STATE OF ALASKA

Vision Screening Guidelines for the Pre-school/School Population

STATE of ALASKA
Department of Health and Social Services

DIVISION OF PUBLIC HEALTH
JANUARY, 2013

Acknowledgements:
This guideline document was developed in collaboration with the Anchorage School District Vision Screening Committee; Alaska Department of Health & Social Services, Division of Public Health, School Nursing/School Health Program; the School Health Nurse Advisory Committee; Alaska Project to Eliminate Amblyopia and Alaska pediatric ophthalmologist, Dr. Robert Arnold; and Alaska optometrist, Dr. Elizabeth Lane.

The guidelines were prepared by:
Mary Ann Batchelder, RN, BSN
Mary Bell, RN, BSN, NCSN
Ruth Bogert, RN, BSN, NCSN
Karen McBride, RN, BSN, NCSN
Lee Stark, RN, BSN, NCSN
Pattie Welch, RN, BSN, NCSN

Guideline review was provided by:
Diane Armitage, Orthoptist
Robert Arnold, MD, Pediatric Ophthalmologist
Marcy Custer, RN, MS
Damien Delzer, OD
Elizabeth Lane, OD
David Karpik, OD
Boyd Walker, OD
School Health Nurse Advisory Committee
Lois Henderson, RN
Faith Hundley, RN, BSN, NCSN
Christy Kinter, RN

Contact Information:
Mary Bell, RN, BSN, NCSN
School Health Nurse Consultant
Department of Health & Social Services
Division of Public Health
Section of Women's, Children's, & Family Health
3601 C Street, Suite 322, Anchorage, AK, 99503
907-269-7368 Fax 907-269-3465 mary.bell@alaska.gov

TABLE OF CONTENTS

Introduction/Purpose 3

Best Practice 4
- Why is it important to screen for vision problems?
- What is the difference between vision screening and a comprehensive vision examination?
- What are the objectives of school vision screening?
- What are the elements of a successful school vision screening program?
- What is considered best practice?
- What does the state law say?
- When and how often should screening take place?
- When is referral to an eye care specialist indicated?
- What are nationally recommended school vision screening tests? A review of best practice

State of Alaska Vision Screening Recommendations 9
- Table summarizing recommended tests, intervals, equipment and referral criteria

Definitions 12

Equipment 15
- Distance Visual Screening
- Binocular Vision Screening
- Photoscreening
- Color Vision Screening
- Near Vision Screening

Protocols/Procedures 20
- Distance Visual Acuity Screening Procedure 20
- Binocular Vision Screening Procedure 22
  - Random Dot "E" Test
  - Stereo Fly or Butterfly Test
  - Cover Test
  - Hirschberg Test
- Photoscreening Procedure 27
- Color Vision Screening 28
- Near Vision Screening Procedure 29
  - Plus Lens Test
  - Near Vision Cards/Charts

Role of the School Nurse 31
- Program planning
- Key considerations
- Documentation
- Referrals and follow up
- Students who wear eyeglasses
- Evaluation of the school vision screening program

Appendices/Forms 35
Appendix A - Anatomy of the Eye
Appendix B - Pinhole Screening
Appendix C - Sample form: Pre-screening Information Letter for Parents
Appendix D - Sample form: Report of Normal Results to Parents
Appendix E - Sample form: Referral Letter for Parents
Appendix F - Sample form: Report of School Vision Screening for Referral to Eye Care Specialist
Appendix G - Sample form: Follow-Up Referral Letter for Parents
Appendix H - Sample form: Notice to Parents on Color Vision
Appendix I - Sample form: Vision Screening Worksheet
Appendix J - Sample form: Vision Referral Follow-Up Worksheet
Appendix K - Sample form: Classroom Vision Observation Checklist

Resources 48

References 51

INTRODUCTION/PURPOSE

Screening for vision problems is an appropriate and important part of school health services. Visual problems can affect the physical, intellectual, social and emotional development of children. Early detection of vision problems will provide a child with a more favorable outlook for correction and improvement of the child's general well-being as well as more opportunity for educational success.

School nurses have been screening vision in schools for decades and the role of the school nurse in vision screening is well established. Recognizing that not all school districts have access to school nursing services, these guidelines are available to provide necessary information to assist schools with completing vision screening requirements.

Vision screening in schools is mandated by Alaska state statute Sec. 14.30.127. Screening should take place when the child first enters school and at regular intervals specified by the school district. When a school district determines the regular intervals for vision screening, the vision functions to screen, and the equipment to use, they should consider the recommendations of expert organizations. The intent of the State of Alaska's *Vision Screening Guidelines for the Pre-school/School Population* is to identify and standardize the appropriate equipment, tests and procedures to use for optimal pre-school and school vision screening based on current research. Though vision screening is mandatory by state law, these guidelines are offered as best practice and each school district may adopt the standards that best meet the needs of their student population.

Effective May 11, 2012, Alaska Department of Health & Social Services adopted the *Bright Futures*/American Academy of Pediatrics Recommendations for Preventive Pediatric Health Care (http://brightfutures.aap.org). *Bright Futures* is a set of principles, strategies, and tools that are evidence based and systems oriented, that can be used to improve the health and well-being of all children through culturally appropriate health promotion interventions. Public health nurses and private providers performing Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) screenings in Alaska will follow these standards that include vision screening recommendations. The vision testing intervals and other standards found in the State of Alaska's *Vision Screening Guidelines for the Pre-school/School Population* are based on the *Bright Futures* guidelines.

The U.S. Preventive Services Task Force recommends vision screening for all children at least once between the ages of 3 and 5 years.[1] Vision screening for the pre-school population is included in these guidelines as some schools have pre-school students included in their school environment. The best practice recommendations found in this document may be useful for other pre-school vision screening settings as well.

BEST PRACTICE

Why is it important to screen for vision problems?
Vision problems are common. Students who have vision disorders commonly experience symptoms such as eyestrain, blurring, headaches, and double vision. Academic consequences of vision difficulties include loss of place while reading, failure to recognize letters or words, difficulty copying from the desk or board, and inability to sustain attention.[2] Identifying those students with vision conditions, particularly at an early age, appears to have substantial benefits in simpler, more effective, and less costly treatment, improvement of developmental outcomes, and enhancement of quality of life.[3, 4]

Among preschool-aged children, 5-10% have vision problems, including 2-5% with **strabismus** and **amblyopia**.[5] **Strabismus** is a condition that causes misalignment of the eye and decreased depth perception.[6] **Amblyopia** is the leading cause of childhood blindness. Amblyopia occurs when a refractive error, strabismus, or other causes of monocular deprivation prevent both eyes from developing equally. The condition is reversible if the cause of the deprivation is treated, but the difficulty of treatment for amblyopia increases, and the likelihood of cure decreases, with increasing age of the child.[5] Improvement over the age of ten is seldom achieved.[7] In young children, screening emphasis should be placed on identifying conditions contributing to or causing amblyopia, specifically high hyperopia (significant farsightedness), strabismus (eye misalignment and decreased depth perception), and anisometropia (markedly different refractive powers between the two eyes).[3]

Among school-aged children and adolescents, more than 10% have refractive errors, such as near-sightedness (myopia) or far-sightedness (hyperopia). Untreated refractive errors may affect learning.[5] In addition, approximately 5-8% of boys and 0.5% of girls have some form of color blindness.[5, 8] Screening in older children and adolescents, particularly those who have been regularly screened through their school years, should be focused on the detection of myopia (nearsightedness) and high astigmatism (blurred vision due to corneal distortion). Therefore, **the only visual function that requires repeat screening is distance visual acuity**.[3]

What is the difference between vision screening and a comprehensive vision examination?
A school appraisal of vision involves the screening of only those conditions that are commonplace and amenable to easy and early intervention. School screening is detective, not diagnostic. A comprehensive ophthalmic evaluation is provided by an eye care specialist and is in order if the student is identified as having possible vision problems or the risk assessment is positive (abnormal).[3]

What are the objectives of school vision screening?

- Identify, using evidence-based screening practices, children who may have eye or visual abnormalities or risk factors for developing eye or vision problems.
- Notify parents or guardians of screening results and facilitate referral of all children who fail screening or who cannot be successfully screened at their second attempt.
- Establish follow up procedures to assist identified students in receiving appropriate care.
- Inform teachers of students with vision problems about recommendations from eye care specialists regarding the most appropriate classroom environment.[9, 10]

What are the elements of a successful school vision screening program?

- The child can perform the test reliably.

- The examiner is knowledgeable and competent.
- The examiner has no vested interest in the result.
- The examiner uses the best methods available.
- The results are reliable, sensitive, and specific.
- The results are clearly communicated to parents and guardians.
- The criteria for referral for a comprehensive examination by an eye care professional are clear.
- A mechanism is in place to ensure follow up.
- The opportunity for a follow up examination is accessible and affordable.
- The results of a comprehensive examination are communicated to the school screener for program evaluation purposes.[10]

What is considered best practice?
Several professional organizations endorse the screening of vision in schools as primary prevention. The organizations recommend that vision screening should be performed at an early age and at regular intervals with age-appropriate, valid methods with the goal of identifying and treating preventable visual impairment at the earliest feasible age. These organizations include:

- American Academy of Ophthalmology (AAO)
- American Academy of Pediatrics (AAP)
- American Association for Pediatric Ophthalmology and Strabismus (AAPOS)
- American Association of Certified Orthoptics (AACO)
- American Optometric Association (AOA)*
- National Association of School Nurses (NASN)[3]
    - Issue Brief: School Vision Screening http://www.nasn.org/Portals/0/briefs/2006briefvision.pdf

  * The AOA supports school screening as a means of identifying children in need of care who have not had access to comprehensive vision examination services.[11]

The American Academy of Pediatrics' *Bright Futures* guidelines, adopted by the State of Alaska Department of Health & Social Services in May 2012, uses a developmentally based approach to address children's health care needs in the context of family and community. These guidelines offer best practice standards for vision screening. The State of Alaska's *Vision Screening Guidelines for the Pre-school/School Population* incorporate these standards in this guideline document.

The 2005 NASN publication, *To See or Not to See,* has been recognized among school nurses as the premier guide of best practice standards for vision screening of preschoolers, school-aged children and adolescents in school and community settings. The book, written in consultation with ophthalmology and optometry consultants, was utilized in determining the standards in this guideline document along with other up-to-date research that has come available.

What does the state law say?
Vision screening in schools is mandated by Alaska state statute. The statute reads:
Sec. 14.30.127. Vision and hearing screening examinations. A vision and hearing screening examination shall be given to each child attending school in the state. The examination shall be made when the child enters school or as soon thereafter as is practicable, and at regular intervals specified by regulation by the governing body of the district.[12]

The program of vision screening is under the general supervision of the Alaska Department of Health and Social Services (DHSS). Access to the full statute is found at http://www.legis.state.ak.us/basis/folio.asp.

When and how often should screening take place?

Bright Futures guidelines recommend performance of vision screening at ages 3, 4, 5, 6, 8, 10, 12, 15, and 18 and risk assessment at alternate ages.[13] The periodicity schedule is found at: http://brightfutures.aap.org/pdfs/AAP%20Bright%20Futures%20Periodicity%20Sched%20101107.pdf. Repeated vision screenings throughout a child's school career are most effective in detecting eye problems.[10, 14]

A positive (abnormal) risk assessment indicates the presence of one or more of the following conditions:

- There is a legitimate concern of a parent or teacher about how the child sees, even in the absence of abnormal screening findings.
- There is observation of behaviors or signs suggesting vision problems, even in the absence of abnormal screening findings.
    - The student holds objects close when trying to focus (young child).
    - The student holds books close to their eyes to read.
    - The student has trouble recognizing faces at a distance.
    - The student tends to squint.
    - Eyes appear unusual, cross, drift, or appear lazy.
    - Eyelids droop or one eyelid tends to close.
- There are medical risk factors.
    - Very premature (less than 32 weeks gestation)
    - Family history of cataracts, retinoblastoma, metabolic or genetic diseases
    - Significant developmental delay or neurologic difficulties
    - Systemic diseases associated with eye abnormalities (i.e., diabetes)
- The eyes have been injured.
- If the child ever failed a school vision screening test and the outcome is unknown or the recommendations need follow up[3, 14, 15, 16, 17]

In the school environment, a part of the risk assessment process might include enlisting school personnel to be alert for signs and symptoms of vision problems and assure student follow up at any grade or age. A sample classroom vision observation checklist is found in Appendix K and may be used to identify those students needing further assessment.

