPENDIX D – LETTERS/FORMS
*(To be determined at a later date for next edition; general format)

ABCS OF VISION CHECKLIST

Check all that apply (Prevent Blindness, 2015).

Appearance Signs

○ Crossed eye or "wall" eye (eye turning in, out, up or down). Eye turn may be continuous or intermittent, particularly when the child is tired.

○ Continually watering eyes.

○ Red-rimmed, encrusted, or swollen eyelids.

○ Cloudiness/haze.

○ Unequal pupil size.

○ Drooping eyelid(s). Ptosis, commonly called drooping eyelid, is observed as the sagging of an upper eyelid to touch or partially cover the pupil of the eye.

○ Sties or infections on eyelids.

○ Presence of white pupil. This can be associated with a rare but serious eye disease. The white pupil may be observed when looking directly at the individual's eyes, or in his or her photograph.

○ Possible eye injury. Watch for eyes that are reddened, bloodshot, blackened, bruised or swollen, or show evidence of lacerations or abrasions.

Behavior Signs

○ Body rigid when looking at distant objects.

○ Clumsiness or decreased coordination.

○ Thrusting head forward or backward while looking at distant objects.

○ Tilting head to one side most of the time.

○ Squinting or frowning when trying to focus.

○ Excessive blinking.

○ Closing or covering one eye while doing near work.

Complaint Signs

○ Headaches, nausea, or dizziness.

○ Blurred or double vision.

○ Burning, scratchy, or itchy eyes.

○ Sees blur when looking up after close work or when looking at whiteboard.

○ Unusual sensitivity to light.

Recording Form - EyE Check Screener with LEA SYMBOLS® - 20/50 Flipbook for 3 year olds

252100 20/40 EyE Check   252111 20/50 EyE Check   Fun Frames may vary

Child's Name:	DOB:	Age:

Mark screening results in the box below (refer to inside flipbook cover for screening instructions).

- Circle correct responses and mark an "X" through incorrect responses.

  PASS = Correct identification of 3 or 4 symbols with each eye.

  FAIL = Correct identification of only 0, 1, or 2 symbols with either or both eyes.

- If child cannot identify 3 or 4 symbols with each eye on flipbook cards 5 through 12 at 5 feet (1.5 meters), rescreen on the same day, or as soon as possible, but no later than 6 months from the first screening attempt. If a rescreen is not possible, it is appropriate to refer the child to an eye care provider now.

Both Eyes		Card 1	Card 2	Card 3	Card 4	Check for Pass	Check for Fail
Teaching Optotypes		⌂	☐	◯	♡		
Right Eye	😊	Card 5	Card 6	Card 7	Card 8		
20/50		☐	♡	⌂	◯		
Left Eye	😊	Card 9	Card 10	Card 11	Card 12		
20/50		♡	◯	⌂	☐		

Recording Form - EyE Check Screener with LEA SYMBOLS® - 20/40 Flipbook for 4 and 5 year olds

252100 20/40 EyE Check   252111 20/50 EyE Check   Fun Frames may vary

Child's Name:	DOB:	Age:

Mark screening results in the box below (refer to inside flipbook cover for screening instructions).

- Circle correct responses and mark an "X" through incorrect responses.

  PASS = Correct identification of 3 or 4 symbols with each eye.

  FAIL = Correct identification of only 0, 1, or 2 symbols with either or both eyes.

- If child cannot identify 3 or 4 symbols with each eye on flipbook cards 5 through 12 at 5 feet (1.5 meters), rescreen on the same day, or as soon as possible, but no later than 6 months from the first screening attempt. If a rescreen is not possible, it is appropriate to refer the child to an eye care provider now.

Both Eyes	Card 1	Card 2	Card 3	Card 4	Check for Pass	Check for Fail
Teaching Optotypes	⌂	□	○	♡		
Right Eye	Card 5	Card 6	Card 7	Card 8		
20/50	□	♡	⌂	○		
Left Eye	Card 9	Card 10	Card 11	Card 12		
20/50	♡	○	⌂	□		

Document Source: Adapted from Ohio Department of Health Vision Screening Requirements and Guidelines for Preschool and School-Aged Children, 2017

APPENDIX E – VISION EDUCATION/RESOURCES

VISION SCREENING AND EXAMINATIONS

All About Vision

Provides free eye exams and glasses for individuals including infants, students, and adults as well as discussing eye services available through Medicaid, the Child Health Insurance Program, and Medicare.

