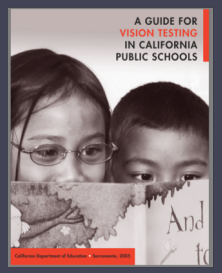
Vision Screening



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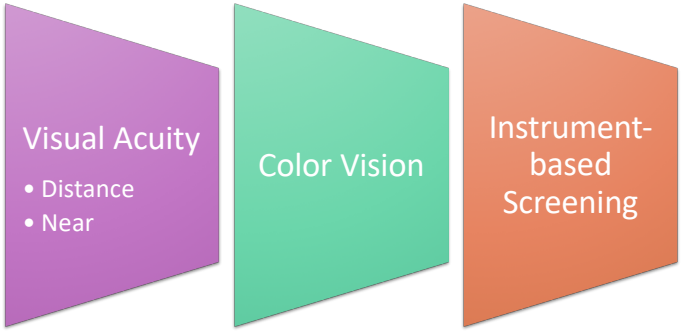
No financial interests in materials or methods presented

Vision Screening



Visual Acuity Screening

- Education Code - 49455: Vision Appraisal
  - Kindergarten and grades 2, 5 and 8
  - First entry in a CA school district at an elementary school
    - If first entry in grades 4 or 7, then not required the following year
- Distance VA screening recommended for preschoolers starting at age 3 (AAPOS, AAP, AAO, National Center for Children's Vision and Eye Health)

What does Visual Acuity tell us?

- VA tells us how clearly can someone see a chart
  - Just because VA is poor does not mean that the child needs glasses
  - Just because VA is good does not mean that the child does not need glasses

Chart Design

Snellen Chart

Sloan Letters Folding Eye Chart

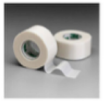
	Snellen	Sloan
Optotypes as equal in legibility as possible	No	Yes
Equal number of optotypes per line	No	Yes
Equal spacing between optotypes	No	Yes

Distance Vision Charts

Examples of evidence-based charts that follow the guidelines				
EyE Check Screener with LEA SYMBOLS®	LEA SYMBOLS®	HOTV	LEA NUMBERS®	Sloan Letters
				
Matching cards can be used as needed				
Preschool	**Kinder - Grade 1**		Grades 2 - 12	

Occluders

- Ensure complete occlusion
- No peeking!
- Don't use…
  - Hand, tissue, cups

Examples of acceptable occluder options				
Adhesive Eye Patch	2-in Hypoallergenic Surgical Tape	Occluder Glasses	Paddle Occluder	Mask Occluder
				
Preschool - Grade 1			Grades 2-12	
• Use the same patch / tape to occlude each eye of an individual student (unless the student has an apparent eye infection) • Use a new patch / tape for each student		• Clean occluder / occluder glasses between students with 70% isopropyl alcohol • Tip: have more than one occluder for each screener to allow alcohol to dry fully between students		

Position of Chart and Student

- Students waiting should not see chart or hear responses of another student
- Place chart at approximately eye level
- Measure and mark distance with tape
  - 10-foot distance (better captures attention)
  - If preschooler, then 5-foot distance
- Stand with the measurement line midfoot

Screening Procedure

- Glasses on if normally worn for distance
- Right eye first (occlude left eye)
- Ensure there is NO peeking, squinting, leaning forward, turning of the head, etc
- Encourage the student to guess if unsure
  - Don't provide sample answers
  - Don't coach the student
  - Don't rush the student

Screening Procedure

Critical Line Screening

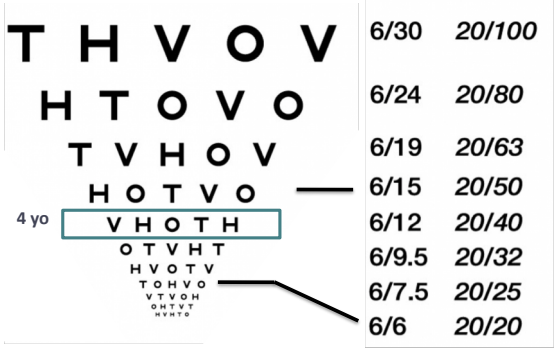
- Uses only the line in which the child should correctly identify 3 out of 5 optotypes according to their age
- Pro: Faster to administer

Threshold Screening

- Involves moving down the chart until the child misses 3 of 5 optotypes
- Pro: Able to detect a 2-line or more difference between the eyes

