



STANDARDS

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Number and Operations

Purpose: Numbers and operations remain a cornerstone for the study of mathematics in grades K – 12. Students use numbers to quantify sets, identify location, measure, quantify the probability of an event, analyze data, and describe and interpret real-world phenomena. Having students know basic facts and having students compute fluently (i.e., accurately and efficiently) continues to be an important goal in mathematics education. However, knowing basic facts should be incorporated into a rich mathematics curriculum that builds conceptual understanding of these facts.

Through the school years, the amount of time spent on numbers and their operations will decrease and the types of numbers studied will change. As students progress through the elementary grades and into middle school, they will need to develop an in-depth conceptual understanding of fractions, decimals, and percents prior to doing algorithmic computations with these numbers. Conceptual development of integers and meaningful computation with them are also goals for middle grade students. The study of irrational numbers and the real number system will begin in eighth grade and continue through high school. Imaginary and complex numbers are introduced in advanced mathematics. It is important for students to model and represent the different types of numbers they study.

Students cannot appreciate the power of numbers unless they also understand the operations upon those numbers. Students need to recognize which operation to apply to a given problem situation they encounter. They need to know what effect the various operations will have on different types of numbers. They need to know the relationships among the operations and among the operations and their properties. A deep understanding of the operations and their properties will help students make sense of computation algorithms and lead to fluency in computation. A firm understanding of numbers as well as operations and their properties will provide a good foundation for the study of algebra.

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<p>M:N&O:K:1 Demonstrates conceptual understanding of rational numbers with respect to: whole numbers from 0 to 12 through investigations that apply the concepts of equivalency in composing or decomposing numbers using models, explanations, or other representations; and positive fractional numbers ($\frac{1}{2}$) as “fair share” (i.e., equal sized parts or sets) using models, explanations, or other representations. (Local)</p>	<p>Student Edition: 19-20, 27-28, 115-116, 269-270, 341-342 LA13, LA14 <i>Chapter Review</i> 35 <i>Math At Home</i> 16 <i>Problem Solving</i> 33-34 <i>Spiral Review</i> 36 <i>Start Smart</i> 3 <i>Test Practice</i> 126 #6</p> <p>Teacher Edition: CRT 35; CSD 13A; CT 19, 269; DI 269B; FMC 27A, 115A, 205A, 269A, 341A; P 270, LA14; ST 13b; 5MC 19A</p>
<p>M:N&O:K:2 Demonstrates understanding of the relative magnitude of numbers from 0 to 20 through investigations that demonstrate one-to-one correspondence; that compare whole numbers to each other or to benchmark whole numbers (5, 10); that demonstrate an understanding of the relation of inequality when comparing whole numbers by using “1 more” or “1 less”; that connect numbers orally and written as numerals to the quantities that they represent using models, representations, or number lines. (Local)</p>	<p>Student Edition: 27-28, 29-30, 31-32, 57-58, 115-116, 165-166, 217-218 <i>Chapter Review Test</i> 35 <i>Spiral Review</i> 36, 64 <i>Start Smart</i> 3 <i>Test Practice Chapters</i> 1-4, p125 #4</p> <p>Teacher Edition: ATS 29, 31, 57, 165; BI 97A; CCL 13H; CT 31, 57, 217; FMC 27A, 29A, 30A, 45A, 55A, 57A, 115A, 165A, 217A; O 27A, 29A, 57A, 115A, 165A</p>
<p>M:N&O:K:3 Demonstrates conceptual understanding of mathematical operations through investigations involving addition and subtraction of whole numbers (from 0 to 10) by solving problems involving joining actions, separating actions, part-part whole relationships, and comparison situations; and addition of multiple one-digit whole numbers. (Local) (See Appendix A.)</p>	<p>Student Edition: 287-288, 291-292, 293-296, 297-298, 299-300, 301-302, 303-304, 317-318, 319-320, 321-322, 323-324, 325-328 <i>Chapter Review</i> 310 <i>Looking Ahead</i> LA3-LA6 <i>Mid Chapter Check</i> 289, 329 <i>Problem Solving</i> 343-344 <i>Problem Solving Strategy</i> 305-306, 339-340 <i>Test Practice</i> 311-312</p> <p>Teacher Edition: CCL 279G, 279H, 313G, 313H; CT 287, 291, 297, 301; FMC 283A, 287A, 291A, 321A, 323A, LA3A, LA5a; P 288, 292, 306, 322; T 305</p>

