Paediatric eye care reference guide

From the Optometry Australia Clinical Practice Guide for Paediatric Optometry

Optometry AUSTRALIA

Table 1 outlines the potential components of a comprehensive vision and eye health examination for different age categories. It is recommended that each consultation is tailored to suit the needs of the individual child. Factors to consider include their ability to comprehend and undertake tests as well as clinical need based on presentation and symptoms.

Table 1: Standard Testing Protocol by Age

Test/Procedure	Birth - 2 years, 11 months	3 years - 6 years, 11 months	7-14 years
Patient History	Parent	Parent/Child	Parent/Child

Visual Acuity	• Fixation Preference
	• Preferential Looking Test:
	  - Teller Acuity Cards
	  - Lea Paddles
	• Patti Pics
	• Lea Chart
	• Cardiff Cards
	• OKN Drum
		• Lea Chart at 3m
		• Patti Pics at 3m
		• Snellen Chart at 6m
		• Broken Wheel Test
			• Snellen Chart at 6m

Refraction	• Static (Dry) Retinoscopy • Cycloplegic Retinoscopy • Mohindra Retinoscopy	• Static (Dry) Retinoscopy • Cycloplegic Retinoscopy • Mohindra Retinoscopy • Topography	• Static (Dry) Retinoscopy • Cycloplegic Retinoscopy • Subjective Refraction • Blur Function • Topography
Binocular Vision Testing	• Cover Test • Hirschberg Test • Krimsky Test • Bruckner Test • Ocular Excursions • Near Point of Convergence • Dolls eye reflex • Vestibulo-ocular reflex (VOR) • Worth 4 Dot	• Cover test • Hirschberg/Bruckner • Ocular Excursions • Near Point of Convergence • Monocular estimation method (MEM) retinoscopy • Objective fusional vergence • Distance and Near Phoria Measurement • Near Point of Accommodation • Worth 4 Dot	• Cover test at distance and near • Ocular Excursions • Near Point of Convergence • Monocular estimate method (MEM) retinoscopy • Near Point of Accommodation – monocularly • Positive and negative fusional vergences • Positive and negative relative accommodation • Accommodative convergence/accommodation (AC/A) ratio • Accommodative facility • Vergence Facility • Distance and Near Phoria Measurement • Worth 4 Dot
Stereopsis	• Lang I & II • Titmus Fly • Randot Stereo Test • Frisby Test • TNO Stereo Test • Stereo Smile Stereoacuity II Test • Randot Preschool Stereoacuity Test	• Lang I & II • Titmus Fly • Randot Stereo Test • Frisby Test • TNO Stereo Test • Stereo Smile Stereoacuity II Test • Randot Preschool Stereoacuity Test	• Lang I & II • Titmus Fly • Random Dot Stereogram • Frisby Test • TNO Stereo Test • Stereo Smile Stereoacuity II Test
Colour Vision Assessment	• Ishihara • Colour Vision Testing Made Easy • City University Colour Vision		
Ocular Health Assessment	• Gross inspection of the external features, including lid anatomy • Assessment of Pupillary Responses • Assessment of the Anterior Segment • Assessment of the Posterior Segment • IOP where clinically indicated • Topography where clinically indicated		

Table 2 (taken from Fricke T, Dinardo C. *Vision Therapy Guidelines for Visual Efficiency 2014*) provides standard testing protocols and a guide to clinical normative values for accomodation and vergence parameters.

Table 2. Guide to Clinical Normative Values for Accommodation and Vergence Parameters

Parameter	Vergence Test	Normative Value	Accommodation Test	Normative Value
Posture	Near Phoria Distance Phoria	3 pd exo ± 4[1] 1 pd exo ± 1[2]	Near Retinoscopy	+0.50DS ± 0.25
Amplitude	Near point of convergence (NPC): Break Recovery	≤ 5cm ≤ 7cm[4]	Near Point of Accommodation	≥ 15D – 0.25 (age)[5]
Range	Near Base In Near Base Out Distance Base In Distance Base Out	≥ 10/16/10 ≥ 12/18/11 ≥ 7/4 ≥ 14/7[6]	Relative Accommodation	±2.00 D at near -2.00 D at distance[5]
Facility	3pd BI/12pd BO flipper[7]	15 cycles per minute at near	± 1.00 D Flipper ± 2.00 D Flipper	8 cycles per minute at near with ±2.00 D flipper[8]
Interaction	AC/C Ratio 2.2pd/D ± 0.8 (consider ratio to + and – lenses separately)[9]			

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2. Dwyer PS. Clinical criteria for vergence accommodation dysfunction. *Clin Exp Optom* 1991; 74: 112-119.
3. Rouse MW, London R, Allen DC. An evaluation of the Monocular Estimate Method of dynamic retinoscopy. *Am J Optom Physiol Optics* 1982; 59: 234-39.
4. Maples W, Hoenes R. Near Point of Convergence Norms measured in elementary school children. *Optom Vis Sci* 2007; 84: 224-228
5. Hofstetter HW. A comparison of Duane's and Donder's tables of the amplitude of accommodation. *Am J Optom Arch Am Acad Optom* 1944; 21: 345-63.
6. Wesson MD, Amos JF. Norms for hand held rotary prism vergence. *Am J Optom Physiol Optics* 1985; 62: 88-94.
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8. McKenzie KM, Kerr SR, Rouse MW et al. Study of accommodative facility testing reliability. *Am J Optom Physiol Optics* 1987; 64: 186-94.
9. Jimenez R, Perez M, Garcia J et al. Statistical Normal Values of Visual Parameters that Characterize Binocular Function in Children. *Ophthal Physiol Opt* 2004; 24: 528-542.

Table 3. Normative visual acuity by age (Taken from Pan Y, Tarczy-Hornoch K, Cotter S, Wen G, Borchert M, Azen S, Varma R. Visual Acuity Norms in Pre-School Children: The Multi-Ethnic Pediatric Eye Disease Study. Optometry and Vision Science. Vol 86. No 6. June 2009.

Table 3: Mean visual acuity by age

Age (months)	Age (years)	Snellen Visual Acuity
30-35 months	2.5 - 3	6/19
36-47 months	3 – 4	6/15
48-59 months	4 – 5	6/12
60-72 months	5 – 6	6/9.5

Clinical Pearls for cycloplegia

• For children less than 6 months of age a concentration of 0.5% Cyclopentolate Hydrochloride is recommended while 1% is recommended for children older than 6 months.[9]

• It is particularly important that over-dosage is avoided in children with Down syndrome, cerebral palsy and other CNS disorders in whom there may be an increased reaction to cycloplegic agents.[10] In these cases, Tropicamide (1%) may be used as the dilating agent

• Retinoscopy should be performed 30-45 minutes after administration of eye drops.[9] An appropriate distance target should be used to control fixation and any remaining accommodation