Preschool, TK
- Critical Line Screening -

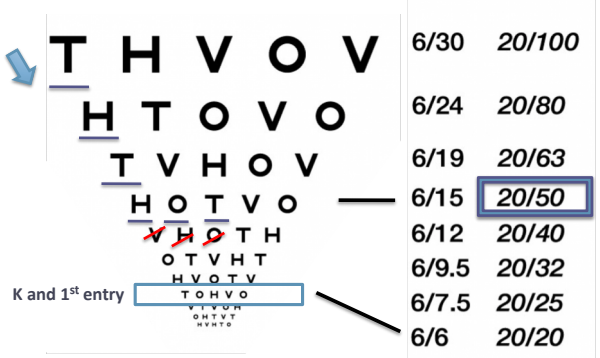
- Use a matching card
- Familiarize the student with optotypes
- Have the student identify optotypes across the critical line
  - 3 year olds: Use 20/50 critical line
  - 4 year olds: Use 20/40 critical line
- Must correctly identify ≥ 3 out of 5 optotypes to pass
- No further testing is necessary if unable to pass the critical line



$$\frac{\text{Test Distance (ft)}}{\text{Letter Size}} \quad \frac{10}{25} = \frac{20}{50}$$

K and First Entry
- Threshold Screening -

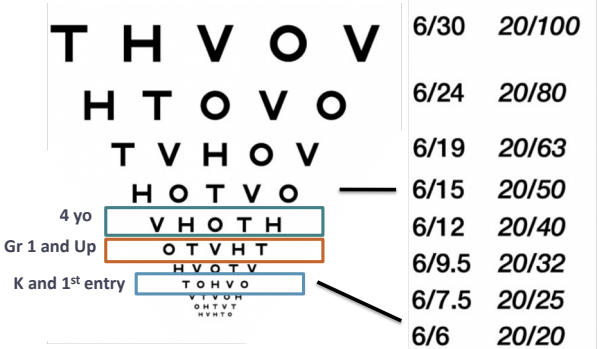
- Use a matching card if needed
- Start with the top line and ask the student to identify the first letter from each line until the student misses a letter
- If the student misses a letter on a line, go to the line above and ask the student to identify optotypes across the line
- The last line on which the student correctly identifies 3 of 5 optotypes is the visual acuity value
- Attempt to screen to the 20/20 line



$$\frac{\text{Test Distance (ft)}}{\text{Letter Size}} \quad \frac{10}{25} = \frac{20}{50}$$

Grades 1 and up
(Critical Line Screening)

- Familiarize the student with optotypes by having the student identify optotypes on the top line, if needed
- Have the student identify optotypes across the 20/32 critical line
- The student must correctly identify at least 3 out of 5 optotypes to pass the critical line
- No further testing is necessary if the student is unable to pass the critical line



$$\frac{\text{Test Distance (ft)}}{\text{Letter Size}} \quad \frac{10}{25} = \frac{20}{50}$$

Referral Criteria

- CA Code or Regulations 594

Group	Referral Criteria
< 6 years old	20/50 or worse in either eye
≥ 6 years old	20/40 or worse in either eye
All children	A difference of VA between the two eyes of ≥ 2 lines

Referral Criteria

- Recommendations from the vision screening task force

Group	Referral Criteria
Preschool (Age 3)	20/60 or worse in either eye
Preschool / TK (Age 4)	20/50 or worse in either eye
TK/K (Age 5)	20/40 or worse in either eye
Grades 1 and up	20/40 or worse in either eye
All age groups	≥2 line difference between eyes (e.g., 20/20, 20/32), if conducting threshold screening

Visual Acuity Screening

- Education Code - 49455: Vision Appraisal
  - Kindergarten or upon first entry in a CA school district at an elementary school and grades 2, 5 and 8
  - If first entry in grades 4 or 7, then not required the following year
  - The appraisal should include tests for visual acuity, including near vision, and color vison; ….”