For the school nurse, awareness of a suspected vision problem, usually through a parent or teacher referral, signals the need for a *nursing assessment* versus *screening*. Screening presumes that the child is without pathology and the intent is to discover those children who were previously undetected. Nursing assessment for vision problems, at any age, should include examination for all visual functions, despite the fact that they may have been previously screened, and difficulties ruled out.[3, 18]

When is referral to an eye care specialist indicated?

Referral for a comprehensive vision examination by an optometrist or ophthalmologist is required when:

- There is clear evidence that a child has not passed a screening test which was carefully performed and followed by an appropriate retest.

- Screening findings are inconclusive but in the nurse's judgment the child would benefit from a thorough visual appraisal by an eye care professional.
- The risk assessment is positive (abnormal).[3,5]

In addition, eye care organizations recommend referring children who are not reading at grade level, children with learning disabilities, or those suspected of learning problems, including dyslexia and attention deficit disorder.[7, 19, 20]

What are nationally recommended school vision screening tests?
In 2011, the U.S. Preventive Services Task Force (USPSTF) cited the screening tests feasible to identify visual impairment among children and found that combinations of tests were generally associated with greater accuracy compared with single tests. These tests include:

- Visual acuity tests
- Stereoacuity tests
- The cover-uncover test
- Hirschberg light reflex test
- Autorefractors and photoscreeners[1]

Vision screening tests recommended by *Bright Futures* include tests of distance visual acuity and tests of ocular alignment and stereovision.

- **Distance visual acuity** screening is important to detect myopia, anisometropia, amblyopia and astigmatism, any of which can affect learning and quality of life. The distance vision acuity screening charts have been the gold standard for decades and continue to be effective, if appropriately selected and used. Optimal charts include either HOTV or Lea Symbols with proportional spacing or crowding (surround) bars for the younger child and Sloan letters for older children.[3, 10, 21] Visual acuity testing should be monocular, meaning each eye is tested separately. The best way to assure monocular acuity screening is with an adhesive patch placed over the non-tested eye. Patched acuity screening is recommended as young children are inclined to peek around hands and paddle occluders.[22, 23]
- **Stereoacuity and Ocular Alignment Testing**
  Stereoacuity (depth perception) and ocular alignment tests (cover-uncover test, Hirschberg light reflex test) evaluate binocular vision. **Binocular vision** is the ability of the eyes to work together to focus on an object. Binocular disorders can significantly impact reading/learning and quality of life. The binocular vision system should be evaluated using both stereoacuity and ocular alignment testing. The Random Dot E or Stereo Fly/Butterfly stereoacuity tests are well-suited for young children. The Cover Test and Hirschberg Light Reflex Test are traditional tests appropriate for identifying ocular misalignment. The Cover Test is preferred over the Hirschberg Test because it allows the examiner to observe the fixation ability of each eye separately.[3]

Additional Tests:

- **Photoscreening:** Photoscreening is an objective vision screening technology used to screen for the conditions or risk factors leading to amblyopia (strabismus, refractive errors, and opacities, such as cataracts). A growing body of evidence currently exists to suggest that these newer technologies, especially in pre-literate children, may be a valuable *adjunct* to the traditional screening process. These technologies offer hope in improving vision screening rates in pre-verbal children, pre-literate children, and those with developmental delays, who are the most difficult to screen.[7]
  - The Vision in Preschool (VIP) Study, a three-year comparative analysis of preschool vision screening methods, found the newer objective technologies to be effective in detecting amblyopia and strabismus in young children.[4]
  - The American Academy of Pediatrics (with co-sponsors of the American Academy of Ophthalmology, the American Association for Pediatric Ophthalmology and Strabismus, and the American Association of Certified Orthoptists) recommend photoscreening and hand-held autorefraction for children from age 3-5 years, after which visual acuity screening with vision charts becomes more efficient.[24]
  - Adaptation of photoscreening into routine vision screening protocol would be beneficial for efficiently detecting vision problems that could lead to amblyopia.[25] School nurses who use photoscreeners report ease of use with young and difficult-to-test children.[26, 27]
  - Photoscreeners do not measure visual acuity. Rather, they detect conditions that contribute to the development of amblyopia.[10] Monocular visual acuity screening should accompany photoscreening. A combination of objective and subjective (traditional, response-based) techniques seems to provide the best results.[26]
- **Color vision screening:** *Bright Futures* recommendations include the consideration for testing color vision. Though the value of screening is debated, color deficiencies are common in boys.[5] Color vision disorders can affect a child's educational success and quality of life. So much of the curricula for the preschool and elementary grades are color-driven. Though no treatment exists for color disorders, early identification provides an opportunity for education of the child, teacher, counselor and parents regarding the nature of the disorder and the impact on learning, safety, and life. Further, the appraisal of color vision is unlikely to occur in any other venue except as necessary for entry into certain occupations.[18] Color vision is optimally screened using pseudoisochromatic plates.[3]
- **Near vision screening** in schools is debated in the literature. Those who support it cite the importance of early recognition of high hyperopia (significant farsightedness), which left untreated, can affect reading and learning. Those opposed argue that children are born hyperopic and the majority will outgrow the condition. There appears to be consensus that a near vision assessment has merit when the child is referred to the school nurse for classroom difficulties, particularly when a student struggles with reading.[3, 23] The Plus Lens Test is preferred over other methods in school screening for near vision due to the inadequacy of other near point testing methods. Young children can often successfully accommodate long enough to complete a test of near vision when near acuity cards, charts, or slides are used. This accommodation overlooks a legitimate refractive error. This phenomenon is less likely to occur with the Plus Lens Test. Near vision acuity screening charts may be useful to obtain an acuity score in older children, especially if a vision problem is suspected.[3] Near vision screening should be monocular, utilizing appropriate occluders (adhesive patch for young children).[3, 23]

STATE OF ALASKA VISION SCREENING RECOMMENDATIONS

When determining which tests to include in a school vision screening program, schools will need to take into account: capacity for program management; cost; availability of equipment and trained vision screening personnel; the age and developmental level of the school population to be screened; and the need for referrals and follow up.

State of Alaska recommended screening tests and age intervals include:

- **Distance Vision**: All children should be screened for distance visual acuity using recommended distance visual acuity charts upon entry into the school district and at the recommended intervals. The recommended ages to screen for distance vision are: 3, 4, 5, 6, 8, 10, 12, 15, and 18 (usual corresponding grades of preschool, kindergarten, first, third, fifth, seventh, tenth and twelfth).
- **Binocular Vision:** All children should be screened for the risk factors for amblyopia using either of the two methods below:
    a. **Stereoacuity and ocular alignment -** administered at least once to children between the ages of 3 and 6 (preschool, kindergarten, or first grade) or upon entry into the school district.
    b. **Photoscreening** - administered at least once to children between the ages of 3 and 5 (preschool or kindergarten) and utilized for the special needs population.

Additional screening considerations:

- **Color Vision**: May be considered as a one-time screening of all boys between the ages of 3 and 6 (preschool, kindergarten, or first grade) or upon entry into the school district using pseudoisochromatic plates. When capacity allows, screen girls for color vision as well.
- **Near Vision**: May be considered for assessing a student who has a suspected vision problem or classroom difficulties. The Plus Lens Test is an appropriate tool for students in first grade or higher. Near vision screening charts may be used in older children to ascertain an acuity score. Both should be administered using monocular procedure.

See the Equipment Section of these guidelines for a summary of specific recommendations for vision screening tools. See the Protocols Section for a detailed description of the procedures for administering the identified vision screening tests and the referral criteria for each. Sample forms are available in the Appendices Section.

The following two tables contain summaries of the recommended tests and additional screening considerations with the intervals, equipment and referral criteria for each.

Table 1

STATE OF ALASKA RECOMMENDATIONS				
Test		**Grade/Interval**	**Equipment**	**Criteria For Referral**
Distance Visual Acuity (monocular)		Preschool, K, 1st, 3rd, 5th, 7th, 10th, 12th and new to the school district	• Sloan, Lea Symbols or HOTV (10 foot chart) • Occluder (adhesive patch for young children)	Age 3, 4, and 5: worse than 20/40 or a two line or greater difference between the eyes* 6 years and older: worse than 20/30 or a two line or greater difference between the eyes*
RISK FACTORS FOR AMBLYOPIA	**Binocular Vision Screening** • Stereoacuity **AND** • Ocular Alignment (Cover Test or Hirschberg Test) **OR**	At least once: in preschool, K, OR 1st; new to the school district	• Stereo Fly or Butterfly test OR • Random Dot "E"	Child is unable to see the raised geometric Fly or Butterfly on the right side of the booklet; OR Child identifies three or fewer presentations or can only distinguish the "E" when it is moved closer
		At least once: in preschool, K, OR 1st; new to the school district	• Paddle occluder • Fixation Target • Pen light	Horizontal, vertical or diagonal movement of the covered or uncovered eye while the student's gaze is fixed on an object, near or far; OR Reflections are unequal as they are reflected off both corneas
	Photoscreening	At least once: in preschool or K, special needs populations	Valid photoscreener instrument	Follow the manufacturer's criteria for referral

*even if in passing range

TABLE 2

FURTHER TEST CONSIDERATIONS			
Test	**Grade/Interval**	**Equipment**	**Criteria For Referral**
Color Vision Screening	One-time screening of boys in preschool, K, 1st or new to the school district (girls optional)	• pseudoisochromatic plates • cotton-tipped applicator or paintbrush	Inability to identify the images correctly. Failure of this test is not a cause for referral to an eye care specialist since no correction is possible. Provide consultation to parents and teachers.
Near Vision Screening (monocular) Plus Lens Test	1st grade or higher, if suspected vision problem or classroom difficulties	• Plus lenses of +2.50 diopter strength • Sloan, Lea Symbols, or HOTV distance vision screening chart • Occluder (adhesive patch for young children)	*Ability* to read any of the optotypes on the 20/30 line while looking through the plus lens in either eye
Near Vision Screening (monocular) Acuity Charts/Cards	Older children to obtain acuity score, if suspected vision problem or classroom difficulties	• Near point acuity cards/charts (Sloan letters, Lea Symbols, or HOTV) with pre-measured cord • Occluder (adhesive patch for young children)	Follow manufacturer's instructions; if none, refer for worse than 20/30 or a two line or greater difference between the acuities of the two eyes*

*even if in passing

DEFINITIONS

- **Amblyopia** – dysfunction of visual processing resulting from degradation of the retinal image (usually unilateral) caused by strabismus, high bilateral hyperopia, anisometropia or deprivation/occlusion. Amblyopia appears during the delicate period of visual development before the age of seven.
- **Ametropia** – a condition of the eye in which images fail to come to a proper focus on the retina due to a discrepancy between the size and refractive powers of the eye.
- **Anisometropia** – a condition in which the two eyes have markedly different refractive powers.
- **Astigmatism** - a refractive error in which light rays entering the eye through the corneal surface are distorted and do not focus on a single point but instead focus on two or more points resulting in blurred vision.
- **Autorefractor** – an instrument that utilizes automated optical methods to determine the refractive error of an eye with the goal in vision screening of detecting errors likely to cause strabismus and/or amblyopia. Other conditions degrading or distorting the unit's imaging pathway, such as media opacities, may also cause a screening failure. The portable autorefractor is a miniature version of refractors used in professional eye care practices.
- **Binocular vision** - both eyes working together simultaneously to focus on the same object, also called binocularity. The two components of binocular vision are ocular alignment and stereoacuity.
- **Color vision deficiency** – a diminution or lessening of one of the three pigments in the color-sensitive cones of the retina.
- **Corneal light reflex** – a test of ocular alignment where the examiner shines a penlight on the eyes and looks for a misalignment of the light that is reflected off of the cornea; also called the Hirschberg test.
- **Cover test** - unilateral test of ocular alignment that is performed by covering one eye while the examiner observes the other eye for signs of strabismus.
- **Distance vision** – the use of convergence and accommodation to allow the eye to see objects at a distance with clarity.
- **Heterotropia** (strabismus) – a manifest alignment disorder in which one or both eyes deviate from parallelism when attempting to focus on a target while both eyes are open; also referred to as a tropia.
- **Heterophoria** – a latent alignment disorder in which the eyes are not parallel during monocular vision, that is, when only one eye is seeing and the binocularity and fusion are disrupted.
- **Hirschberg test** – a test of ocular alignment where the examiner shines a penlight on the eyes and looks for a misalignment of the light that is reflected off of the cornea; also called the corneal light reflex.
- **HOTV chart** - acuity charts for young children with optotypes H, O, T, or V grouped together in lines or as singular optotype flashcards with surround bars to elicit the crowding effect. (The charts are not copyrighted.)
- **Hyperopia or hypermetropia** – a refractive error in which the focal point of light is destined to be behind the retina due to the shape of the eye being shortened; also called farsightedness.
- **Ishihara test** – a test for color vision using pseudoisochromatic plates that have small dots grouped together in different colors to produce the image of a number or a line that can be traced.

