

CHC-organized and non-CHC-organized key math research synthesis CHC “cross-walk” summary table

Type of source*	Research group or source	Abilities described as important for math (by source)	CHC cross-walk CHC classifications	
			Broad CHC Ability	Narrow CHC Ability
A	Fiorello et al .	Processing speed	Gs	**
A	Floyd et al.	Processing speed	Gs	**
A	Flanagan et al.	Processing speed; perceptual speed	Gs	Perceptual Speed (P)
D	McGrew (2008)	Processing speed; perceptual speed	Gs	Perceptual Speed (P)
B	Fuchs et al.	Processing speed; efficiency with which simple cognitive tasks are executed	Gs	Perceptual Speed (P)
D	McGrew (2008)	Processing speed; perceptual speed	Gs	Perceptual Speed (P)
B	Geary et al.	Speed of processing; speed of information processing; counting speed; consistency in speed of executing processes	Gs	Number Facility (N)
C	Swanson & Jerman (2006)	Numerical processing	Gs	Number Facility (N)
A	Floyd et al.	Short-term memory	Gsm	**
A	Flanagan et al.	Working memory; memory span	Gsm	Memory Span (MS) Working Memory (MW)
A	Osman et al. (2006)	Short-term memory; working memory	Gsm	Memory Span (MS) Working Memory (MW)
D	McGrew (2008)	Working memory; memory span	Gsm	Memory Span (MS) Working Memory (MW)
B	Berninger et al	Short-term memory; working memory	Gsm	Memory Span (MS) Working Memory (MW)
B	Fuchs et al.	Short-term memory; working memory	Gsm	Memory Span (MS) Working Memory (MW)
B	Rourke et al.	Auditory memory	Gsm	Memory Span (MS)
B	Geary et al.	Memory span; working memory	Gsm	Memory Span (MS) Working Memory (MW)
C	Swanson & Jerman (2006)	Verbal working memory; short-term memory for words	Gsm	Memory Span (MS) Working Memory (MW)

* Type of source key: At end of table document.

** Source focused primarily on the broad CHC domains. Insufficient discussion at the narrow ability level to allow for accurate classification of narrow CHC abilities.

Bold font designates literature synthesis of CHC-organized/designed primary studies

A	Fiorello et al.	Long-term retrieval	Glr	**
A	Floyd et al.	Long-term retrieval	Glr	**
A	Osman et al. (2006)	Long-term memory; semantic retrieval	Glr	Associative Memory (MA)
B	Geary et al.	Retrieval of math facts from long-term semantic memory; memorization of basic math facts; long term memories; difficulty forming or accessing long-term memory representations of facts	Glr	Associative Memory (MA)
D	McGrew (2008)	Naming facility	Glr	Naming Facility
B	Fuchs et al.	Long-term memory; automatic retrieval from long-term memory; semantic retrieval fluency	Glr	Ideational Fluency (FI)
D	McGrew (2008)	Meaningful memory	Glr	Meaningful Memory (MM)
B	Rourke et al.	Verbatim memory	Glr	?
D	McGrew (2008)	Phonetic coding	Ga	Phonetic Coding (PC)
B	Fuchs et al.	Phonological processing; encoding and maintaining phonological representations of terms and operators in working memory	Ga	Phonetic Coding (PC)
B	Rourke et al.	Auditory perception, attention; linguistic phonology	Ga	Phonetic Coding (PC)
C	Swanson & Jerman (2006)	Phonological short-term memory representations	Ga	Phonetic Coding (PC)
B	Berninger et al.	Temporal processing	Ga	Temporal Tracking (UK)
A	Fiorello et al.	Fluid intelligence	Gf	**
A	Floyd et al.	Fluid reasoning	Gf	**
A	Osman et al. (2006)	Abstract concept formation; rule generation and hypothesis formation	Gf	Induction (I)
A	Flanagan et al.	Inductive reasoning; general sequential reasoning	Gf	Induction (I) General Sequential Reasoning (RG)
B	Fuchs et al.	Nonverbal problem-solving; concept formation; ability to complete patterns presented visually; fluid intelligence; concept formation	Gf	Induction (I) General Sequential Reasoning (RG)
B	Rourke et al.	Concept formation; problem solving; mathematical reasoning; scientific reasoning	Gf	Induction (I) General Sequential Reasoning (RG) Quantitative Reasoning (RQ)
D	McGrew (2008)	Quantitative reasoning; general sequential reasoning	Gf	Quantitative Reasoning (RQ) General Sequential Reasoning (RG)
B	Berninger et al.	Concrete-operational level of thinking; quantitative reasoning	Gf	Piagetian Reasoning (RP) Quantitative Reasoning (RQ)
B	Geary et al.	Computational strategies; speed of executing computational strategies; fluid intelligence; reasoning; explicit, abstract, and logical problem solving	Gf	Quantitative Reasoning (RQ) Speed of Reasoning (RE)