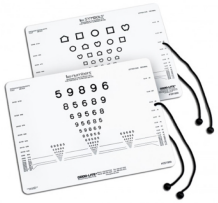
Near Visual Acuity

- Age-appropriate near vision cards that meet guidelines for distance vision charts
- Cards with an attached string are preferred to help maintain test distance of 16 in (40 cm)

Referral Criteria

- Refer if the student is unable to pass the 20/32 line with both eyes open

Near Vision Charts

Examples of charts that follow the above guidelines		
LEA SYMBOLS® LEA NUMBERS®	HOTV	Sloan Letters
		
TK/K - Grade 1		Grades 2 - 12

TK / K / Grades 1 and up (Critical Line Screening)

- Glasses on if normally worn for near
- Screen with both eyes open
- Familiarize the student with optotypes, if needed
- Ask the student to identify optotypes on the 20/32 critical line
- Must correctly identify ≥ 3 out of 5 optotypes to pass
- No further testing is necessary if unable to pass the critical line

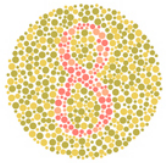
Color Vision Screening

- Education Code – 49455: Vision Appraisal
  - Once and only on male student
  - Need not begin until the male student has reached the first grade
- Early screening recommended

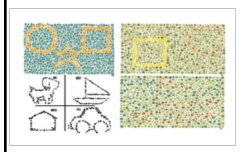
Why evaluate color vision?

- May not be aware of color vision deficiency
- Learn to see the "right color"
- Early detection is vital because many early childhood learning materials rely on color perception or color coding

Color Vision Evaluation



- Pseudoisochromatic plate test
  - Dots of similar color form a **figure** am **background** of dots of another color



Color Vision Test Made Easy

Color Check Complete Vision Screener

Color Dx Pediatric

Preschool, TK/K, First Grade

- Both eyes open
- Use clean, soft paint brush or cotton swab to point/trace targets
- Do NOT allow use of fingers to trace
- Follow the manufacturer's instructions regarding procedures for screening & scoring

Referral Criteria

- No referral needed
- Inform the parents of failed results
- Advise to consult with their eye care specialist for additional information on color vision deficiency
- Inform teachers to adjust educational materials requiring color discrimination

Instrument-Based Screening

Photoscreening

Autorefraction

Vision Appraisal

- Amendments
  - A child's vision may be appraised by using an eye chart or any scientifically validated photoscreening test

Assembly Bill No. 1840

Photoscreening tests shall be performed, under an agreement with, or the supervision of, an optometrist or ophthalmologist, by the school nurse or a trained individual who meets requirements established by the department.

Instrument-Based Screening

- Estimates refractive error and sometimes strabismus
- Does NOT measure visual acuity
- CANNOT convert refractive error value to visual acuity

Myopia		Hyperopia			
Nearsighted		*Farsighted*			
Minus (-) Sphere		Plus (+) Sphere		Plus (+) Sphere	
Ages: All	Estimated Visual Acuity	*Ages: 5y to 15y*	*Ages: 16y to 35y*	*Ages: 45y to 55y*	Estimated Visual Acuity
-0.5	20/30-	+2.00	+1.25	+1.00	20/20
-0.75	20/5	+3.0	+1.75	+1.25	20/25
-1	20/60		+2.50	+1.50	20/30
-1.25	20/70		+3.00	+1.75	20/40
-1.5	20/100			+2.00	20/50
-2.5	20/200			+2.50	20/70

https://www.reddingmedical.com/documents/Spot%20VS100%20Vision%20Screener,%20Conversion%20Chart%20&%20Instructions.pdf

Instrument-Based Screening

- Quick and requires minimal cooperation, thus may be useful in young children, non-cooperative or non-verbal children
- Distance visual acuity still considered the preferred method

Photoscreener devices

- Infrared camera to capture images of the red reflex
- Screen for…..
  - Strabismus
  - Media opacities
  - Significant refractive errors
  - Anisocoria (unequal pupil size)

PlusOptix

Spot

Autorefractors

- Sensors that detect reflections from a cone of infrared light
- Reflections are used to determine the size and shape of a ring in the retina
- Estimate refractive error

Sure Sight

Keep in mind…..

- Pupil size must be at least 4mm
- Dark room with lights off
- Student's pupils should be level
- High refractive errors may exceed measurement range of the instrument
  - e.g. Spot Vision Screener: myopia of 6D to hyperopia of 4D

Referral Criteria

- Keep in mind…
  - Different cutoff criteria for children vs. adults
  - Cutoff for clinically significant refractive error varies with age (infants, preschoolers, school-age students)
- Refer to manufacturer's age-appropriate referral criteria
- Refer if unable to obtain results after 3 attempts (most likely due to out of range refractive error)

What Does the Evidence Say?