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<p>M:N&O:K:5 Demonstrates understanding of monetary value through investigation involving knowing the names and values for coins (penny, nickel and dime). (Local)</p>	<p>Student Edition: <i>Concepts and Skills Bank</i> CS1, CS2 Teacher Edition: A CS2; APK CS1</p>
<p>M:N&O:K:6 Mentally adds and subtracts whole numbers by naming the number that is one more or one less than the original number. (Local)</p> <p>(IMPORTANT: <i>The intent of this GLE is to embed mental arithmetic throughout the instructional program, not to teach it as a separate unit.</i>)</p>	<p>The following references could be used in classroom activities and discussions to meet this objective.</p> <p>Teacher Edition: DI(G&T)297B, 299B</p>
<p>M:N&O:K:7 Makes estimates of the number of objects in a set (up to 20) by making and revising estimates as objects are counted (e.g., A student estimates the number of pennies in a jar as 20. Then the student counts the first 10 and makes another estimate based on those that have been counted and those that remain in the jar.). (Local)</p> <p>(IMPORTANT: <i>Estimation should be imbedded instructionally throughout all strands.</i>)</p>	<p>Student Edition: 217-218 Teacher Edition: CT 217; FMC 217A</p>

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Geometry and Measurement	
<p>Purpose: Geometry and the related area of measurement help students represent, describe, and make sense of the world in which they live. Geometry is also a natural place for students to develop their reasoning and justification skills.</p> <p>We live in a three-dimensional world. To interpret, understand, and appreciate that world, students need to develop an understanding of space. In addition, success in mathematics depends, in part, on the development of spatial abilities. Spatial skills include making and interpreting drawings, forming mental images, and visualizing changes.</p> <p>Measurement is the process of assigning a numerical value to an attribute of an object. The study of measurement provides students with techniques and tools they will need to describe and analyze their world. It also provides an opportunity to make connections within mathematics and between mathematics and other curricular areas. High school students must develop more mature insights into the essential role of measurement as a link between the abstractness of mathematics and the concreteness of the real-world.</p> <p>In both areas, geometry and measurement, students need to investigate, experiment, and explore geometric properties using both technology and hands-on materials.</p>	
<p>M:G&M:K:1 Uses properties, attributes, composition, or decomposition to sort or classify polygons (triangles, squares, rectangles, rhombi, trapezoids, and hexagons) or objects by using one non-measurable or measurable attribute; and recognizes, names, and builds polygons and circles in the environment. (Local)</p>	<p>Student Edition: 251-252, 255-256, 257-258, 259-260, 261-262, 263-264, 271-272, LA11, LA12 <i>Chapter Review</i> 275 <i>Game Time</i> 266 <i>Mid Chapter Check</i> 265 <i>Problem Solving</i> 273-274 <i>Problem Solving Strategy</i> 267-268</p> <p>Teacher Edition: CCL 251G, 251H; CT 255, 257, 259, 261, 271; FMC 255A, 257A, 259A, 261A, 263A, 271A, LA11A; PD 257A; 5MC 257A, 259A, 261A, 271A</p>
<p>M:G&M:K:7 Demonstrates conceptual understanding of measurable attributes using comparative language to describe and compare attributes of objects (length [longer, shorter], height [taller, shorter], weight [heavier, lighter], temperature [warmer, cooler], and capacity [more, less]); and compares objects visually and with direct comparison. (Local)</p>	<p>Student Edition: 175-176, 179-180, 181-182, 183-184, 189-190, 191-192, 193-194 <i>Chapter Review</i> 197 <i>Game Time</i> 188 <i>Mid Chapter Check</i> 187 <i>Problem Solving Strategy</i> 185-186 <i>Problem Solving</i> 195-196 <i>Problem Solving Projects</i> P11-P18 <i>Start Smart</i> 7-8</p> <p>Teacher Edition: BMV 179A, 183A, 191A; CCL 175G; CT 179, 181, 183, 189, 191; FMC 179A, 181A, 183A, 189A; PD 183A, 185A; 5MC 181A, 183A, 185A, 205A</p>