For more information, visit: https://www.allaboutvision.com/eye-exam/free-exam.htm

Colour Blind Awareness

This website provides information on the everyday problems experienced by color blind people and offers advice to parents and caregivers in how to provide support for the color blind children in their care, including details on how to access tests for color blindness or to arrange for a formal diagnosis.

View an advice sheet for teachers.

For more information, visit: http://www.colourblindawareness.org/

iCanConnect

iCanConnect provides people with both significant vision and hearing loss with free equipment and training. iCanConnect is a national program with local contracts that helps people stay connected with others.

For more information, visit: http://www.icanconnect.org/

Infant See® Program

InfantSEE®, a public health program, managed by Optometry Cares® - the American Optometric Association Foundation, is designed to ensure that eye and vision care becomes an essential part of infant wellness care to improve a child's quality of life. Under this program, participating optometrists provide a comprehensive infant eye assessment between 6 and 12 months of age as a no-cost public service.

For more information, visit: http://www.infantsee.org/

Prevent Blindness

Prevent Blindness is a national non-profit organization dedicated to preventing blindness and preserving sight for all ages. Prevent Blindness offers a wealth of educational materials including fact sheets, webpages, patient and professional training, and more. Parents and caregivers can access free, downloadable information, financial assistance resources, news, and events.

For more information, visit: https://www.preventblindness.org/

Sight for Students

Sight for Students is a Vision Service Plan (VSP) charity that provides free vision exams and glasses to low-income, uninsured children. The program operates nationally through a network of community partners who identify children in need and VSP network doctors who provide eye care services. Sight for Students vouchers are available to school nurses who are members of the National Association of School Nurses.

For more information, visit: https://vspglobal.com/cms/vspglobal-outreach/gift-certificates.html

https://www.vsp.com/sfs-find-affiliate.html?WT.ad=body_find_a_partner

Vision USA

A program provided by doctors of optometry that provides basic eye health and vision care services free of charge to uninsured, low-income people and to families that do not qualify for government aid or private health care assistance.

For more information, visit: http://www.aoafoundation.org/vision-usa/whoiseligible

APPENDIX F - EYE ANATOMY, REFRACTIVE ERRORS, AND VISUAL PATHWAY

HOW NORMAL VISION DEVELOPS

Often children cannot tell you how they see. Vision problems may not be obvious. Most vision problems are not painful. Even after looking at children's eyes, and watching how they act, it may still be difficult to recognize that they have vision problems.

During the early years of life, children learn to use their eyes. At first, babies learn to recognize familiar faces. Next, they begin to figure out how to reach and hold onto things that they see. They look at pictures and start to draw. By the age of four, children may be able to draw and name pictures and to copy shapes and letters. To do these things, children must have usable vision.

Babies who have vision problems may learn to "see" in a way that is different from babies with normal vision. Babies or toddlers with vision problems may need help to learn skills like eating, playing with toys, or naming common things (like a ball, a book, or a shoe). Children who may have vision problems need help during the first years of life.