- **Lea Symbols** – acuity chart composed of four optotypes, most commonly interpreted as a circle, square, apple and a house. A well-validated test used for testing visual acuity in pre-literate children. (The charts are copyrighted.)
- **Monocular screening** – vision screening in which each eye is tested separately.
- **Myopia** – a refractive error in which the focal point of light converges in front of the retina due to the elongated shape of the eye; also called nearsightedness.
- **Near vision** - the use of convergence and accommodation to allow the eyes to see objects at a close range with clarity.
- **Ocular alignment** – a positioning of both eyes by the extraocular muscles so they are targeting the same focal object simultaneously with the result that two images, one from each eye, fall on the respective parts of the retina.
- **Optotype** - a standardized symbol for testing vision. Optotypes can be specially shaped letters, numbers, or geometric symbols. To test visual acuity, optotypes of different sizes are presented to a person and the smallest size is determined at which the person can reliably identify the optotypes.
- **Patched acuity screening** – vision acuity testing using a paper adhesive patch over the non-tested eye to assure monocularity. Patched acuity screening is recommended as young children are inclined to peek around hands and paddle occluders.
- **Photoscreener** – an instrument that utilizes optical images of the eye's red reflex to estimate refractive error, ocular alignment and other conditions degrading or blocking line of sight such as media opacities and ptosis.
- **Plus Lens Test** - use of a plus (+) or convex diopter strength lens to assess near vision.
- **Random dot "E" test** - a forced choice test of stereoacuity which requires stereoscopic glasses. The test consists of three plates, a trainer, a placebo, and a stereo E card which contains random configurations of dots called a stereogram. The stereo letter E is perceived to be either raised or recessed by the person wearing the glasses if they have normal ocular alignment. This test of stereoacuity is considered ideal for young children.
- **Sensitivity** - the ability of a test to correctly identify those who have a disease, health problem, or condition. A maximally sensitive test will identify the largest number of children who need care as confirmed by a subsequent professional eye exam.
- **Sloan letters chart** - distance and near vision charts, named after Dr. Louise Sloan, consisting of 10 non-serif letters from the Roman alphabet that were circumspectly chosen and arranged. This chart is currently recommended in place of the Snellen chart.
- **Snellen chart** - a prominent and well-known visual acuity chart named after Dr. Hermann Snellen who developed it in the 19th century. The chart is composed of nine letters of the Roman alphabet in a font with serifs. The serifs make this chart a less optimal choice.
- **Specificity** - the ability of a test to correctly identify all those who do not have a disease, health problem, or condition. A maximally specific test will correctly discern the largest percentage of children who do not have disease, health problem or condition and who do not need care as confirmed by subsequent professional examination.
- **Stereo Fly or Butterfly**- a stereoscopic test often used with children which requires stereoscopic glasses and is presented as a booklet. The right side of the booklet depicts a picture of a fly or butterfly. If the eyes have normal ocular alignment, when the fly or butterfly is viewed through the glasses the wings will appear to be raised off the page enough to be touched. The left side of the booklet contains additional tests that offer a more refined measure of stereoacuity.

- **Stereoacuity** – The ability to detect differences in depth using binocular cues, measured by the smallest difference in the images presented to the two eyes that can detect depth reliably.
- **Stereopsis** - depth perception or three dimensionality possible only when both eyes are in alignment and perceive the same image clearly.
- **Strabismus** – a deviation of one or both eyes from the visual axis of the other so they are not simultaneously directed to the same object; also referred to as heterotropias or tropia.
- **Surround or crowding bars**– vertical or horizontal lines placed above and below and to the right and left of an optotype. An example is HOTV single optotype presentation.[3, 23, 26, 28, 29, 30]

EQUIPMENT

Equipment and eye chart standardization is important in vision screening as it permits a comparison of current screening results with previous results, a comparison of results obtained by different practitioners, an evaluation of treatment effects, and an evaluation of visual acuity changes over time.[21]

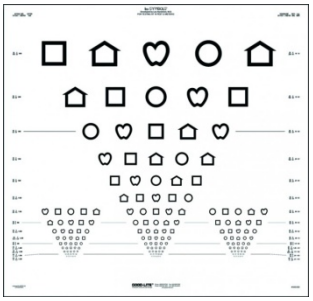
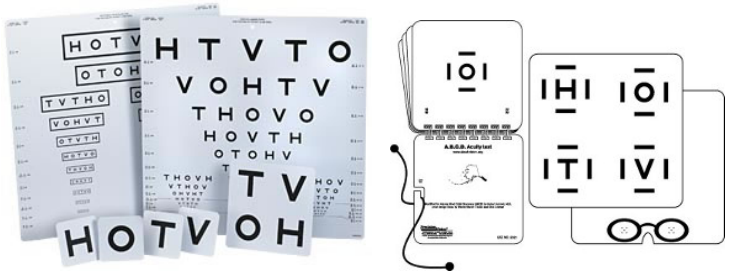
The following equipment recommendations can assist in the selection of appropriate, up-to-date vision screening equipment when initiating a school vision screening program and provide guidance for school nurses and other school personnel when replacing vision screening tools. See the Resources Section for a list of vendors who market vision screening equipment.

Distance Vision Screening[3, 5, 10, 21, 22, 23, 26, 31, 32, 33]

Recommended distance acuity screening tools:

- ✓ Distance visual acuity chart for 10 feet (should contain a 20/25 line) – **Sloan**, **Lea Symbols** or **HOTV**
  - Each line on an eye chart should have the same number of optotypes. If the 20/20 line has five optotypes, the 20/50 line should as well.
  - Charts should have proportionally spaced optotypes (i.e., horizontal spacing between optotypes should be equal to the width of the optotypes on a line; vertical spacing between optotypes should be the height of the optotypes in the next line down).
  - The size of optotypes should progress geometrically up or down the chart by 0.1 log units. This format appears as an inverted pyramid or triangle.
  - Multiple optotypes on a line is preferred over single optotype; OR, if a single optotype is used, it should be a "surrounded or boxed" optotype (surround bars).
  - Preferred optotypes are alphabet letters rather than pictures or symbols reserving symbol or picture charts for young children and/or those with disabilities.
  - Self-illuminated charts are preferred over non-illuminated because self-illuminated equipment avoids yellowing, shadows are minimized, and the letters are well-contrasted.
- ✓ Occluder –Paper adhesive patch provides the best occlusion for young children who are inclined to peek. Right and left eye occlusion spectacle frames for young children are an alternate, less preferred option. Traditional monocular handheld occluder is an appropriate occluder for use in older children. Binocular pinhole occluder is another recommended tool.
- ✓ Cleanser (alcohol swabs) for any occluder reused between children.

Recommended distance acuity screening charts:

Preschool, kindergarten (3-5 year olds)**, and those with developmental disabilities** NOTE: Charts need to have proportionally spaced optotypes or have crowding (surround) bars. Lea numbers can be used with children who use English as a second language.	 **LEA**
NOTE: Charts need to have proportionally spaced optotypes or have crowding (surround) bars. HOTV is also recommended for students who use English as a second language.	 **HOTV**
Older school-aged children (6 years and older) NOTE: Sloan charts are preferred over Snellen charts. The optotypes need to be proportionally spaced.	 **Sloan**

Binocular Vision Screening[3, 5, 18, 33]

School-appropriate tests and measurement strategies for assessing binocular function are divided into two categories: stereoacuity tests and ocular alignment tests. It is recommended to perform both.

- Stereoacuity test (choose one)
- Ocular alignment test (choose one)

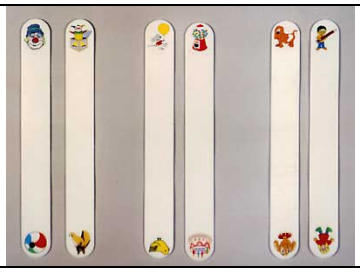
Stereoacuity -

Recommended stereoacuity screening tools:

Random Dot E NOTE: This test is recommended by the National Preschool Vision Screening Task Force as the stereoacuity test of choice for use with young children	
Stereo Fly or Stereo Butterfly NOTE: Also well-suited for young children	

Ocular Alignment –

Recommended Ocular Alignment Tools:

Hirschberg Corneal Light Reflex Test	penlight
Cover Test	occluder
Fixation Target	

Photoscreening[24, 26]

Photoscreeners use optical images of the eye's red reflex to estimate refractive error, media opacity, ocular alignment, and other factors that put the child at risk for amblyopia. These instruments assess both eyes simultaneously and the output is interpreted by operators, by a central reading center, or by computer.

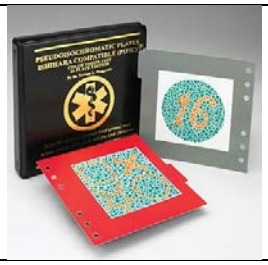
Objective vision screening is emerging as new photoscreening equipment becomes more readily available, national guidelines are encouraging and more pediatric providers are utilizing the technology in their practices. Current valid photoscreeners can be identified utilizing the following resources:

- American Association for Pediatric Ophthalmology and Strabismus: performance data of commercially available instruments for pediatric photoscreening and autorefraction: https://jshare.johnshopkins.edu/ksimons1/ps10b.htm#6 (last updated 6/27/12)
- Alaska Blind Child Discovery (ABCD) http://www.abcd-vision.org/
    - ABCD calibration and validation of 9 objective vision screeners: http://www.abcd-vision.org/references/Calibrate-9/Calbrate-9.htm
    - ABCD video descriptions of set-up and use of various forms of vision screening technology: http://vimeo.com/album/1877048

NOTE: Partnering with the Lions Club, community health clinics, and health care providers as an option to provide screenings will be discussed under Photoscreening Procedure and listed under the Resources Section.

Color Vision[3, 5]

Recommended color vision testing tools:

Pseudoisochromatic plates NOTE: Pseudoisochromatic plates are preferred as most other methods are cost prohibitive. A cotton-tipped applicator or paint brush is recommended so children do not touch the plates with their fingers.	

Near Vision Screening[3]

Recommended near vision screening tools:

The Plus Lens Test -

- ✓ Plus lenses of +2.50 diopter strength
- ✓ Sloan, Lea Symbols or HOTV 10 distance vision screening chart (as above)

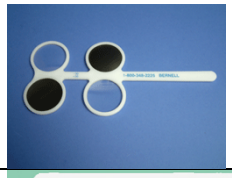
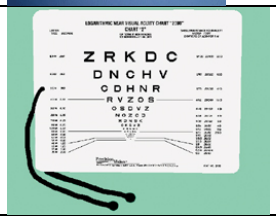
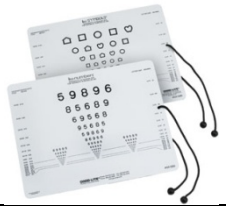
Near point acuity cards/charts -

- ✓ Sloan letters, Lea Symbols, HOTV with pre-measured cord

Other tools:

- ✓ Occluder – Paper adhesive patch provides the best occlusion for young children who are inclined to peek. Right and left eye occlusion spectacle frames for young children are an alternate, less preferred option. Traditional monocular handheld occluder is an appropriate occluder for use in older children.
- ✓ Cleanser (alcohol swabs) for any occluder reused between children[3, 22]

Recommended near vision screening tools:

Plus Lens Appropriate for children 6 years and older	
Near point acuity cards Appropriate for older children	 

PROTOCOLS/PROCEDURES

Distance Visual Acuity Screening Procedure[3, 33, 34, 35, 36, 37]

Purpose: To screen for clearness of vision when looking in the distance; to detect myopia, amblyopia, astigmatism

Grades: Repeated screenings in pre-school, K, 1st, 3rd, 5th, 7th, 10th, 12th; new to the school district

Equipment: Sloan chart, Lea Symbols or HOTV (10 foot)
Occluder or adhesive patch

Preparation: Choose a room that is well-lit, preferably with natural light, free from glare and has no distractions (e.g. other children, pictures, toys, noise). Mount the chart at the child's eye level, away from a wall with a window. Utilize tape, glue, or Velcro to attach the chart to the wall. If using a portable self-illuminated chart, adjust the height to the child's eye level. Mark off 10 feet. The line may be marked with masking tape or paper feet taped on the floor so that the child will be at the required distance.