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<p>M:G&M:K:8 Determines elapsed and accrued time as it relates to calendar patterns (days of the week, yesterday, today, and tomorrow), the sequence of events in a day; and identifies a clock and calendar as measurement tools (days of week, months of the year). (Local)</p>	<p>The following references cover elapsed time. Student Edition: 226-227, 229-230, 231-232, 233-234, 239-240, 241-242 <i>Game Time</i> 238 <i>Mid Chapter Check</i> 237 Teacher Edition: CaT 67H, 97H, 127H; CT 231, 233, 241; FMC 229A, 233A, 239A, 241A, 321A; PD 231A; 5MC 233A</p>
<p>M:G&M:K:9 Demonstrates understanding of spatial relationships using location and position by using positional words to locate and describe where an object is found in the environment. (Local)</p>	<p>Student Edition: 71-72, 73-74, 75-76 <i>Chapter Review</i> 93 <i>Test Practice</i> 95-96 Teacher Edition: CT 71, 73, 75; 5MC 73A, 75A</p>
<p>Functions and Algebra</p>	
<p>Purpose: Algebra is the language through which much of mathematics is communicated. Students in Kindergarten begin to explore algebraic concepts using informal representations (e.g., words, physical models, tables, graphs). In later years students progress to more abstract representations. The study of patterns is one of the central themes of algebraic thinking and leads to an understanding of relations and functions. Students at all grade-levels should recognize, describe, and generalize patterns and build mathematical models to describe, interpret, and predict the behavior of real-world phenomenon. Algebraic processes are important tools that students can use throughout their lives.</p>	
<p>M:F&A:K:1 I Identifies and extends to specific cases a variety of patterns (sequences of shapes, sounds, movement, colors, and letters) by extending the pattern to the next one, two or three elements, or by translating AB patterns across formats (e.g., an abb pattern can be represented as snap, clap, clap or red, yellow, yellow) or by identifying number patterns in the environment. (Local)</p>	<p>Student Edition: 77-78, 81-82, 83-84, 85-86, 87-88, 89-90 <i>Game Time</i> 80 <i>Problem Solving Strategy</i> 83-84, 136, 161-162 <i>Spiral Review</i> 310 <i>Start Smart</i> 5, 6 <i>Test Practice</i> 96 Teacher Edition: BI 67A; CCL 67G, 67H; CT 77, 81, 83, 85, 87, 89; LU 85A; P 84, 86, 87; PD 87A; 5MC 81A, 83A, 85A, 87A, 89A</p>

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Data, Statistics, and Probability	
<p>Purpose: Collecting, organizing, and displaying data, as well as interpreting and analyzing the information to make decisions and predictions, have become very important in our society. Statistical instruction should be carried out in a spirit of investigation and exploration so students can answer and formulate questions about data. Probability should be studied in familiar contexts. Students need to investigate fairness, chances of winning, and uncertainty. Technology should be used as a tool throughout the investigation process.</p>	
<p>M:DSP:K:1 Interprets a given representation created by the class (models and tally charts) to answer questions related to the data, or to analyze the data to formulate conclusions using words, diagrams, or verbal/scribed responses to express answers. (Local)</p> <p>(IMPORTANT: <i>Analyzes data consistent with concepts and skills in M:DSP:K:2.</i>)</p>	<p>Student Edition: 127-128, 131-132, 133-134, 141-142, 147-148 <i>Game Time</i> 138, 145 <i>Mid Chapter Check</i> 137 <i>Problem Solving</i> 143-144 <i>Project</i> P11 <i>Start Smart</i> 11, 12</p> <p>Teacher Edition: CCL 127H; CP 129; CT 131, 133, 141; FMC 131A, 133A, 141A; I 138134, 140, 142; 5MC 141A</p>
<p>M:DSP:K:2 Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using more, less, or equal (e.g., Have there been more, less, or the same number of cloudy days compared to sunny days this week?). (Local)</p>	<p>Student Edition: 77-78, 81-82, 89-90, 139-140, 141-142, 147-148 <i>Chapter Review</i> 146 <i>Problem Solving</i> 143-144 <i>Problem Solving Strategy</i> 83-84 <i>Spiral Review</i> 146 <i>Test Practice</i> 147-148</p> <p>Teacher Edition: CaT 67H; CT 81, 89; FMC 141A; LP 143; P 142; P 142; PD 89A; TD 148; 5MC 89A</p>