Without help, children may not be able to "catch-up" later, even if the vision problem is corrected and their vision is normal. Children with vision problems may have trouble with school work. As adults, they may have trouble learning job skills. That is why it is very important to screen the vision of young children to identify vision problems or potential vision problems as early as possible and to help assure children with vision impairments get the special help they need.
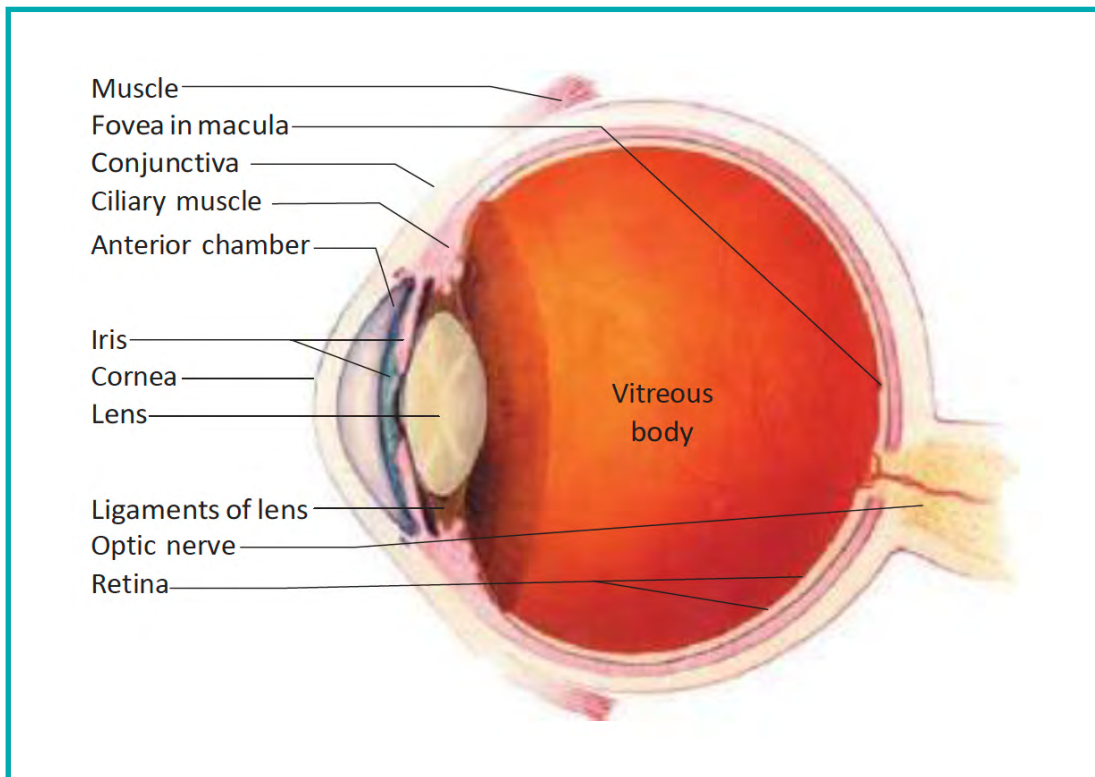
For a person to see normally, all parts of this visual system must work. The visual system is not fully developed at birth. An infant with normal vision will not be able to see things as clearly as an adult with normal vision. The baby's eyes do not work together all the time until about four months of age. Pathways carrying signals to the brain, and the brain itself, continue to develop during the early years of life.

As the eye and the visual cortex of the brain develop, a child's ability to see detail improves. As the eyes begin to work together, the brain learns to combine the images from the two eyes into a single image. The child learns how to use the signals in the brain to recognize things, such as faces and toys, and to tell the difference between things that look similar. Vision continues to develop until a child is at least 9 years old.

In order for a person to see, several things must happen:

1. The eyes must be able to catch light and send signals to the optic nerve of each eye.

2. The optic nerves of each eye must be able to send signals to the brain's visual cortex, the "seeing brain."

3. The visual cortex must be able to put together the signals from each eye to create one view of the world.

THE VISUAL PATHWAY

Vision is generated by the retina as information leaves the eye by way of the optic nerve, and there is a partial crossing of nerves at the optic chiasm. From the optic chiasm the nerves are called the optic tracts and synapse at the lateral geniculate nucleus. From there, they travel to the primary visual cortex at the back of the brain.

The brain works on a crossed wire system. Each eye is divided into right and left visual fields. Each eye gets information from both visual fields. To ensure that the brain doesn't get extraneous information, the nerves from the retina divide themselves out into separate pathways. The inner visual field retinal nerves (a) cross over at the optic chiasm — whereas the lateral nerves (b) do not cross.