Procedure:

1. The child may sit or stand. If sitting, place the back of the chair on the line so the back of the child's head should line up with the tape. If standing, ask the child to place the back of his or her heels on the line or floor marking. Do not allow the child to lean forward with the torso or head.
2. Ask the child if he/she wears glasses or contact lenses. If so, and for distance vision, screening should be conducted with the glasses or contacts and noted on the screening form.
3. Orient the student to the screening. Let the student use both eyes to look at the 20/100 letters/symbols to make sure the child can identify them and understands the protocol. Demonstrate how to use the occluder.
4. Place (or have the child place) the occluder over the left eye first. *One of the most critical issues is assuring monocular testing.* Be consistent in testing the right eye first to avoid recording errors.
5. Starting, at least, at the 20/50 line of the chart, instruct the child to keep both eyes open and read or match (if using Lea Symbol or HOTV matching card) the selected letter or line of letters with the uncovered eye. Do not cover or mask optotypes in an attempt to enhance performance. Watch to be sure the child is not peeking, tilting the head or squinting.
6. If the child is able to read the 20/50 line, move to the 20/40 and continue down to the 20/20 or until the child is unable to read the optotypes. If the child is unable to initially read the 20/50 line, move upward.
7. Record results. Record the line number for the last line read correctly. (See passing criteria below)
8. Proceed to the other eye and repeat the procedure.

Pass: A child must be able to identify at least 75 percent of the letters or symbols presented on that line. The recorded visual acuity is the smallest line of letters that can be read with 75 percent accuracy:

1-3 optotypes = no misses
4-7 optotypes = one miss
8-11 optotypes = two misses (criteria recommended by the Ohio Department of Health)

Rescreen: Any student who does not pass should be rescreened within 2 weeks. Rescreen the poorer eye first. Pinhole screening (See Appendix B) may help determine the urgency of referral, which is particularly useful for remote locations where travel for a comprehensive examination is necessary.

Refer: Indications for referral for a comprehensive pediatric ophthalmic evaluation includes:

Age	Pass Criteria	Referral Criteria
3 years 4 years 5 years	20/40 or better in each eye without a 2-line difference*	Worse than 20/40 in either eye, or 2-line difference or greater between each eye, even if in the passing range*
6 years & older	20/30 or better in each eye without a 2-line difference*	Worse than 20/30 in either eye, or 2-line difference or greater between each eye, even if in the passing range*

*** Note:** A 2-line difference between each eye means that, for passing criteria, the eyes must at least see lines next to each other (i.e., 20/25 line right eye, 20/20 line left eye). A referral example, even in the passing range, would be 20/20 right eye, 20/30 left eye (i.e., 2-line difference between each eye, both in the passing range).

See Appendix F for a sample referral form.

Binocular Vision Screening Procedure – Stereoacuity[3, 35, 38]
RANDOM DOT "E" TEST

Purpose: To assess the child's ability to see the depth of an object in order to rule out heterotropia and anisometropia (risk factors for amblyopia)

Grade: One time screening in pre-school, K, OR 1st; new to the school district

Equipment: **RANDOM DOT "E" TEST**

- One pair of polarized glasses
- Demonstration plate (with a large, raised, embossed letter "E") to be used for training purposes only
- Stereo E screening test card with an array of dots that appear randomly oriented (student will view a raised "E" while wearing the glasses if they have binocular vision)
- Blank screening test card with an array of dots that appear randomly oriented (student will not view a raised "E" while wearing the viewing glasses)

Preparation: Seat the child at a table or desk where the lighting is well illuminated but glare free. Seat yourself across from the child.

Random Dot E Procedure:

1. For training purposes, start with the "E" figure on the demonstration card. Tell the child that the "E" figure is "popping off the card" and ask the child to point to it. This training assures that the child can identify an "E" figure.
2. Place the polarized glasses on the student. (The glasses are fragile and excessive handling by children can result in breakage.) Do not remove prescription glasses if the child wears them but place the polarized glasses over the student's glasses. HINT: If the child hesitates, tell him or her that you are putting on glasses that look like sunglasses or that they are magic glasses so they can see magic pictures.
3. At 20 inches away and at the child's eye level, practice using the demonstration "E" card with the blank card together by mixing the cards behind your back and presenting the cards to the child. Have the child point to the card with the "E" on it. Do this 4-5 times.
4. When you feel the child is comfortable with the glasses and images, substitute the demonstration "E" card with the stereo "E" card and move on to the screening session.
5. Present the two test cards 5 times mixing them behind your back as before. NOTE: slightly rotate (don't tilt) the cards up and down to pick up light to give optimal viewing of the stereo image.
6. Move back 40 inches from the child and repeat step 4.

Pass: The child must locate the stereo "E" card at least four out of five presentations.

Rescreen: If results are inconclusive, reassess prior to referral to an eye care professional.

Refer: The child who identifies three or fewer presentations or can only distinguish the "E" when it is moved closer. See Appendix F for a sample referral form.

Binocular Vision Screening Procedure – Stereoacuity[3, 36]
STEREO FLY or BUTTERFLY TEST

Purpose: To assess the child's ability to see the depth of an object in order to rule out heterotropia and anisometropia (risk factors for amblyopia)

Grade: One time screening in pre-school, K, OR 1st; new to the school district

Equipment: **STEREO FLY or STEREO BUTTERFLY TEST**

- Polarized glasses
- Polarized stereo depth test with picture of a fly or butterfly on the right side of the test holder

Preparation: Seat the child at a table or desk where the area is well-illuminated. Seat yourself close to the child. Place the two sided booklet containing the Fly or Butterfly flat on the table or desk or slightly propped up so that the child can easily perceive it.

Stereo Fly Procedure:

1. Place the polarized glasses on the student. (The glasses are fragile and excessive handling by children can result in breakage.) Do not remove prescription glasses if the child wears them but place the polarized glasses over the student's glasses. HINT: If the child hesitates, tell him or her that you are putting on glasses that look like sunglasses or that they are magic glasses so they can see magic pictures.
2. Direct the child's attention to the Fly or Butterfly on the right side of the booklet.
3. Ask the child what he/she sees. Frequently, children will make a great expression of glee as they perceive the Fly or Butterfly three-dimensionally. The Fly or Butterfly's wings appear as if they could be pinched, "standing out" from the Fly or Butterfly's back.
4. Proceed to the left side of the booklet and ask the child to look at the nine Titmus Stereo Circles on the upper half (older children), or the stereo animals on the bottom half (younger children). Ask the child to identify the circles (or animals) in each group of four or five that "lifts off the page."

Pass: A student who does not have an alignment disorder or a severe acuity problem should see the raised geometric Fly or Butterfly and one circle in each group of four, or one animal in each group of five as "lifting off the page."

Rescreen: The test may be repeated for confirmation at another time prior to referral.

Refer: If the child is unable to see the raised geometric Fly or Butterfly on the right side of the booklet or is unable to correctly detect any of the circles or animals in each group of four or five presented. See Appendix F for a sample referral form.

Binocular Vision Screening Procedure – Ocular Alignment[3, 36]

COVER TEST

Purpose: To test for eye misalignment, risk factor for amblyopia (heterotropia and heterophoria)

Grade: One time screening in pre-school, K, or 1st; new to the school district

Equipment: **COVER TEST**

- Occluder
- Fixation Target: tongue blade with picture on it, finger puppet for near; wall mounted or far focal object

Preparation: The student will need to be tested using both the cover/uncover assessment to detect heterotropias and the alternate cover assessment to detect heterophorias, at near point and far point. For near point assessment, seat the child 2 feet away and facing you. For far point assessment, the child should remain seated 2 feet away and facing you and direct the child's attention to a distant focal point that requires his or her eyes to be straight ahead facing you, but not looking at you. Often it is convenient to ask the child to look at a distant object over your shoulder. If the student wears glasses, test with glasses on.

Procedure:

Near point cover/uncover assessment (Heterotropias)

1. Direct the child's attention to a near fixation target in your hand held closely to your own midline of vision (your nose). Hold the fixation object in your left hand if you are right-handed.
2. Hold the occluder in your dominant hand with the handle down, cover one of the child's eyes by moving the occluder in from the outside of the child's face to cover the eye for a second or two, and then move the occluder outward away from the child's face. Repeat this cycle at least 3 times.
3. Observe the <u>unoccluded</u> eye for movement as you are occluding the other eye. If you observe movement in the unoccluded eye, a **presumptive** heterotropia is present.
   - An inward deviation of the eye indicates esotropia.
   - An outward deviation of the eye indicates exotropia.
   - An upward deviation of the eye indicates hypertropia.
   - A downward deviation of the eye indicates hypotropia.
4. Repeat the process, occluding the other eye observing for movement of the <u>unoccluded</u> eye.

Far point cover/uncover assessment (Heterotropias)

1. Direct the child's attention to a distant focal point, wall mounted or otherwise.
2. Repeat the previously described process for near point cover/uncover assessment, observing for movement in the <u>unoccluded</u> eye and noting the direction of eye movement.

Near point alternate cover assessment (Heterophorias)

1. Direct the child's attention to a near fixation target as in the near point cover/uncover assessment.
2. Hold the occluder in your dominant hand. Move it back and forth (2-3 seconds) over the bridge of the child's nose occluding one eye and then the other.
3. Observe the <u>occluded</u> eye as the cover is being removed. If you observe movement in the occluded eye, a **presumptive** heterophoria is present.

- An inward deviation of the eye indicates esophoria.
- An outward deviation of the eye indicates exophoria.
- An upward deviation of the eye indicates hyperphoria.
- A downward deviation of the eye indicates hypophoria.

Far point alternate cover assessment (Heterophorias)

1. Direct the child's attention to a distant focal point, wall mounted or otherwise.
2. Repeat the previously described process for near point alternate cover assessment, observing for movement in the occluded eye and noting the direction of eye movement.

Pass: No movement or very slight movement of the covered or uncovered eye; the child is able to fixate on the near or far focal object.

Rescreen: If results are in doubt, repeat or recheck using another methodology (Hirschberg Test or photoscreening).

Refer: Refer any student who has a consistent horizontal, vertical or diagonal movement of the covered or uncovered eye while the student's gaze is fixed on an object, near or far. See Appendix F for a sample referral form.

Note: A video demonstration of the cover test is found in Resources Section under training.

Binocular Vision Screening Procedure – Ocular Alignment[3, 35]
HIRSCHBERG TEST (CORNEAL LIGHT REFLEX)

Purpose: To test for eye misalignment, risk factor for amblyopia (heterotropia)

Grade: One time screening in pre-school, K, or 1st; new to the school district

Equipment: **HIRSCHBERG TEST (CORNEAL LIGHT REFLEX)**

- Penlight
- Fixation Target: tongue blade with picture on it, finger puppet for near; wall mounted or far focal object

Preparation: The student will need to be tested using both near point and far point assessment. For near point assessment, seat the child 2 feet away and facing you. For far point assessment, the child should remain seated 2 feet away and facing you and direct the child's attention to a distant focal point that requires his or her eyes to be straight ahead facing you, but not looking at you. Often it is convenient to ask the child to look at a distant object over your shoulder. If the student wears glasses, test with glasses on.

Procedure:

1. Direct the child's attention to a near fixation target in your hand held closely to your own midline of vision (your nose).
2. Holding the penlight in your other hand, position it as closely as possible to the midline of your own vision.
3. Turn on the penlight and shine it into the child's eyes at the bridge of the child's nose.
4. Observe the reflections of the light on both corneas.
5. Repeat the procedure using a far focal point.