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Problem Solving, Reasoning, and Proof	
<p>Purpose: Problem solving should serve as the organizing feature of the mathematics curriculum as well as other areas of study and be applied to everyday activities. Thus, problem solving approaches should be used to investigate and understand new mathematical content, with students working sometimes independently and sometimes in groups. Students should have many experiences in posing and solving problems from their world, from data that are meaningful to them, and from mathematical investigations. Students should build a positive disposition toward problem solving, including the confidence needed to explore unique problems and increasingly complex tasks.</p>	
Grades K-2	
<p>M:PRP:2:1 Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content and be able to:</p> <ul style="list-style-type: none"> • Formulate and solve multi-step problems from everyday and mathematical situations. • Solve problems using a variety of strategies (e.g., working backwards, looking for patterns and relationships; guess and check; making tables, charts, or organized lists; solving a simpler version of a problem, drawing a diagram; or creating a model) • Verify and interpret results with respect to the original problem. • Determine if the solution of a problem is reasonable. • Solve problems using manipulatives, graphs, charts, diagrams, and calculators. • Demonstrate that a problem may be solved in more than one way. • Exhibit confidence in their ability to solve problems independently and in groups. • Display increasing perseverance, and persistence in problem solving. 	<p>Student Edition: <i>Problem Solving</i> 91-92, 1430144 <i>Problem Solving Projects</i> P3, P7, P11, P15 <i>Problem Solving Strategy</i> 21-22, 53-54, 83-84, 113-114, 135-136, 161-162, 185-186, 209-210, 243-244, 267-268, 339-340 <i>Start Smart 2</i></p> <p>Teacher Edition: ATS 21, 83, 135, 185, 209; CP 129; IP 54; LU 339A; PD 19A, 21A, 47A, 87A, 135A; T 53, 83, 113, 161, 267</p>

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<p>M:PRP:2:2 Students will use mathematical reasoning and proof and be able to:</p> <ul style="list-style-type: none"> • Use models, known facts, properties, and relationships to explain their thinking. • Justify solution processes and answers (e.g., "I chose this method to solve the problem because..."). • Draw conclusions using inductive reasoning. • Identify the missing information needed to find a solution to a given story problem. • Use patterns and relationships to analyze mathematical situations (e.g., count by fives). 	<p>Student Edition: 89-90, 141-142, 217-218 <i>Problem Solving</i> 33-34, 91-92 <i>Problem Solving Projects</i> P3, P7, P11, P15 <i>Problem Solving Strategy</i> 135-136, 161-162, 185-186, 210-211, 339-340 Note: See Scope and Sequence, reasoning skills are introduced in Grade 1.</p> <p>Teacher Edition: ATS 135, 217; FMC 133A, 141A, 217A; PD 89A, 135A, 141A; T 21, 83, 113</p>