Damaging the visual system before the optic chiasm will affect one eye, both visual fields — analogous to closing one eye. Damaging the pathway after the chiasm, though, will damage parts of both eyes, and only one visual field. If you could imagine, the field of view seen would be only 90°, from straight ahead to one side.
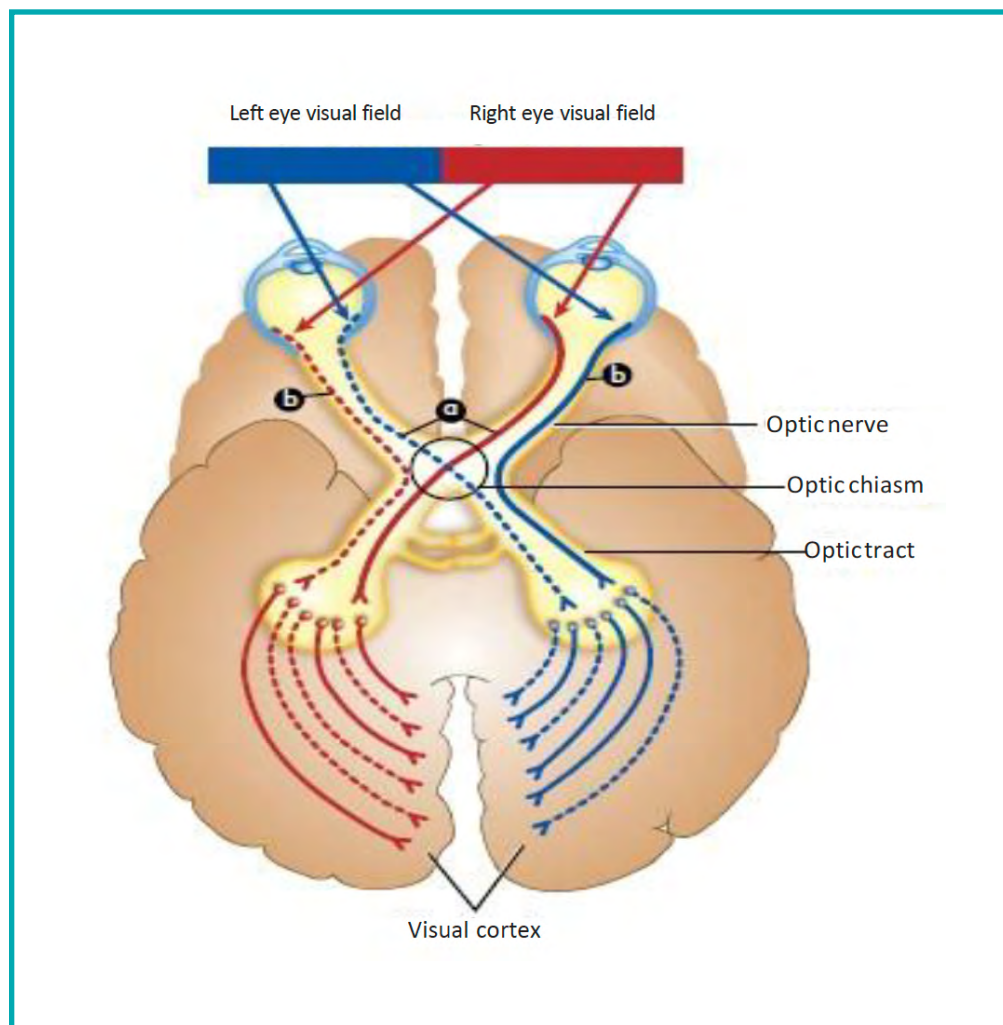
Normal Eye

In a normal eye, light enters our eye through the pupil. The cornea, at the front of our eye, bends the light. The light passes through the lens to the retina. It then focuses on the retina, like a little picture of whatever we are looking at. Nerve cells in the retina send that "picture" to our brain.
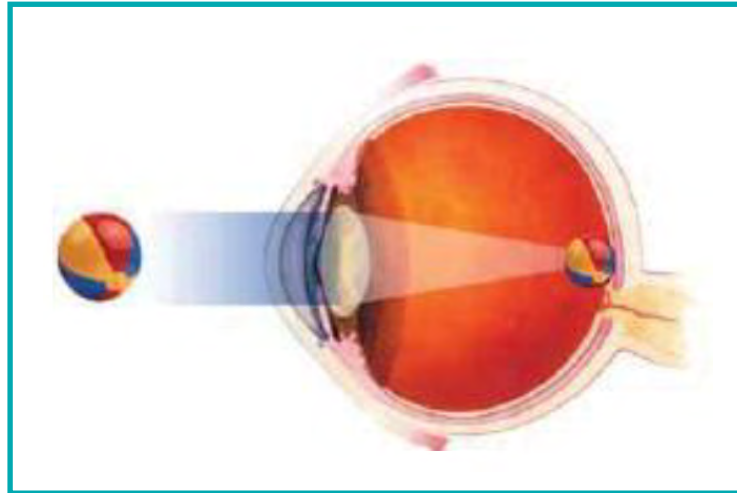
Hyperopia - Farsighted