Pass: The reflections should be approximately central over the pupils, equidistant from the margins of the iris in both eyes.

Rescreen: If results are in doubt, repeat or recheck using another methodology (Cover Test or photoscreening).

Refer: If the reflections are unequal as they are reflected off both corneas. See Appendix F for a sample referral form.

Photoscreening Procedure[3, 10, 39]

Purpose: To identify children with possible visual defects which place a child at risk for developing amblyopia. Photoscreeners use an optical image or invisible wavelength of light to detect significant refractive errors, opacities that block transmission of light to the retina, and abnormal ocular alignment.

Grade: One time screening in pre-school or K and special needs populations, when available and feasible

Equipment: Valid photoscreening instrument

Procedure: The procedure varies by screener mechanism and manufacturer.

1. The child sits in front of the photoscreener and an image of the light reflexes of the eyes is obtained.
2. Partnership options include the Alaska Lions Club, local community clinics, and health care provider offices.
    - The Lions Club provides volunteers who bring and operate equipment for the screening activity in preschool, elementary school and community health fair settings. Contact your local Lions Club to learn more. http://www.lionsclubs.org/locator/lions/search_form_state_results.php.
    - Alaska Blind Child Discovery Coordinating Center at 907-276-1617 or 1-800-270-1617. The screening technology spans out from hubs in Bethel, Dillingham, Kodiak, Kenai, MatSu, Valdez, Copper Center, Tok, Fairbanks, Norton Sound, Southeast and the North Slope. http://www.abcd-vision.org/contact-coordinate/index.html

Pass: Follow the manufacturer's criteria.

Rescreen: If the child failed because they were unable to participate adequately, the child should be retested either by photoscreening or by age appropriate visual acuity, stereoacuity and ocular alignment tests.

Refer: Follow the manufacturer's criteria for referral. See Appendix F for a sample referral form.

NOTE: A video demonstration of photoscreening is available in the Resources Section.

Color Vision Screening Procedure[3, 36]

Purpose: To identify any deficiency in the ability to recognize color.

Grade: One-time screening for boys (girls optional) in pre-school, K, 1st grade or new to the school district

Equipment: pseudoisochromatic plates
cotton-tipped applicator or paintbrush

Preparation: Place the color test plates on the table with the book closed. Seat the child next to you. The room should be well-lit by daylight or a fluorescent desk lamp.

Procedure:

1. Provide the student with a clean cotton-tipped applicator and instruct him or her not to touch the cotton or the pages of the book. Do not use fingers or pencil to trace as oil in the skin can cause color change of the plates.
2. Beginning with the first page, and moving through the plates one at a time, instruct the student to trace the shape, form, or object on the page using the cotton tipped applicator. If numbers are part of the test, the child may call out the number. If the child has difficulty, give him or her another opportunity to discern the perceived image.
3. Follow the manufacturer's directions for scoring.

Pass: Ability to discern the images presented within a reasonable length of time

Rescreen: Inability to identify the images correctly

Refer: Failure of this test is not a cause for referral to an eye care specialist since no correction is possible. Some younger children may not do well on this test because of difficulties in seeing figures against background, unrelated to color deficiency. Re-evaluate 6-12 months later. Provide consultation to parents and teachers. Encourage parents to share the information with their health care provider at their next office visit. See Appendix H for sample notice to parents.

Near Vision Screening Procedure[3, 36]

PLUS LENS TEST

Purpose: To detect hyperopia (farsightedness) in which incoming images converge "behind" the retina resulting in a blurred image. The convex plus lens provides a degree of refraction to the hyperopic eye, "pulls" the image forward so it converges on the retina resulting in clear vision. NOTE: The Plus Lens Test may be particularly appropriate when a child exhibits signs of eyestrain or headaches after near work, loses his or her place when reading, complains of blurriness when reading or after any extended near activity. However, referral on symptoms alone may be appropriate.

Grade: 1st grade and higher, for assessment when suspected vision problem or classroom difficulties

Equipment: Plus lenses of +2.50 diopter strength
Sloan, LEA or HOTV 10 foot distance vision screening chart
Occluder or adhesive patch

Preparation: Screen the student for distance visual acuity as above. Follow directly with near vision Plus Lens screening.

Procedure:

1. Place (or have the child place) the lens over the eye being tested and the occluder over the other eye. If a flipper is being used, have the student hold it in his/her right hand and place it on the nose as if it were a pair of glasses; when you are ready to test the second eye, instruct the student to "flip" the lenses so that the opposite eye is occluded.
2. Direct the student's attention the 20/30 line of the distance acuity chart.
3. Ask the child to read/name the letters or symbols on the 20/30 line while looking through the plus lens with one eye. Allow the child to try again if necessary.
4. Proceed to test the other eye ("flip" the flipper) and repeat the process.

Pass: *Inability* to read or discern the optotype(s) on the 20/30 line while looking through the plus lens in either eye.

Rescreen: *Ability* to read any of the optotypes on the 20/30 line while looking through the plus lens in either eye. Rescreen within 2 weeks.

Refer: Any student who does not pass the retest of Plus Lens screening. See Appendix F for a sample referral form.

Near Vision Acuity Screening Procedure[3, 36, 37]

NEAR VISION CARDS/CHARTS

Purpose: To assess near vision acuity scores. NOTE: Most children, even those who are moderately farsighted, can pass a test of near vision acuity. Near vision acuity testing may be particularly appropriate when a child exhibits signs of eyestrain or headaches after near work, loses his or her place when reading, complains of blurriness when reading or after any extended near activity. However, referral on symptoms alone may be appropriate.

Grade: Older children, for assessment when suspected vision problem or classroom difficulties

Equipment: Near point acuity cards/charts (Sloan letters, Lea Symbols, HOTV) with pre-measured cord
Occluder or adhesive patch

Preparation: Make sure the room in which you are screening has no distractions, is quiet and well-lit. As the card or chart is presented, make sure it is free from glare. Mount the card/chart on a wall or other flat vertical surface at eye level. It is less desirable to hand-hold the card at the appropriate distance.

Procedure:

1. Position the child and measure the exact desired distance from the card or chart to student's face. Do not allow the child to lean the head or torso forward. Pre-measured cords when pulled and kept taut, maintain an optimal test distance (14 inches per most manufacturer's instructions).
2. Ask the child if he/she wears glasses or contact lenses. If the glasses are for reading, test the child with and without glasses in order to obtain a baseline.
3. Occlude the left eye with an occluder and screen the right eye. Ask the child to name or read the letter or symbols on each line as directed starting at the 20/70 line. Do not cover or mask optotypes in an attempt to enhance performance.
4. Move up or down the chart depending on the number of misses. Watch to be sure the child is not peeking, tilting the head or squinting.
5. Record results. Record the line number for the last line read correctly.
6. Proceed to the other eye and repeat the procedure.

Pass: A child must be able to identify at least 75 percent of the letters or symbols presented on that line. The recorded visual acuity is the smallest line of letters that can be read with 75 percent accuracy:

1-3 optotypes = no misses
4-7 optotypes = one miss
8-11 optotypes = two misses (criteria recommended by the Ohio Department of Health)

Rescreen: If use of near vision cards or charts were utilized as the initial screening and the child does not pass, rescreen within 2 weeks. Consider using the Plus Lens Test in addition to the near point chart or card for rescreening.

Refer: Follow manufacturer's instructions; if none, refer at worse than 20/30 or a two-line or greater difference between the acuities of the two eyes. See Appendix F for a sample referral form.

ROLE OF THE SCHOOL NURSE

Susan Proctor, author of NASN *To See or Not to See: Screening the Vision of Children in School*, makes this statement: "Vision screening by nurses should be 'more than' and 'better than' screening by paraprofessionals or lay volunteers. Because nurses are licensed health care professionals, it is reasonable to expect that their mastery of the vision screening process should exceed that of non-licensed persons." Therefore, it is important to seek training and updates in vision screening techniques as those nurses who do not rely on outmoded techniques or methods will more effectively identify children in need of care.[40]

Program planning

School nurses are instrumental and are often the key professional involved in program planning for school vision screening. The success of a screening program depends on attention to detail, and the use of a program planning model can facilitate positive outcomes. The validity of a screening result is dependent on children and screening assistants' preparation for the experience.

A program planning model should contain six elements[26]:

1. Identification of an overall program purpose or goal
2. A statement of program objectives/sub-objectives written in measurable terms and specifying:
    - The when – completion date
    - The standard – how much or what percent
    - The who – target group
    - The what – intended outcome
    - The condition or qualifier – how evaluated
3. Anticipation of equipment, materials, space, services, and personnel needs, with estimated costs
4. Identification of timelines and a schedule that considers school activities, events, and the developmental needs of children
5. Concurrence with the building administrator and key teachers or classroom personnel that the plan and schedule for screening are operational
6. An evaluation

Key considerations for vision screening[3]

- Informing parents of the vision screening process ahead of the screening date can help foster communication and understanding. A sample pre-screening information letter for parents is found in Appendix C.
- Consider the following for order of screening tests:
    - With older children, begin screening with distance vision if other visual functions are to be assessed.
    - With young children, screen binocular vision before proceeding to the monocular screening of near and distance vision and conclude with color vision screening.
- Pay attention to squinting during a screening exam. Squinting is a symptom of astigmatism as well as myopia.
- Avoid using the word *fail* in front of a child, adolescent or parent.
- Rescreening students who do not pass the first vision screening test should occur within approximately two weeks.
- Educate teachers, parents and other staff about the signs and symptoms of visual difficulties and elicit their observations. See Appendix K for a sample classroom vision observation checklist that can be utilized as an education tool.

- Advise teachers and parents about problems associated with alignment disorders such as the risk for amblyopia and the loss of stereopsis which can be associated with safety issues related to inadequate depth perception.
- If a child has one eye with better vision than the other or a preferred head turn due to an eye condition, advise the teacher to seat the child on the side of the room where the gaze is most efficient.
- Advise the teacher that some children with ADHD have difficulty seeing white boards because of the reflection.
- Pay close attention to children taking Ritalin/Adderall, and, to a lesser degree, Strattera, as these medications have been reported to affect accommodation.
- Apprising parents of normal results is advised as most parents welcome information about their child and are pleased to hear of screening results, particularly if nothing untoward is detected. See Appendix D for a sample form.

Documentation[3]

Documentation of vision screening results can be a challenge because the screener often does not have ready access to school files. Guidelines for documentation and handling of screening data include:

- Some thought needs to be given to effective and efficient ways of noting the findings and promptly and accurately entering the data into the permanent record. Transfer of screening results to the permanent record is essential as notes or logs are not considered to be legal health records. A sample vision screening worksheet and a sample follow-up worksheet are found in Appendix I and Appendix J.
- Record the results, screening tests used, and the screening date. The use of PASS/FAIL when recording results of acuity testing is discouraged; actual acuities should be recorded along with any actions that were taken or any plan for action.
- Vision screening data are subject to FERPA (Family Education Rights and Privacy Act of 1974) and as such are disclosed to outside parties on a need-to-know basis with written parental authorization.
- A system should be devised to store data for easy access as well as to protect confidentiality. Systematic and uniform district-wide storage makes for ready retrieval for evaluation or reports.
- Electronic records need to be password protected or have other system safeguards for confidentiality.

Referrals and follow up[3, 8, 36, 41]

The referral and follow-up process should follow district policies as they are available.

- A form should be created that facilitates transfer of information to the eye doctor and allows for a return response. See Appendix F for a sample eye care specialist referral form.
- Forms, for school nurse referrals, should use abbreviations such as OD or OS rather than right eye and left eye.
- Parents should be notified in writing in a simplified referral letter that includes the explanation of why the child failed the screening. Use no more than a 6th- 8th grade reading level. Explain the vision screening process and specifically, the part of the screening with which the child had difficulty. See Appendix E for a sample parent referral letter.
- Ideally, the referral form, along with a cover letter from the nurse and the eye examiner's report to the school, should be mailed to the parent. The cover letter should invite the parent to contact the nurse should they have further questions and may include a fax number or self-addressed stamped envelope to encourage the eye examiner to return results to the nurse.