A	Osman et al. (2006)	Spatial ability	Gv	Spatial Relations (SR) Visualization (Vz)
D	McGrew (2008)	Spatial relations; visualization	Gv	Spatial Relations (SR) Visualization (Vz)
B	Berninger et al.	Visual-spatial reasoning	Gv	Spatial Relations (SR) Visualization (Vz)
B	Fuchs et al.	Visual-spatial working memory	Gv	Visualization (Vz) Visual Memory (MV)
B	Rourke et al.	Visual-spatial; visual perceptual organization; visual perception; visual memory; visual attention	Gv	Spatial Relations (SR) Visualization (Vz) Visual Memory (MV) Imagery (IM)
B	Geary et al.	Spatial representation of numerical information; visual-spatial deficits; visual-spatial systems; spatial representation of number lines; representing visual-spatial information in working memory	Gv	Spatial Relations (SR) Visualization (Vz) Imagery (IM)
C	Swanson & Jerman (2006)	"visual memory; visual spatial working memory; visual/spatial; difficulty representing numerical information spatially	Gv	Spatial Relations (SR) Visualization (Vz) Visual Memory (MV)
A	Fiorello et al.	Crystallized ability;	Gc	**
A	Floyd et al.	Comprehension-knowledge	Gc	**
A	Flanagan et al.	Language development; lexical knowledge; listening ability	Gc	Language Development (LD) Lexical Knowledge (VL) Listening Ability (LS)
D	McGrew (2008)	Language development; lexical knowledge; listening ability; general information	Gc	Language Development (LD) Lexical Knowledge (VL) Listening Ability (LS) General (verbal) Information (K0)
B	Berninger et al	Verbal reasoning	Gc	Language Development (LD) Lexical Knowledge (VL)
B	Fuchs et al	Language ability; vocabulary knowledge	Gc	Listening Ability (LS) Lexical Knowledge (VL) Grammatical Sensitivity (MY)
C	Swanson & Jerman (2006)	Language	Gc	Language Development (LD)
B	Rourke et al.	Verbal reception & repetition, verbal storage, associations, output	Gc	?
B	Rourke et al.	Tactile perception, attention and memory	Gh	?
B	Rourke et al.	Complex and simple psychomotor skills	Gp/Gh	?
B	Berninger et al.	Finger function skills	Gp	?

A	Osman et al. (2006)	Executive functions	EF	Executive Functions
D	McGrew (2008)	Attention/concentration; inhibition; vigilance	EF	Executive Functions
B	Berninger et al	Meta-cognitive system that controls a variety of executive functions' self-monitoring and self-regulation; strategies	EF	Executive Functions
B	Fuchs et al.	Attention; allocating attention; attention shifts; inhibition of irrelevant stimuli; inhibition; controlled attention; attentive behavior	EF	Executive Functions
B	Geary et al.	Executive system deficits; attentional allocation; detecting computational errors; general attention deficits; attentional control inhibition of irrelevant information or previously used behavioral responses; central executive; intrusion of task irrelevant information	EF	Executive Functions
C	Swanson & Jerman (2006)	Sequencing steps in complex procedures; keeping information in working memory; self-correcting errors; executive processing deficits; inhibition; monitoring the counting process	EF	Executive Functions

Key to type of source (in CHC-organized and non-CHC-organized key math research synthesis CHC “cross-walk” summary table)

- **A: CHC-organized secondary source narrative literature synthesis**
 - *Fiorello et al. CHC group*: Fiorello & Primerano (2005)
 - *Flanagan et al. CHC group*: Flanagan et al. (2007)
 - *Floyd et al. CHC group*: Floyd et al. (2003); Floyd et al. (2005)

- **B: Non-CHC-organized secondary source narrative literature synthesis**
 - *Berninger et al. group*: Berninger et al (2001)
 - *Fuchs et al. group*: Fuchs et al. (2006); Fuchs et al. (2008)
 - *Rourke et al. MD/NVLD group*: Rourke et al. (1997)
 - *Geary et al. group*: Geary (1993), 2003, 2007)

- **C: Non-CHC-organized secondary source meta-analytic (empirical) literature synthesis**
 - *“Math disabilities” meta-analysis*: Swanson and Jerman (2006)

- **D: CHC-organized secondary source meta-analytic (empirical) literature synthesis**
 - *Cattell - Horn - Carroll (CHC) Cognitive Abilities-Achievement Meta-Analysis*: McGrew (2008)

Note: All references, including access to pdf copies of most articles, can be accessed via **IQ’s Corner Blog** (www.intelligencetesting.blogspot.com) and clicking on “**CHC & Math**” under “**IQs Corner Information**” section. This will also provide access to a clickable Mind Map organization of the information summarized in the above table.