- Most instruments lack high-quality published data
- Many different instruments; results published in the literature for one system are not necessarily valid for others
- Difficult to compare instruments because different criteria used
- Quick and requires minimal cooperation, thus may be useful in young, non-cooperative or non-verbal children

Special circumstances…

- Young children, children with special needs, non-verbal, non-English speaking
  - Have familiar faces present during screening
  - Conduct screening like a "game"
    - Avoid terms like "testing", "examination"
  - Same tests, just presented differently
    - Matching during VA, etc
  - Allot appropriate amount of time

Suspected eye disorder…

Signs	Symptoms
▪ Eye turns in or out at any time ▪ Pupils or eyes appear to be different sizes ▪ Red eyes and/or swollen eyelids ▪ Excessive tearing ▪ Droopy eyelids ▪ Discharge from the eyes ▪ Holds reading materials close to face ▪ Frequent eye rubbing ▪ Excessive blinking ▪ Squints, closes, or covers one eye ▪ Squints to see board or far away ▪ Loses place when reading ▪ Uses finger or marker to keep place when reading ▪ Frequently omits words or lines when reading or copying from the board ▪ Abnormal head turn or head tilt	• Double vision • Blurry vision • Difficulty seeing small print • Tired eyes when doing close work or reading • Headaches when doing close work or reading • Words appear to move or swim on the page when reading

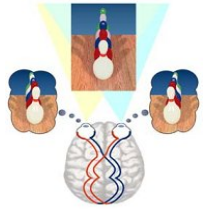
Optional Tests

Stereopsis

Near Point of Convergence

Stereopsis

- 3D vision
- Measure of binocular vision / eye teaming function
- If no stereopsis…..
  - Strabismus?
  - Amblyopia?
  - Pathology?
  - Cooperation?



Who?

- Preschool to Grade 12

Room Requirement

- Relatively quiet
- Normal lighting

Pass Stereotest 2

- 4 cards
  - Card A: Demonstration card
  - Card B: 480” for preschool & TK
  - Card C: 240” for K through grade 12
  - Blank Card

Measured in seconds of arc (smaller number = better stereopsis)

Preschool & TK

- Glasses on if student normally wears glasses
- Wear the polarized glasses
- Hold cards at 16 inches
- Tilt cards back slightly towards the screener
- Show demo card & blank card and ask student to point to the card with smiley face
- Show **card B** & blank card and ask student to point to the smiley face
- Shuffle cards behind your back to change position of smiley face and present again
- Repeat 5 times

K to Grade 12

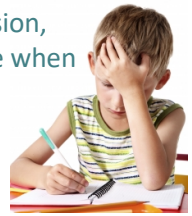
- Glasses on if student normally wears glasses
- Wear the polarized glasses
- Hold cards at 16 inches
- Tilt cards back slightly towards the screener
- Show demo card & blank card and ask student to point to the card with smiley face
- Show **card C** & blank card and ask student to point to the smiley face
- Shuffle cards behind your back to change position of smiley face and present again
- Repeat 5 times

Referral Criteria

- Preschool/TK (age 3 to 4 years)
  - Unable to identify card B at least 4/5 presentations
- K-Grade 12 (age ≥ 5 years)
  - Unable to identify card C at least 4/5 presentations
- Refer any student who is unable to identify demo card

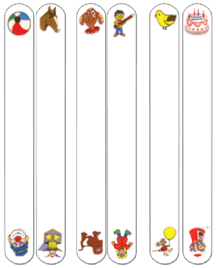
Near Point of Convergence

- Evaluate student's ability to converge their eyes to a near target
- Screen for eye teaming problems like convergence insufficiency
  - Possible symptoms include double vision, headaches, eye strain, or loss of place when reading



Who?

- Grade 1 to 12



Room Requirement

- Relatively quiet
- Normal lighting

Referral Criteria

- Break point is ≥ 2.5 inches (6 cm)

1st to 12th Grade

- Glasses on if student normally wears glasses for reading or near work
- Both eyes open
- Hold fixation target approx 16 inches away from eyes
- "Focus on this target and keep it one as long as you can, but tell me if it becomes two"
- Slowly move target toward student's eyes until student sees two or screener observes a loss of fusion (one eye moves outward)

- If double, ask "does it stays two or does it go back to one?"
- If target becomes one within 1-2 seconds, continue moving target towards student's eyes until the target becomes double and stays double
- Measure distance from temple near the eye to the point where target stays double (break point)