- School nurses should be diligent in following up on referrals. Sending the original notice is not enough. See Appendix G for a sample follow-up referral letter for parents.
- Use verbal communication for follow- up contacts regarding referrals. Explore barriers to exams. Verify, does the parent:
    - Understand the vision concern?
    - Need assistance locating affordable care?
    - Need assistance scheduling an appointment?
    - Need financial assistance?
    - Need transportation assistance?
- If the nurse assisted with scheduling the appointment, she/he should make appointment reminder contacts.
- Encourage eye care providers to make appointment reminder contacts with families as well as offer some appointments on "same day as call for appointment" basis.
- Encourage teachers to teach students how to use monthly calendars for planning.
- Color deficiency is usually non-progressive, cannot be corrected and usually does not affect visual acuity or visual function. Though color vision deficiency does not require a referral to the eye care specialist, the following recommendations are offered:
    - Inform parents of the student's color vision deficiency. See Appendix H for sample notice.
    - Help parents understand and identify some occupations and vocational areas that may be problematic with a color vision deficiency.
    - Encourage parents to share the information with their health care provider at their next office visit.
    - Inform the teachers and counselors of a student's color vision deficiency so that they may:
        - Adjust educational materials to situations where color discrimination is not a criterion for progress.
        - Help the student develop special techniques for compensating for their limitations.
        - Accommodate the student, as required by American with Disabilities Act (ADA) for a child with a color disorder that may affect learning. A 504 plan should be in place for any child in need of such assistance.
        - Take into account color vision difficulties for driver training and vocational guidance.

Students who wear eyeglasses[3]

- Assist the teacher with eyeglasses management in the classroom.
- Urge children to wear glasses, if prescribed.
- Counsel children regarding the care and maintenance of glasses and contact lenses.
- Check children with glasses periodically with and without glasses. Periodically assess the child with a diagnosis of strabismus for refractive errors as well.
- Build community alliances and advocate for children in need of treatment.

Evaluation of the school vision screening program[3]

A well-designed and well-implemented school vision screening program will include an evaluation. Evaluation allows the nurse to see the benefits of having children receive care, to be able to astutely articulate what type of testing has been conducted and why, and to recommend change in program structure and process.

Essential concepts include:

- Evaluation is an ongoing process.
- Data may be used in subsequent planning.
- Aggregate data potentially may be shared with organizations or agencies in ascertaining treatment rates locally, regionally or nationally.
- Aggregate data potentially may be shared with school administrators and Boards of Education.

Key questions of interest to pose:

1. What percentage of the target population was screened?
2. Of those screened, what percentage was referred for an eye examination?
3. Of those referred, what percentage received a professional eye examination?
4. Of those examined, what percentage was found to have a visual problem?
5. What types of visual problems were identified?

APPENDICES/FORMS

Appendix A - Anatomy of the Eye

Appendix B - Pinhole Screening

Appendix C - Sample form: Pre-screening Information Letter for Parents

Appendix D - Sample form: Report of Normal Results to Parents

Appendix E - Sample form: Referral Letter for Parents

Appendix F - Sample form: Report of School Vision Screening for Referral to Eye Care Specialist

Appendix G - Sample form: Follow-Up Referral Letter for Parents

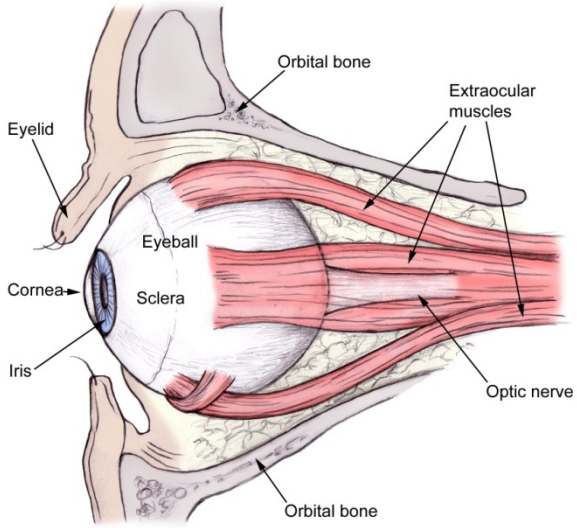
Appendix H - Sample form: Notice to Parents on Color Vision

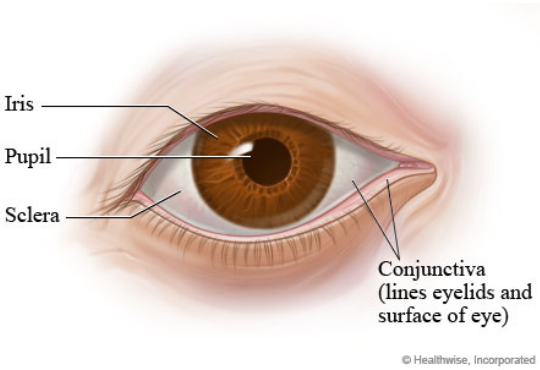
Appendix I - Sample form: Vision Screening Worksheet

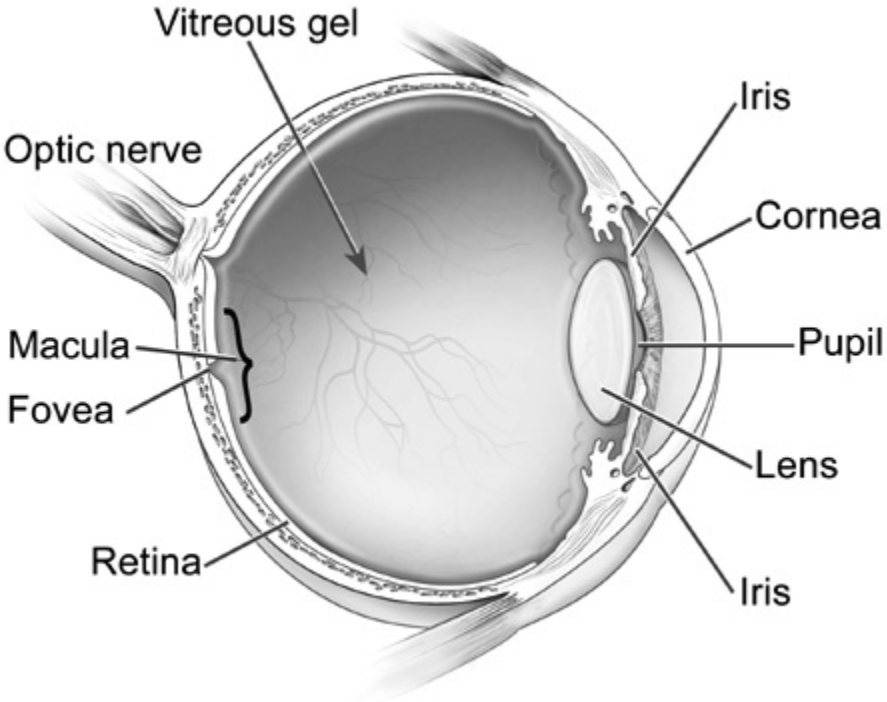
Appendix J - Sample form: Vision Referral Follow-Up Worksheet

Appendix K - Sample form: Classroom Vision Observation Checklist

Appendix A **Anatomy of the Eye**







Appendix B

Pinhole Screening[3, 23]

Purpose: A pinhole may be used as an adjunct to monocular distance vision screening to assist in determining the urgency of a referral. Pinhole screening is used ONLY for those children already failing distance acuity screening and need for a referral is evident. This determination may be especially useful in more rural areas of Alaska where traveling for a comprehensive vision examination by an ophthalmologist or optometrist is necessary. School nurses may also utilize this test among the battery of tests administered when assessing a student's vision concern or poor school performance identified by a parent or teacher.

A pinhole narrows the aperture through which a child sees the target, and in the presence of ametropia (where the images are out of focus), it improves the clarity of the perceived image. Squinting provides the same effect, a behavior that should be noted during screening or at other times. By reducing the refraction, the goal of myopia treatment, a pinhole can be quite useful in ascertaining whether an eye may have a treatable refractive error. If the student has a treatable refractive error, his/her vision will improve from the initial test for distance vision that was performed without the pinhole.

The referral becomes more urgent, when a student's vision does NOT improve when utilizing pinhole screening in comparison to the initial monocular distance vision screening results. This is because a student with a simple refractive error should experience improved vision through the pinhole but a student with significant amblyopia will not experience improved acuity.

Grade: Appropriate for any age

Equipment: A pinhole apparatus may be made by mounting a disk of heavy, high-quality card stock or plastic in a hand-held holder or in a pair of glasses frames and by making a small pinhole in the center of the disk. A hard plastic version with multiple pinholes (performs the same function as a single pinhole) is available for purchase from vision screening vendors and is preferred for the ability to clean between students.

Preparation: Complete distance vision screening and obtain the results.

Procedure:

1. Place the pinhole over the eye being screened, while occluding the other.
2. Screen the student again using distance procedure.
3. Note the results, proceed to the other eye, and repeat.

Refer: Refer all students who do not pass monocular distance vision screening. A more urgent referral is indicated when a student does not see the optotypes more clearly using the pinhole. Examples: a) distance acuity right eye 20/60, pinhole to 20/30 = less urgent; b) distance acuity left eye 20/100, PHNH (pinhole no help) = more urgent (suggesting amblyopia or organic cause and not just a refractive error).

Appendix C
SAMPLE Pre-Screening Information Letter for Parents

[School Letterhead]

School Vision Screening Information
Date: _____

To: Parent(s)/Guardian(s)
Vision screenings will be administered on _____ to all preschool and students in grades _____ as required by state law and school district policy.

Why is it important to have your child's vision screened?
If vision problems are not detected and treated early, they can lead to permanent vision loss and learning difficulties. If a child has poor vision, it makes it much harder for them to succeed in school, sports, social situations, and in life.

- Vision problems affect 1 in 20 preschoolers
- 1 in 4 school-age children experience vision problems

Vision screening will consist of one or more of the following:

1. Distance visual acuity - ability to see objects far away
2. Binocular vision - how well your child's eyes work together
3. Photoscreening - ability to see far away, up close, and how well the eyes work together
4. Color vision - ability to see colors
5. Near visual acuity - ability to see objects up close

How will the results be shared?

- ✓ If your child passes the vision screening, you may be contacted by your school nurse with the results. You are welcome to contact the nurse to learn the screening findings.

- ✓ If your child does not pass the vision screening, the school nurse will contact you to share the results and may make a recommendation for further evaluation by an eye care specialist.

A vision screening provides only a snapshot of how your child performs on the day the test was administered and is not a substitute for a complete eye exam by an optometrist or ophthalmologist.

If you have any questions about the school vision screening program please call the school nurse.

_____
School Nurse

_____
Phone/Fax/Email

Appendix D
SAMPLE Report of Normal Results to Parents

Vision Screening Report to Parents
NORMAL FINDINGS
Child's Name_____ **Date**_____
Today your child's vision was screened at school and the results were found to be within normal limits. Vision screening is routinely conducted as required by state law and school district policy. School vision screening is performed to determine if your child has a vision problem that could interfere with learning.

The vision tests conducted at school are screening only and are not meant to replace a professional eye examination performed by an eye care specialist.

Your child had the following vision screening(s) performed (check all that pertain):

	Distance visual acuity	ability to see objects far away
	Binocular vision	how well your child's eyes work together
	Photoscreening	ability to see far away, up close, and how well the eyes work together
	Color vision	ability to see colors
	Near visual acuity	ability to see objects up close

Please direct any questions to the school nurse at _____.

Vision Screening Report to Parents
NORMAL FINDINGS
Child's Name_____ **Date**_____
Today your child's vision was screened at school and the results were found to be within normal limits. Vision screening is routinely conducted as required by state law and school district policy. School vision screening is performed to determine if your child has a vision problem that could interfere with learning.

The vision tests conducted at school are screening only and are not meant to replace a professional eye examination performed by an eye care specialist.

Your child had the following vision screening(s) performed (check all that pertain):

	Distance visual acuity	ability to see objects far away
	Binocular vision	how well your child's eyes work together
	Photoscreening	ability to see far away, up close, and how well the eyes work together
	Color vision	ability to see colors
	Near visual acuity	ability to see objects up close

Please direct any questions to the school nurse at _____.

Appendix E
SAMPLE Referral Letter for Parents

[School Letterhead]
School Vision Screening Referral

Date: _____
To: Parent(s)/Guardian of _____
Today your child's vision was screened at school. Vision screening is routinely conducted in schools as required by state law and school district policy. School vision screening is performed to determine if your child has a vision problem that could interfere with learning.