Those with hyperopia see distant objects clearly, but close up objects appear blurry. Farsighted- ness occurs if your eyeball is too short or the cornea has too little curvature, so light entering your eye is not focused correctly.
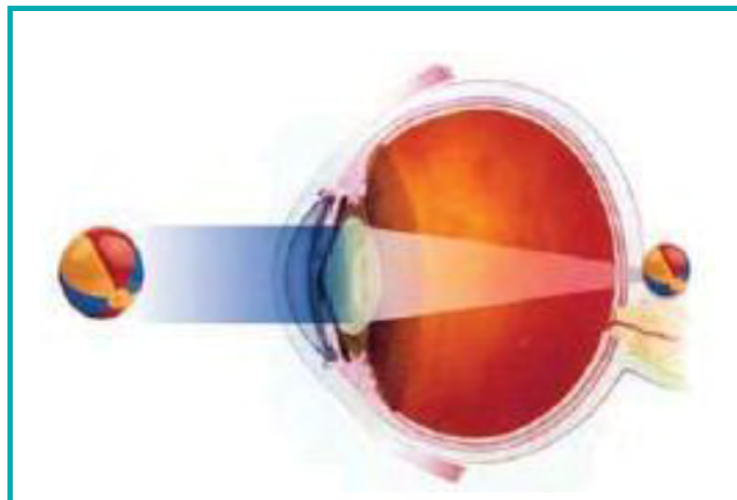
Myopia - Nearsighted

Those with myopia see near objects clearly, but far away objects appear blurry. With myopia, the eyeball is too long, or the cornea is too steep, so images are focused in the vitreous inside the eye rather than on the retina at the back of the eye.

APPENDIX G - GLOSSARY

Accommodation: The eye's ability to adjust its focus by the action of the ciliary body. This permits the lens of the eye to thicken, increasing its focusing power. Accommodation allows the eye to focus on near objects. As we get older the lens of the eye becomes less flexible and its ability to change focus decreases.

Amblyopia: Loss of vision at the brain level when eyes receive insufficient stimulation during development. Can lead to permanent vision loss if not detected and treated early.

Anisometropia: A difference of refraction between the two eyes. For example, one eye may be nearsighted and the other eye may be farsighted.

Astigmatism: Distorted vision, typically caused by an abnormally shaped cornea. When the cornea is not perfectly spherical in shape, two different images may be formed in the same eye, creating distorted and blurred vision and producing eyestrain or headaches. Astigmatism often accompanies myopia and hyperopia and may change gradually over time. Regular astigmatism can be corrected with specially shaped corrective lenses. Irregular corneal astigmatism can sometimes be corrected with contact lenses. Astigmatism can also be caused by irregular shape of other structures of the eye, such as the retina or the lens.

Binocular Vision: The brain's ability to combine the images from each eye into a single, three-dimensional object. Problems in binocular vision ability can include double vision, blurred vision, problem with depth perception, headaches, or loss in visual efficiency and comprehension.

Blind Spot: The area on the retina where the optic nerve enters the eyeball. This small area has no visual receptor cells and creates a natural blind spot on the retina. In normal binocular vision, each eye "covers" the other eye's blind spot, producing a full visual field.

Cataract: Opacity or cloudiness of the crystalline lens that may prevent a clear image from forming on the retina. May be congenital or caused by trauma, disease, and/or age.

Central Visual Acuity: Ability of the eye to perceive the shape of objects only in the direct line of vision.

Chorioretinitis: Inflammation

Choroid: Major blood vessel layer of the eye between the retina and sclera that provides nourishment to the outer layers of the retina.

Color Vision: Perception of color, results from stimulation of the cone system of the eye. The cones are our most precise light receptors, able to distinguish fine detail and colors, but require bright light to function effectively.

Cones: The highly specialized conical or flask-shaped outer segments of the visual cells; together with the retinal rods, they form the light-sensitive elements of the retina. Also called cone cells, visual cones and retinal cones.

Congenital And Perinatal Cytomegalovirus (CMV): A viral infection acquired prenatally or perinatally causing many symptoms including chorioretinitis or may be asymptomatic without concerns. Although hearing loss is most common impairment in otherwise asymptomatic neonates vision disturbances can be an eventual symptom.

Congenital Rubella: A viral infection acquired by the mother during pregnancy that may cause cataracts and retinopathy.

Congenital Syphilis: Prenatal infection transmitted through the placenta to the fetus that can cause optic atrophy sometimes developing blindness.

Conjunctivitis (Pink Eye): Pathological condition. Inflammation of the conjunctiva (membrane that covers the white of the eye and inner surfaces of the eyelids) characterized by discharge, grittiness, redness and swelling. Can be contagious.

