Cognitive Verbs Used in Mathematics Instructional Data Statements

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The *Primary Grades Instructional Data* statements are written very specifically to reflect the content/skills, cognitive rigor, and the context of an item or items. The verbs used in the *Primary Grades Instructional Data* statements represent the cognitive rigor within the item(s). The chart below, based on the revised Bloom's Taxonomy,[1] describes the correlation of the verbs used in *Primary Grades Instructional Data* statements to the cognitive dimension.[2]

	Remember	Understand	Apply	Analyze	Evaluate	Create
Problem Solving		Represents		Analyzes Selects Solves		
Number Sense	Counts Counts on Identifies Recognizes	Compares Finds Illustrates Infers Interprets Matches Orders Represents Understands	Rounds	Selects		
Computation		Represents	Determines Estimates	Solves		
Measurement and Geometry	Identifies Names	Compares Classifies Exemplifies Finds Illustrates Orders Reads Represents Sorts Understands	Determines Estimates Measures	Selects Solves Decomposes/ Composes		
Statistics and Probability	Identifies	Exemplifies Finds Infers Interprets Predicts Represents Sorts Summarizes Understands	Applies	Selects		
Algebra		Explains Illustrates Infers Interprets Matches Represents	Determines Extends	Selects Solves		

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These cognitive verbs are provided to assist the teacher in understanding the intentional use of verbs in the *Primary Grades Instructional Data* statements. They only reflect the calibrated items. No items that use the cognitive dimension "evaluate" have been calibrated at this time. With additional item types, and additional calibrated items, NWEA will continue to add to this list.

It is important for teachers to recognize that learning initial mathematical concepts does not mean that students only work at the "remember" and "understand" cognitive levels. NWEA's items assess mathematical skills and knowledge across the full range of cognitive categories.

Cognitive Processes	Cognitive Verb	Definition or Examples
Remember "Retrieve relevant knowledge from long-term memory"[3]	Counts	Uses one-to-one correspondence (moving specific number of items) or reciting numbers in order beginning with the smallest whole number, often memorized (e.g., count to 10, beginning with 1; count by 2's beginning with 2)
	Counts on	Recites numbers in order, beginning with a number that is not the smallest whole number (e.g., counts on by 1's from 34; counts on by 2's from 16; counts on by 2's from 17)
	Identifies	Recognizes the mathematical concept using long-term memory (e.g., a title of a graph; the number immediately after a given number)
	Names	Identifies the mathematical term for a given object (e.g., triangle, cylinder)
	Recognizes	Identifies the number word for a number or the numeral for a number word (e.g., two is the number word for 2)
Understand "Construct meaning from instructional messages, including oral, written, and graphic communication"[4]	Compares	Compares two objects, numbers, or situations according to magnitude, using either words or symbols (e.g., larger, more, hotter, greater, >, <, =)
	Classifies	Chooses the appropriate objects or numbers for a specified classification (e.g., chooses the object that has line symmetry)
	Exemplifies	Gives an example in either numerical or word form (e.g., odd number; response 3)
	Explains	Describes the effect of a given situation or describes a procedure using words (e.g., "ice melts when it is very hot" or "to add 54 + 78, add 50 + 70, add 4 + 8, then add 120 + 12")
	Finds	Isolates the incorrect example (e.g., "Which does not show 3?")
	Illustrates	Gives an example in pictorial form (e.g., odd number of objects: response [] [] [])
	Infers	Draws a logical conclusion (e.g., the rule for a pattern)

