Mathematical Understanding Scale
Grades 3-5

Note: The descriptors for each level identify many of the key indicators that a student is developing mathematical understanding. Judgments about student placement on a level are to be based on overall attainment, not on a point-by-point check off.

Level 4	Level 5	Level 6	Level 7	Level 8
Knows most basic facts and uses them to solve addition and subtraction problems. Beginning to use place value and decomposition of two digit numbers to solve multi-digit addition and subtraction problems. Can model simple multiplication and division situations and represent them with number sentences.	Uses place value and decomposes two and three digit numbers flexibly to solve addition and subtraction problems. Knows many multiplication facts and uses them to solve problems involving multiplication and division. Understands and uses common fractions to represent parts of a whole and of a set.	Developing understanding of the relationships among operations. Solves problems involving addition and subtraction of whole numbers. Uses place value and decomposition of multi-digit numbers to solve multiplication and division problems. Uses models (e.g., number line), benchmarks, and equivalents to understand, represent, compare, and order common fractions and decimals.	Solves problems involving computation of whole numbers and knows which operation(s) makes sense for a situation. Developing understanding of primes/composites, factors/multiples. Understands and uses the relationships among fractions, decimals, and percents, to solve simple problems involving rational numbers in a variety of ways (e.g., models, mentally, etc.)	Uses understanding of the number system to effectively and efficiently solve problems involving whole number computation. Becoming proficient solving problems involving computation with fractions, decimals, and percents. Developing understanding of positive and negative numbers and solves simple problems involving integers that arise in common situations and on the number line.
Beginning to recognize the same growing numerical patterns in a variety of situations and to identify simple "rules" to describe the patterns (e.g., 2 more, counting by 5s.	Creates, extends, and describes numerical patterns that emerge from a variety of situations, and verbally identifies a "rule" to describe simple patterns.	Identifies and describes numerical patterns and simple functions that emerge from a variety of situations, and represents them with tables and mathematical expressions. Plots points on a coordinate grid.	Beginning to identify and describe relationships between two quantities that vary together (functions) and represent them in tables as verbal rules, and as mathematical equations. Sets up a coordinate grid, and plot data from a functional relationship.	Developing understanding of and ability to use variables in equations and expressions to model situations. Represents a simple functional relationships in tables, as rules, as equations, and on graphs.

GRADES 3-5 (Continued)

Level 4	Level 5	Level 6	Level 7	Level 8
Identifies and classifies polygons using simple attributes (e.g., number of straight sides/corners, closed figures, etc.). Beginning to accurately measure the length of objects by selecting appropriate units and/or measuring tools, and by iterating (repeating) units.	Beginning to sort and classify a set of triangles or a set of quadrilaterals into subsets using distinguishing attributes (e.g., right angle, variation of angles, parallel lines, etc.). Visualizes and describes how two dimensional figures can be combined or subdivided into other figures. Measures the length of objects using standard units and tools (e.g., inches, cm, feet, rulers.)	Identifies, names, and classifies common two and three dimensional geometric figures using distinguishing attributes (e.g., number of angles/vertices, sides/faces, symmetry). Visualizes and predicts the results of sliding, flipping and turning two dimensional figures. Estimates and measures lengths (in./ft. or cm/m). Beginning to understand the concepts of area, perimeter, and volume, by counting/measuring appropriate units.	Beginning to describe figures using geometric properties and relationships (e.g., congruence, size of angles, etc.). Visualizes and builds three dimensional shapes given two dimensional drawings (and vice versa). Develops, understands, and uses formulas for finding areas and perimeters of rectangles and figures made up of a combination of rectangles. Developing ability to choose appropriate units/tools to measure length, area, and volume.	Beginning to use visualizations and drawings to represent geometric phenomena (e.g., transformations, nets). Developing understanding of and beginning to solve problems involving geometric properties and relationships (e.g., parallelism, similarity.) Chooses appropriate units/tools to estimate and measure length, area, and volume.
Conduct a simple survey, keeping track of who/what has been counted, organizes and displays the data in a way that is easy for classmates to interpret.	Poses a simple question, gathers data, organizes and represents the data in an appropriate way (e.g., table, bar graph), and writes statements about the results. Interprets and makes valid statements about data in graphs made by others.	Gathers data to answer a question, represents the data on a graph and makes justifiable conclusions based on the data. Conducts simple probability experiments and describes what happened verbally and numerically.	Gathers, organizes, and represents data accurately and appropriately in more than one way. Developing an understanding of the mean, median, mode, and range and how/when they are useful and appropriate to describe data sets. Represents possible outcomes for simple probability situations using tables, grids, and/or tree diagrams and expresses the outcomes in words and fractions.	Designs and conducts a survey, considering how to phrase the question,, how the sample will be selected and whether it will be representative of the population, and whether the results might be valid beyond the sampled group. Developing an understanding of and ability to use experimental and theoretical probability to predict outcomes and solve problems.