The vision screening findings indicate your child needs to have further evaluation by an eye care specialist. Specifically of concern is (are) the test(s) marked below:

	Distance visual acuity	ability to see objects far away
	Binocular vision	how well your child's eyes work together
	Photoscreening	ability to see far away, up close, and how well the eyes work together
	Color vision	ability to see colors
	Near visual acuity	ability to see objects up close

Attached is a referral form for you to take to the eye care specialist. It is important that the ophthalmologist or optometrist complete this form and that it is returned to the school nurse. The recommendations can then be followed at school to benefit your child's learning.

If you need help with locating an eye care specialist, paying for the examination and/or glasses (if prescribed), or have questions about your child's vision screening, please contact me. If your child is already receiving eye care from a professional, please call me or send a note to share their findings.

_____
School Nurse

_____
Phone/FAX/email

Appendix F

Report of School Vision Screening for Referral to Eye Care Specialist

Identifying Information		
Child's Name:	**Date of Birth:**	**Grade:**
Parent/Guardian Name:		

Screening Information	
Date of screening:	**Date of referral:**
☐ Wearing glasses/contacts ☐ Glasses are broken/lost ☐ Does not wear glasses/contacts	
Distance Vision Acuity Right 20/ Left 20/ Screening tool:	
Observations/other tests/comments:	Attach Photoscreening results (place label here)

Eye Care Specialist Report				
DIAGNOSIS: ☐ Normal ☐ Myopia ☐ Hyperopia ☐ Astigmatism ☐ Strabismus ☐ Amblyopia				
Other:				
ACUITY:		**OD**	**OS**	**Field limitation: Y N**
Distance	without glasses	20/	20/	Widest diameter (in degrees) of
	with correction	20/	20/	remaining vision field:
Near	without glasses	20/	20/	**OD**
	with correction	20/	20/	**OS**

RECOMMENDATIONS OF EXAMINER: ☐ Ophthalmologist ☐ Optometrist

Glasses prescribed ☐ Yes ☐ No Comments_____

If yes, to be worn: ☐ constantly ☐ classroom only ☐ distance only ☐ near only

☐ sports glasses for PE/sports

School accommodations: ☐ preferential seating ☐ extra lighting ☐ remove glasses for PE

☐ physical activity limitations (specify)_____other_____

Comments/prognosis:

Return visit recommendation:

Parent authorization for release of information

I, the parent/guardian of the above named child, authorize the exchange of information between the eye care specialist and my child's school/school nurse. I understand this form will be faxed to the school nurse/screener so she/he may assist in assuring the above recommendations can be followed to benefit my child's learning.

Parent/guardian signature_____Date_____

Return to school nurse/screener

FAX Form to:	**From:**
School Nurse/Screener	Eye Care Specialist
School Address	Address
Phone	Phone
Email Address	Email Address
FAX	FAX

Appendix G
SAMPLE Follow-Up Referral Letter for Parents

[School Letterhead]
School Vision Screening Referral Follow-Up

Date: _____
To: Parent(s)/Guardian of _____
Earlier in the school year I sent a vision referral letter home with an attached eye care specialist report form. At that time, due to the results from our school screening, I recommended that your child have a professional eye examination. I have not received any information regarding this referral. Please check the appropriate statement listed below so I can record this information in your child' health file.

_____ The form has been lost. Please send another one.
_____ No appointment was made and we do not plan to follow up at this time.
_____ No appointment was made. We would appreciate information on possible financial assistance for this eye examination.

_____ An appointment is scheduled on_____. We will send in the results of the examination after it has been completed. (date)

_____ The examination was done. My child saw _____ and glasses are not needed.
(name of eye care specialist)
_____ The examination was done and glasses have been ordered. You should receive a report from _____.
(name of eye care specialist)
_____ The examination was done. My child saw _____ and only preferential seating in the class is advised. (name of eye care specialist)

_____ Other _____

If you have any questions or need assistance in scheduling an appointment, please feel free to contact me.

_____
School Nurse

_____
Phone/FAX/email

Appendix H
SAMPLE Notice to Parents on Color Vision

[School Letterhead]

Date: _____
To: Parent(s)/Guardian of _____
Your child was tested for color vision. The results of this screening indicate your child has difficulty seeing some of the shades of the color spectrum. The following is some information about color vision:

- Color deficiency is the inability to distinguish certain shades of color. Most often the person with a color deficiency has difficulty distinguishing between the colors of red and green and, less often, blue and yellow.
- Difficulty with color is not uncommon, especially among males. It occurs in about 1 in 12 boys and 1 in 250 girls in the U.S. Color deficiency should not be confused with color blindness, the inability to see any color at all. Color blindness is a rare condition.
- Usually difficulty with color is present from birth and does not become worse with age. There is no known treatment for color deficiency. It does not suggest other vision problems or health issues, and it does not reflect intelligence.

The purpose of this notice is to inform you that your child had difficulty seeing some of the colors presented during the screening. At the elementary school level, early detection is vital as many learning materials rely heavily on color perception and color-coding. Alternate ways to identify colors are needed during the school day. Your child's teacher should be made aware of the color deficiency in order to provide classroom strategies and accommodations.

From the intermediate level on, this information is of value when looking at career and occupation options as color differentiation is imperative for certain vocations. Color issues may not necessarily exclude a person from certain jobs, especially mild color deficiencies, but personal knowledge can help avoid possible disappointments.

You are welcome to come in and review the test with your child in my office. There is no specialist or medical referral necessary at this time but you are encouraged to share this information with your health care provider at your next office visit. If you have questions at any time, do not hesitate to contact your family's vision or health care provider.

_____
School Nurse

_____
Phone/FAX/email

Appendix I
SAMPLE Vision Screening Worksheet

Date	School	School Year
Grade	Teacher	Screener

Student Name	glasses	Distance Visual Acuity				Near Visual Acuity/Plus Lens				Binocular Vision				Color Vision		Photo-screening P/F	Referral Date(s)/Comments
		1st		2nd		1st		2nd		Stereopsis		Ocular Misalignment					
		R	L	R	L	R	L	R	L	1st	2nd	1st	2nd	1st	2nd		

Appendix J

SAMPLE Vision Follow Up Worksheet

School Year	School	Screener

Student Name	Teacher/ Grade	Reason for Referral							Follow-Up Results: Diagnosis/Glasses Comments
		Distance Visual Acuity		Near Visual Acuity/Plus Lens		Binocular Vision		Photo screening	
		R	L	R	L	Stereopsis	Ocular Misalign-ment		

Appendix K
SAMPLE Classroom Vision Observation Checklist

Classroom Vision Observation Checklist		
Student Name		**Grade:**
Purpose: To identify eye or vision problems throughout the school year		
Procedure: The child is asked to report any complaint about his/her eyes. Teachers are asked to report any abnormal visual behaviors or any visual complaints as expressed by the child whenever they occur and complete the vision observation checklist. Provide the checklist to the school nurse for further assessment.		
Yes	**No**	**Description: Teacher Observations**
		Do you suspect anything is wrong with the child's eye/vision or color determination?
		Has the child ever been diagnosed with an eye condition you are aware of?
		Problems or change in the whites, pupils, lids, lashes or the area around the eye (ex: swollen or drooping eyelids, one pupil larger than the other, frequent sties, discharge of the eye)
		Excessive blinking or watering of the eyes
		Signs of abnormal sensitivity to light or dizziness
		Turning in, out, up, or down of one eye
		Squinting
		Poking at the eyes or frequent rubbing
		Covering or closing an eye when looking at an item of interest
		Abnormal head posture such as tilting the head to one side or moving forward or backward when viewing item of interest
		Work avoidance, especially close work
		Inaccuracy in reaching for an item of interest
		Bumps into things, knocks things over
		Difficulty copying from the board
		Using finger or other device to keep place while reading
		Repeatedly omits or rereads words or lines unknowingly
		Writes up or downhill on paper
		Orients drawings poorly on a page
		Holds printed materials in unusual position
		Frowning or scowling when reading
		Displays short attention span in reading or copying
		Child's performance in school is less than expected
		Reads below grade level
		Gives up easily (say's "I can't" before trying)
		Homework takes too long
		Hard to understand what he/she read
Yes	**No**	**Description: Child's Complaints**
		Headache
		Blurred vision or seeing double images
		Light sensitivity
		Burning or itching of eyes or eyelids
		Words or lines running together

		Words or pictures jumping
		Nausea or dizziness
		Unable to see the board
Teacher Name:		**Date completed:**
Other Comments:		

Form adapted from Minnesota Department of Health Vision Screening Procedures

RESOURCES

National resources

American Academy of Ophthalmology www.aao.org
Public vision education and availability of eye care

American Association for Pediatric Ophthalmology and Strabismus www.aapos.org
Resources and information for the public as well as resources for school nurses.

American Optometric Association www.aoa.org
Public vision education, eye care and community outreach

American Academy of Pediatrics http://aap.org/healthtopics/visionhearing.cfm
Position statements for professionals and guidelines for child vision care

Sight & Hearing Association www.sightandhearing.org
Public information about vision and hearing topics as well as information regarding products and services

Vision In Preschoolers (VIP) Study Home Page http://optometry.osu.edu/research/vip/

Center for Medicare and Medicaid Services http://www.medicaid.gov/index.html

Children's Health Matters http://childrenshealthmatters.org/
Assistance with access to Medicaid and the State Children's Health Insurance Program (SCHIP)

National Eye Institute
Information about eye conditions, research results, and vision education resources. Free materials are available upon request. http://nei.nih.gov/

Prevent Blindness America
Formerly the National Society for the Prevention of Blindness. Provided community vision education, certified vision screening training, service programs, and national and state research.
http://www.preventblindness.org

National Association School Nurses *To See or Not To See,* Screening the Vision of Children in School
https://portal.nasn.org/members_online/members/viewitem.asp?item=S011&catalog=MAN&pn=2&af=NASN

Vision Service Plan Program: Sight for Students 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 the eye care services.

NASN members: http://www.nasn.org/MemberCenter/VisionServicePlanVSPSightforStudents
For further information, Sight for Students website: http://www.sightforstudents.org/

Training
Prevent Blindness America http://www.preventblindness.org/childrens-vision-screening-training-and-certification Children's vision screening training and certification

AAPOS Resources for School Nurses - AAPOS and the NASN partnered to develop resources to promote school vision screening and to disseminate information about common eye diseases in children.

- AAPOS/NASN Vision Screening Tutorial and Near/Distance Vision Screening Kit – Kathy Lee, MD developed this 2010 video for school nurses about how to screen vision using the best practices in school vision screening; the 2011 screening kit contains distance and near eye charts for LEA symbols and numbers, HOTV, and Sloan letters. http://www.aapos.org/ahp/resources_for_school_nurses
- Nurse Video Tutorials – why we do it, photoscreening, performance enhancers, monocular testing and optotype presentation. http://www.aapos.org/ahp/nurse_video_tutorials/
- Pediatric Ophthalmology for School Nurses: What You Need to Know PowerPoint – contains 3 talks, http://www.aapos.org/ahp/nurse_ppt_/
    - Common Causes of Red Eye in the Pediatric Population by Jane C. Edmond MD –numerous photos of abnormal eye conditions and injuries
    - Reading, Dyslexia and Vision by Sherly M. Handler, MD
    - Vision Screening and Vision Screening Devices by Dan E. Neely, MD

Ophthalmology Lecture – Tropia & Phorias (Cover Test demonstration)
http://www.youtube.com/watch?feature=endscreen&NR=1&v=TxEQWtlXtrI

Pediatric Photoscreening demonstration http://vimeo.com/album/1877048/video/38874943

Resources for children with visual impairments
American Foundation for the Blind http://www.afb.org/

Children's Disability Information http://www.childrensdisabilities.info/vision/index.html

Lighthouse International http://lighthouse.org/
Information about low vision and blindness

Alaska Resources
National Federation of the Blind - Alaska Resource List
http://www.nfb.org/nfb/AK_resources.asp?SnID=669602

Lions Club International - a service club organization whose local members are all volunteers. The club may offer resources for financial assistance for eyeglasses, organization of vision screening and eyeglass recycling. http://www.lionsclubs.org/EN/member-center/planning-projects/sight-hearing/sight/eyeglass-recycling/recycling-centers/vision-eyeglass-alaska.php

Denali KidCare – a State of Alaska program that provides health insurance coverage for children and adolescents of working and non-working families who meet income requirements. Denali KidCare benefit

coverage includes vision examinations and eyeglasses.
http://www.hss.state.ak.us/dhcs/DenaliKidCare/gen_info_dkc.htm

ABCD – Alaska Blind Child Discovery is a cooperative, charitable research project to vision screen every preschool child in Alaska. The website includes information for parents and providers about amblyopia and other eye disorders, vision screening, photoscreening and frequently asked questions. Information about preschool vision screening tools is offered.