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Understand (continued)	Interprets	Understands the meaning of a mathematical concept to identify a number or object (e.g., interprets a number line to choose a number that corresponds to a given position)
	Matches	Chooses an equivalent representation (e.g., three blocks shown horizontally is the same number of blocks as three blocks shown vertically)
	Orders	Arranges three or more objects or numbers in ascending or descending order (e.g., order the numbers 4, 8, 2 from smallest to largest)
	Predicts	Draws a logical conclusion about what may happen in the future (e.g., probability- certain, likely, impossible)
	Reads	Determines the magnitude when a picture of a measuring tool is given (e.g., determines the length of a picture of an object when a picture of a ruler is placed beside the object or determines the temperature from a picture of a thermometer)
	Represents	Understands different ways of showing equivalent concepts (e.g., represents a fraction using a diagram or represents a story problem using an equation)
	Sorts	Moves pictures of objects into categories (e.g., sorts big and little balls)
	Summarizes	Generalizes the data in a graph, chart, or table to determine an appropriate title
	Understands	Knows the meaning of a concept to give a mathematical answer (e.g., knows days of week to identify tomorrow; knows meaning of addition to identify the + symbol in an equation)
Apply "Carry out or use a procedure in a given situation"[5] (The procedure may have been taught or invented by the student.)	Applies	Uses a procedure or rule (e.g., applies the rule to create a pattern)
	Determines	Figures out the answer, using whatever strategy or procedure the student prefers (e.g., the sum of 6 + 5 is 11)
	Estimates	Determines an approximate answer based on rules of rounding (e.g., approximate sum of 31 and 52)
	Extends	After inferring the rule, continues a repeating or growing pattern (e.g., [] [] o o [] [] o o [] [] o o, what comes next?)
	Measures	Uses a manipulative to determine the length of a picture of an object (e.g., moves a picture of a ruler to determine length of a picture of a pencil)
	Rounds	Applies the rules for approximation (e.g., 18 is closer to 20 than to 10)

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Cognitive Processes	Cognitive Verb	Definition or Examples
Analyze "Break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose"[6]	Analyzes	Reviews given information to select an appropriate organization or procedure (e.g., select two categories that could be used to sort a given selection of objects)
	Decomposes/ Composes	Rewrites a number or expression using smaller quantities and then groups the decomposed numbers to make computation easier e.g., 54 + 23 = 50 + 4 + 20 + 3 = 50 + 20 + 4 + 3 = 70 + 7 = 77
	Selects	Distinguishes relevant from irrelevant information (e.g., selects the information needed to solve a story problem or selects an appropriate strategy)
	Solves	Distinguishes relevant from irrelevant information, determines appropriate procedure, and applies procedure (e.g., solves a story problem)
Evaluate "Make judgments based on criteria and standards"[7]		
Create "Put elements together to form a coherent or functional whole; reorganize elements into a new pattern or structure"[9]		

For purposes of classification, NWEA has made the following decisions:

- In Number Sense, "identifies" is used when different strategies may be used to determine the number of objects in a set. For example, how many hearts? ♥♥♥ Students may count or subitize (perceiving an amount without needing to count.)

- All items where a student is asked to find an answer to a computation calculation are classified as "determines." We do not know which strategy the student will choose to use. For example, some students may add; some may count on; some may draw pictures and then count.

1, 3, 4, 5, 6, 7, 9 Lorin W. Anderson, David R. Krathwohl, et al., eds. A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. New York: Longman, 2001.

2 NWEA has classified the cognitive verbs with the *Primary Grades Instructional Data* statements to the cognitive framework of the revised Bloom's Taxonomy. This includes the use of verbs tailored to their appropriate use in each subject area. "There has always been and remains to this day an expectation that the Taxonomy would be adapted as educators in different fields used it, as education changes, and as new knowledge provided a basis for change." (Anderson, p. xxciii).

8 In the *MAP for Primary Grades* Mathematics test, students do manipulate shapes to create new shapes. This is closest to the cognitive dimension of Create, but not fully the ability to construct and create as an independent response.

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Cognitive Verbs Used in Reading Instructional Data Statements

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	Remember	Understand	Apply	Analyze	Evaluate	Create
Phonological Awareness	Identifies	Classifies Compares Exemplifies Matches Sorts	Blends	Deletes Distinguishes Finds Substitutes		
Phonics	Identifies Recognizes	Classifies Compares Matches		Deletes Finds Selects		
Concepts of Print	Identifies Recognizes	Classifies Infers Interprets Matches		Alphabetizes Discriminates Finds Selects	Evaluates	
Vocabulary and Word Structure	Identifies	Matches Infers	Uses	Discriminates Finds Selects		
Comprehension	Identifies Recognizes	Classifies Compares Infers Interprets Locates Matches Predicts		Distinguishes Finds		
Writing	Identifies Recognizes	Classifies Infers Locates Matches Sorts	Demonstrates Spells Uses	Finds Substitutes Selects	Edits Evaluates Detects Judges	Creates

These cognitive verbs are provided to assist the teacher in understanding the intentional use of verbs in the *Primary Grades Instructional Data* statements. They only reflect the calibrated items at this time. With additional item types, and additional calibrated items, NWEA will continue to add to this list.