Convergence: The simultaneous turning in of both eyes that occurs when viewing an approaching object. An effort to maintain single binocular vision as the object approaches.

Cornea: The transparent, blood-free tissue covering the central front of the eye where initial refraction, or bending, of light rays occurs as light enters the eye. Contact lenses are fitted over the cornea.

Cortical visual Impairment (CVI): Temporary or permanent visual impairment caused by disturbance of the posterior visual pathways and/or the occipital lobes of the brain. The degree of vision impairment can range from severe visual impairment to total blindness. The presence of CVI is not an indicator of the child's cognitive ability.

Depth Perception: The ability to judge distances by interpreting size, shape, shadows, and overlapping images.

Diplopia: The seeing of one object as two.

Divergence: The simultaneous turning out of both eyes when viewing an object moving away from the eyes.

Dominant Eye: The eye that "leads its partner" during eye movements. Humans also have dominant tendencies in hands, feet and brain halves.

Down Syndrome: A chromosomal condition associated with intellectual disability, cognitive delays, characteristic facial appearance, and increased risk for development of a variety of medical conditions including vision problems. Vision problems include a wide range of visual acuity errors, amblyopia, strabismus, nystagmus, lid anomalies and infections, cataracts, and other various visual concerns.

Emmetropia (At Rest): No refractive error when accommodation is at rest. Images of distant objects focus clearly on the retina without accommodation or corrective lenses.

Esotropia (Crossed Eyes): Functional defect. Misalignment of the eyes in which one eye deviates inward (towards nose) while the other fixates normally. Deviation is present when both eyes are uncovered.

Exotropia (Wall-Eyed): Functional defect. Misalignment of the eyes in which one eye deviates outward (away from nose) while the other fixates normally. Deviation is present when both eyes are uncovered.

Extraocular Muscles: The muscles attached to the outside of the eyeball that control eye movement. Each eye has six such muscles, coordinated by the brain. This is the reason that sudden occurrence of uncoordinated eye movements could be a sign of brain or nerve damage.

Focus: The eyes ability to see objects clearly at various distances through precise refraction or bending of light rays by the lens to place them exactly on the retina.

Glaucoma: Pathological condition. Group of diseases characterized by increased intra-ocular pressure that results in damage to the optic nerve and to retinal nerve fibers. A common cause of preventable blindness.

Herpes Simplex Virus Type 2 (Genital): A common virus that can be passed from the mother to the newborn causing central nervous system and other organ threat including vision problems and corneal scarring.

Hyperopia (Farsighted): A refractive error in the lens of the eye, in which parallel rays of light focuses behind the retina, resulting in difficulty in near vision. Hyperopia can be corrected with convex lenses.

Hypertropia: The abnormal turning of one eye in an upward direction, while the fixating eye focuses straight ahead.

Instrument-Based Screening: An approach to vision screening using photoscreeners or handheld, portable autorefractors to provide estimates of refractive error and information about the eyes. Does not provide visual acuity measurements (e.g., 20/40). Estimates of refractive error cannot be converted to visual acuity measurements.

Iris: The colored part of the eye. A thin circular membrane that opens up and closes down to regulate the amount of light entering the eye.

Lens: A transparent, elastic body behind the iris which changes shape to focus on objects at different distances from the eye. At rest, the lens is about the size of an aspirin tablet; it becomes more round when focusing at near.

Legally Blind: Functional defect. Best corrected visual acuity of 20/200 or less, or a visual field reduced to 20 degrees or less in the better seeing eye.

Macula: The most sensitive part of the retina, about the size of a pinhead, where our most detailed vision occurs.

Marfan Syndrome: A genetic disorder that affects connective tissue in the body of varied onset. It can affect vision by causing a dislocated lens in one or both eyes

Microphthalmia: Abnormally small eyeball.

Microcephaly: Abnormal small head circumference often associated with developmental delays and vision deficits.

Myopia (Nearsighted): The condition in which the eye at rest focuses light rays in front of, rather than on, the retina. Myopia is caused by the eyeball being too long, front to back, and results in near objects being seen clearly but distant objects seen with blurred vision. Myopia can be corrected with concave corrective lenses.

Near Point of Accommodation: This is a measure of the distance from the eye to the nearest point at which print can no longer be kept clear. It varies according to the power of accommodation.

Near Point of Convergence: The nearest point at which the two eyes can direct their visual lines, normally about 3" from the eyes in young people.