- The HOTV Flip Card is a vision screening tool recommended by ABCD. http://www.abcd-vision.org/vision-screening/ABCD-HOTV-Flipcard.html
- The PlusOptix photoscreener is available through the Lions Club in hubs throughout Alaska. To learn more about this objective technology see http://www.abcd-vision.org/vision-screening/plusoptix.html
- The Home Acuity Screen is an inexpensive, downloadable, valid acuity test that is available to almost all Alaska children. This home acuity test may be especially helpful for small rural schools, private schools, charter schools and home schools. It can be used by parents, teachers, public health nurses or community health aides, and others. The kit comes with instructions and a video demonstration is available at: http://www.abcd-vision.org/vision-screening/HomeAcuityTest.html
- Monocular occlusion patches are available through several vision screening vendors. A couple are identified here:
  - To read more about patching and supply options http://www.abcd-vision.org/vision-screening/patched-acuity.html
  - School Health Supply http://www.schoolhealth.com/product/vision+%26+hearing/vision-screening/vision+screening+accessories/freddy+the+fish+disposable+occluders+500-package.do
  - Precision Vision http://precision-vision.com/index.cfm/product/366_66/happy-face-eye-patch.cf

Vision screening equipment - numerous companies market vision screening equipment. Possible sources for vision screening equipment include:

Bernell Corporation	1-800-348-2225	http://www.bernell.com/
Good-Lite Company	1-800-362-3860	https://www.good-lite.com/default.cfm
School Health	1-800-323-5465	http://www.schoolhealth.com/
MacGill School Health	1-800-323-2841	https://www.macgill.com/
School Nurse Supply	1-800-485-2737	http://schoolnursesupplyinc.com/
Moore Medical	1-800-234-1464	http://www.mooremedical.com/
School Kids Healthcare	1-800-558-0686	http://www.schoolkidshealthcare.com/
Precision Vision	1-800-772-9211	http://precision-vision.com/index.cfm

Zenni Optical is a low cost prescription eyeglass vendor online with glasses from $6.95.
http://www.zennioptical.com/

REFERENCES

1. US Preventive Services Task Force. Vision Screening for Children 1 to 5 Years of Age: US Preventive Services Task Force Recommendation Statement. *Pediatrics.* 2011;127:340-346. Available at: http://www.uspreventiveservicestaskforce.org/uspstf11/vischildren/vischildrs.htm. Accessed April 14, 2011.

2. Bessler MR, Birnbaum, MH. Symptoms of Vision Problems that Cause School Troubles. Available at: http://www.visionhelp.com/vh_learning1_08.html. Accessed February 18, 2011.

3. Proctor S. To See or Not To See: *Screening the Vision of Children in School*. Castle Rock, CO: National Association of School Nurses; 2005.

4. National Eye Institute of the National Institutes of Health. Vision in Preschoolers Study. Available at: http://optometry.osu.edu/research/VIP/index.cfm. Accessed January 11, 2011.

5. Kemper A, Delmonte M. Vision. In: Tanski S, Garfunkel L, Duncan P, Weitzman M eds. *Performing Preventive Services: A Bright Futures Handbook*. American Academy of Pediatrics;2010:155-157. Available at: http://brightfutures.aap.org/pdfs/Preventive%20Services%20PDFs/Screening.PDF. Accessed January 2011.

6. American Optometric Association. Strabismus: Care of the Patient with Esotropia and *Exotropia. Available at* http://www.aoa.org/documents/CPG-12.pdf. Accessed March 20, 2012.

7. American Academy of Ophthalmology. *Policy Statement: Vision Screening for Infants and Children*, a Joint Statement of the American Association for Pediatric Ophthalmology and Strabismus and the American Academy of Ophthalmology. Available at: http://www.aapos.org//client_data/files/2011/337_visionscreeningforinfantsandchildren2011.pdf Accessed August 25, 2011.

8. American Optometric Association. Color Vision Deficiency. Available at http://www.aoa.org/x4702.xml. Accessed January 15, 2012.

9. U.S. Department of Health & Human Services. Agency for Healthcare Research and Quality (AHRQ). National Guideline Clearinghouse. Pediatric eye evaluations: I. Screening. II. Comprehensive ophthalmic evaluation. Available at http://www.guidelines.gov/content.aspx?id=11753. Accessed July 14, 2011.

10. Lee K. School Nurse Vision Screening Tutorial. National Association of School Nurses/American Association for Pediatric Ophthalmology and Strabismus. [DVD video] Peppershock Media Productions, LLC. Available from: http://www.aapos.org/ahp/resources_for_school_nurses. Accessed November 12, 2010.

11. American Optometric Association. The Need for Comprehensive Vision Examination of Preschool and School-age Children. Available at: http://www.aoa.org/x5419.xml. Accessed August 1, 2012.

12. Alaska Statute 14.30.127. Vision and Hearing Screening Examinations. Available at: http://www.touchngo.com/lglcntr/akstats/Statutes/Title14/Chapter30/Section127.htm. Accessed January 11, 2011.

13. Bright Futures/American Academy of Pediatrics. Recommendations for Preventive Pediatric Health Care. Available at: http://brightfutures.aap.org/pdfs/AAP%20Bright%20Futures%20Periodicity%20Sched%20101107.pdf. Accessed January 11, 2011.

14. American Academy of Ophthalmology, Policy Statement: Frequency of Ocular Exams, 2006. Available at: http://www.aapos.org/client_data/files/2011/_2_policyfrequencyofocularexams.pdf. Accessed September 8, 2011.

15. Duncan P.M., Shaw J.S., Gottesman M.M., Swanson J., Hagen J.F., & Pirretti A.E. *Bright Futures Tool and Resource Kit*. Elk Grove, IL: American Academy of Pediatrics; 2010.

16. Hagen J.F., Shaw J.S., & Duncan P.M. (Eds.). *Bright Futures: Guidelines for health supervision of infants, children, and adolescents. (3rd ed.).* Elk Grove, IL: American Academy of Pediatrics; 2008.

17. Tanski S., Garfunkel L.C., Duncan P.M., & Weitzman M. *Performing preventive services. A Bright Futures handbook.* United States: American Academy of Pediatrics; 2010. Retrieved from http://brightfutures.aap.org/pdfs/Preventive%20Services%20PDFs/Forward%20and%20Introduction.pdf. Accessed August 28, 2012.

18. National Association of School Nurses. Issue Brief: *School Nursing Services Role in Health Care, School Vision Screening;* 2006. Available at: http://www.nasn.org/PolicyAdvocacy/PositionPapersandReports/NASNIssueBriefs

19. Daniel E. Neely, MD, AAPOS President, Associate Pro*fessor of Ophthalmology, Indiana University School of Medicine. Email* correspondence, March 22, 2011.

20. Optometrists Network. The Relationship between Convergence Insufficiency (CI) and ADHD (Attention Deficit Hyperactivity Disorder). Available at: http://www.add-adhd.org/convergence_insufficiency.html. Accessed April 4, 2012.

21. Nottingham Chaplin P.K., Bradford G. A Historical Review of Distance Vision Screening Eye Charts. *NASN School Nurse*. July 2011;26(4):221-228.

22. Clausen M, Armitage D, Arnold R. Overcoming Barriers to Pediatric Visual Acuity Screening Through Education Plus Provision of Materials. *Journal of AAPOS*. 2009;13:151-154.

23. Robert Arnold, MD, Pediatric Ophthalmologist, Anchorage, Alaska. Multiple correspondence and in person discussion, 2011-2012.

24. American Academy of Pediatrics. Instrument-Based Pediatric Vision Screening Policy Statement. *Pediatrics*. 2012;130(5):983-986. Available at:

http://pediatrics.aappublications.org/content/early/2012/10/24/peds.2012-2548.full.pdf. Accessed November 2, 2012.

25. Leman RE, Clausen MM, et al. A comparison of patched HOTV visual acuity and photoscreening. *JOSN.* 2006;22(4):237-243.

26. Proctor, S. E. Vision Screening: New and Time Honored Techniques for School Nurses. 26*NASN School Nurse.* March 2009;24(2):62-68.

27. Clarke N, Shacks J, Kerr A, Bottrell C, Poulsen M, Yin L. Use of a Noncycloplegic Autorefractor to Perform Vision Screening in Preschools. *JOSN*. 2008;24:158-163.

28. American Academy of Pediatric Ophthalmology and Strabismus. *Eye Terms & Conditions.* Retrieved from: http://www.aapos.org/terms. Accessed November 12, 2012.

29. Holmes J.M., Clarke M.C. Amblyopia. *The Lancet*. 2006;36*;*1343-1351*.*

30. *National* Institute of Health. 2011. *Color deficiency; Blindness - color*. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0001997. Accessed November 12, 2012.

31. Leman R, M.D. Armitage, et al. The Receiver-Operator Curve for Flip-Card Surround HOTV in Younger Children: Validation of a Simple Flip Card for School Acuity Testing. *Am Orthpt J*. 2005;55:128-135.

32. Simons K. AAPOS Preschool Visual Acuity Test Recommendations Draft v 2.0 01/06/2006. Available at http://www.abcd-vision.org/issues/Acuity%20Test%20Issues.html. Accessed May 12, 2011.

33. American Academy of Pediatrics. Clinical Pediatric Ophthalmology. Eye Examination Guidelines. 2009. Available at: http://pediatricopthalmology.wordpress.com/2009/05/24/eye-examination-guidelines-aap/. Accessed April 5, 2012.

34. Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents. Well-Child Care Module 3: Screening & Risk Assessment. Vision Screening Methods. Available at: https://www.brightfutures.org/wellchildcare/login/index.php. Accessed April 4, 2012.

35. Missouri Department of Health and Senior Services. *Guidelines for Vision Screening in Missouri Schools*. June 2009. Available at: http://dss.mo.gov/fsd/rsb/childrensvision/vision_screening_guidelines.pdf. Accessed January 12, 2011.

36. Colorado Department of Education. January 2006.*Guidelines for School Vision Screening Programs: Kindergarten through Grade 12.* Available at: http://www.cde.state.co.us/HealthAndWellness/download/nurVisionGuidelines.pdf. Accessed January 12, 2011.

37. Ohio Department of Health. *Vision Screening Guidelines & Requirements. 2007.* Available at: http://www.odh.ohio.gov/en/odhprograms/cfhs/hvscr/requir.aspx. Accessed August 8, 2011.

38. Minnesota Department of Health. *Vision Screening Online Training Program.* Available at: http://www.health.state.mn.us/divs/fh/mch/webcourse/vision/mod7a.cfm. Accessed August 30, 2011.

39. Alaska Blind Child Discovery. Photoscreening. Available at: http://www.abcd-vision.org/vision-screening/photoscreening.html. Accessed May 12, 2011.

40. Proctor S. A Course in Vision Screening for School Nurses. *NASN School Nurse*. November 2009;24(6):255-261.

41. Kimel L. Lack of Follow-up Exams After Failed School Vision Screenings: An Investigation of Contributing Factors. *The Journal of School Nursing.* June 2006;22:156-162.

This publication was produced by the Alaska Department of Health and Social Services and printed at a cost of $4.37 per copy in Anchorage, Alaska.
This cost block is required by AS 44.99.210.

SEAN PARNELL, GOVERNOR
STATE OF ALASKA

WILLIAM J. STREUR, COMMISSIONER
DEPARTMENT OF HEALTH & SOCIAL SERVICES

WARD B. HURLBURT, M.D., MPH
CHIEF MEDICAL OFFICER

KERRE FISHER
ACTING DIRECTOR, DIVISION OF PUBLIC HEALTH

STEPHANIE BIRCH, RN, MPH, MSN, FNP
SECTION CHIEF, SECTION OF WOMEN'S, CHILDREN'S, & FAMILY HEALTH