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Cognitive Verbs Used in Reading Instructional Data Statements

It is important for teachers to recognize that learning initial reading and writing concepts does not mean that students only work at the "remember" and "understand" cognitive levels. NWEA's items assess reading and writing skills and knowledge across the full range of cognitive categories.

Cognitive Processes	Cognitive Verb	Definition or Examples
Remember "Retrieve relevant knowledge from long-term memory"[3]	Identifies	Locates knowledge from long-term memory that is consistent with presented material (e.g., letter o is a vowel; the picture on a page; the number of words in a sentence; word meanings based on given definitions; contraction of given words)
	Recognizes	Visually remembers or recalls the correct form or order (e.g., letters; order of the alphabet)
Understand "Construct meaning from instructional messages, including oral, written, and graphic communication"[4]	Classifies	Determines that something belongs to a category (e.g., picture words with the same beginning sound)
	Compares	Understands the relationship among multiple corresponding ideas, concepts, or examples
	Exemplifies	Finds a specific example or illustration of a concept or principle (e.g., blending sounds that represent a picture)
	Infers	Draws a logical conclusion based on presented material
	Interprets	Understands the meaning of a component within a word (e.g., root) to translate that meaning to a given example
	Locates	Finds a specific example or illustration of a concept or principle (e.g., writing topic for a writing web; map feature using a map key)
	Matches	Understands the relationship between two corresponding ideas or concepts (e.g., letters and sounds; words and picture words; colors and color words)
	Predicts	Infers a future conclusion based on details and evidence in literary or informative text or based on details in a picture or illustration
	Sorts	Organizes and arranges multiple examples that belong to a category or classification
Apply "Carry out or use a procedure in a given situation"[5]	Blends	Combines sounds to form words
	Demonstrates	Shows knowledge to about a familiar task (e.g., meaning of prepositional phrase)
	Spells	Manipulates letters and their associated sounds to spell words
	Uses	Applies a procedure (e.g. placing a punctuation mark in the appropriate place)

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Cognitive Processes	Cognitive Verb	Definition or Examples
Analyze "Break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose"[6]	Alphabetizes	Determines how words or letters fit within a structure when organizing words/letters in alphabetical order
	Deletes	Removes a sound or sounds to create a new word (e.g., cat into at)
	Discriminates	Differentiates visually or auditorally based on the component parts of the presented material (e.g., visually discriminating words or letters that are the same)
	Distinguishes	Determines examples and non-examples based on the component parts within a structure (e.g., fact versus opinion)
	Finds	Determines how component parts fit within a given structure (e.g., dividing a word into syllables)
	Selects	Analyzes from multiple examples to distinguish based on components parts of presented material (e.g., number of syllables in a word; sentences that use spaces between words correctly)
	Substitutes	Replaces a letter and/or sound in a word to form a new word or representation of a word (i.e., picture word)
Evaluate "Make judgments based on criteria and standards"[7]	Detects	Checking for inconsistencies within a process (e.g., is the sentence written correctly)
	Edits	Applies given criteria or standards to correct or incorrect examples in presented material
	Evaluates	Chooses based on given criteria
	Judges	Determines the appropriateness of an example for a specific purpose
	Creates	Manipulates and orders words or text to create a sentence

1, 3, 4, 5, 6, 7, 9 Lorin W. Anderson, David R. Krathwohl, et al., eds. A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. New York: Longman, 2001.

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8 In the MAP for Primary Grades Reading tests, students do manipulate words to create new words or sentences. With item functionality, students create within a given structure. This is closest to the cognitive dimension of Create, but not fully the ability to construct and create as an independent response.

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