Near Vision: The ability to perceive distinctly objects at normal reading distance.

Nystagmus (Jerky Eyes): A condition in which the eyes involuntarily move rapidly from side to side, up and down or in a rotary fashion.

Optic Nerve: The bundle of nerve fibers, roughly the thickness of a pencil, which connects each eye to the brain. Images are transmitted through the optic nerve from the retina to the brain.

Optic Atrophy: Optic nerve degeneration that usually results in irreversible vision loss.

Optotype: The symbol, letter, or number on an eye chart an individual is asked to identify

Optotype-Based Screening: An approach to vision screening using eye charts or computer software.

Pupil: Variable-sized, black circular opening in center of iris; regulates amount of light that enters the eye.

Ptosis (toh-sis): Functional defect. Drooping of upper eyelid. May be congenital or caused by paralysis or weakness of either 3rd (oculomotor) cranial nerve or sympathetic nerves, or by excessive weight of upper eyelids.

Refraction: Determination of the refractive error of an eye and the best corrective lenses to be prescribed; series of test lenses in graded power are presented to determine which provides sharpest, clearest vision.

Refractive Error: The eye's inability to focus images clearly on the retina, typically due to either an inability of the lens to focus (accommodate), a distortion (astigmatism), or an abnormal distance (either too long or too short) from the cornea to the retina. (See Anisometropia, Astigmatism, Hyperopia, and Myopia.)

Retina: The back part of the eye that contains the cells that respond to light. These specialized cells are called photoreceptors. There are two types of photoreceptors in the retina: rods and cones.

Retinitis Pigmentosa: The name given to a group of inherited eye diseases that affect the retina. This causes the degeneration of photoreceptor cells in the retina. As these cells degenerate and die, patients experience progressive vision loss.

Retinoblastoma: Most common malignant intraocular tumor in children of the retina. It can be unilateral or bilateral, and can be identified through abnormal red reflex or whitening of the red reflex.

Retinopathy: Any non-inflammatory degenerative disease of the retina.

Retinopathy of Prematurity (ROP): Abnormal development of retinal blood vessels in premature infants that can cause retina damage and in some blindness. Those babies with birth weight of 1250 grams or below and birth before 31 weeks gestation are at highest risk for ROP.

Rods: Light-sensitive retinal receptor cells specialized to work at low light levels (night vision). There are about 120 million rods in the retina.

Sclera (White of the eye): Opaque outer layer of the eye.

Sight: The eye's ability to detect light, form and motion. Clear sight depends upon the eye's ability to send clear, accurate signals to the brain.

Stereoscopic Vision: The ability to see three-dimensionally. Requires adequate fusion of the images from each eye.

Strabismus: When the eyes don't line up or move together properly, we call it strabismus or heterotropia. If an eye deviates inward, it is esotropia (cross eyed); if it deviates outward, it is exotropia (walleyed). Eyes may also deviate up or down.

Toxoplamosis: A prenatal illness caused by congenital or acquired infection with a protozoan intracellular parasite called Toxoplama gondii. Symptoms for congenital cases may include retinal scarring, strabismus, microphthalmia, cataract, otpic atrophy, and nystagmus. Acquired cases are typically from animal feces most often from cats.

Usher Syndrome: A genetic disorder that causes hearing and vision loss that continues to worsen over time. This disorder causes the retina to deteriorate with night vision loss typically the first sign followed by blind spots, tunnel vision, and sometimes cataract formation. The retina deterioration is caused by retinitis pigmentosa or retina deterioration.

Vision: The ability to interpret and gain meaning from the things we see. Vision not only requires sight, but also interpretation, association and memory skills. Vision problems can include difficulties in eye-hand coordination, object location, visual discrimination, or visualization.

Visual Acuity: The quantifiable measurement of the sharpness or clearness of vision when identifying black optotypes on a white background using specific optotype sizes at a standardized distance.

Visual Field (Field of vision): Extent of space visible to an eye as it fixates straight ahead measured in degrees away from fixation.

Visual Pathway: Route of the nerve impulses from the retina along the optic nerve, and optic nerve radiations to the brain's sensory cortex, located at the base of the skull.

Visible Spectrum: The colors visible to the human eye: red, orange, yellow, green, blue, indigo, and violet.

Zika: A virus that can be transmitted during pregnancy causing microcephaly and eye abnormalities.

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