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Communication, Connections, and Representations	
<p>Purpose: Reading, writing, talking, listening, and modeling provide students with the opportunity to develop deeper mathematical understanding and to integrate the language of mathematics into their world. Actively exploring, investigating, describing, and explaining mathematical ideas promote communication which leads to a greater comprehension of mathematical concepts.</p> <p>Representing ideas and connecting the representations to mathematics lies at the heart of understanding mathematics. Representations make mathematical ideas more concrete and available for reflection, and they help students recognize the common mathematical nature of different situations. Students can develop and deepen their understanding of mathematical concepts and relationships as they create, compare, and use various representations.</p> <p>Mathematical topics, ideas, and procedures must be connected to each other and to the students' everyday experiences, both in and out of school. In particular, mathematics must be connected to all other curriculum areas. Mathematical connections will help students become aware of the usefulness of mathematics, serve to bridge the concrete and the abstract, and enable deeper understanding of important ideas.</p>	
<p>M:CCR:2:1 Students will communicate their understanding of mathematics and be able to:</p> <ul style="list-style-type: none"> • Demonstrate mathematical communication through discussion, reading, writing, listening, and responding, individually and in groups. • Discuss relationships between everyday language and mathematical language and symbols (e.g., words that mean something different in mathematics and in everyday life). • Explain conclusions, thought processes, and strategies in problem-solving situations. • Discuss, illustrate, and write about mathematical concepts and relationships. • Draw pictures and use objects to illustrate mathematical concepts. 	<p>Student Edition: <i>Game Time</i> 80, 138, 269 <i>Problem Solving</i> 33-34, 61-62, 91-92, 143-144, 169-170, 244-245 <i>Problem Solving Projects</i> P3-P18 <i>Problem Solving Strategy</i> 53-54, 114-115, 135-136, 267-268, 305-306, 339-340 <i>Start Smart</i> 9</p> <p>Teacher Edition: A/C 10; BMV 43A, 73A, 141A; CCL 13G, 13H; 39G; 67G, 97G; CP 41, 99, 177, 227, 315; FMC 269A; IWO 19B, 31B, 45B, 81B, 117B; RW 13, 39, 67, 149, 175</p>

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<p>M:CCR:2:2 Students will create and use representations to communicate mathematical ideas and to solve problems and be able to:</p> <ul style="list-style-type: none"> • Create and use age level appropriate representations to organize, record, and communicate mathematical ideas (e.g., students should recognize the relationship among seven counters, seven tally marks, and the symbol 7). • Select, apply, and translate among mathematical representations to solve problems (e.g., representing fractions with circles, with geoboards, and with pattern blocks). • Link different representations. • Use representations to model and interpret physical, social, and mathematical phenomena. • Use conventional and self-generated (invented) representations and connect them. • Realize that any representation is subject to multiple interpretations (e.g., drawings and graphs can be read in a different way). 	<p>Student Edition: 85-86, 87-88, 131-132, 135-136, 141-142, 269-270 <i>Game Time</i> 138 <i>Looking Ahead</i> LA11-LA14 <i>Problem Solving</i> 245-246 <i>Problem Solving Strategy</i> 21-22, 53-54, 113-114, 135-136, 161-162, 243-244, 340-341 <i>Start Smart</i> 11-12</p> <p>Teacher Edition: CCL 13G, 127G, 127H, 149H; CP 15, 41, 99, 129, 281, 315; DI 81B; EG 330; FMC 131A, 133A, 135A, 141A, 283A; HO 117, 131, 161, 243, 269, 283, 339; LA11A-LA13B</p>
<p>M:CCR:2:3 Students will recognize, explore, and develop mathematical connections and be able to:</p> <ul style="list-style-type: none"> • Link conceptual and procedural knowledge (e.g., they will know that when they “regroup,” they are simply changing the representation of the minuend, but not its value). • Recognize and use mathematics in other curriculum areas (e.g., science, social studies). • Recognize and use mathematics in their daily lives (e.g., graphs, tables, or maps). • Identify mathematical situations occurring in literature for children. • Identify examples of geometry in nature, art, and architecture. 	<p>Student Edition: <i>Concepts & Skills Bank</i> CS5-CS6 <i>Game Time</i> 80, 108 <i>Looking Ahead</i> LA5 <i>Problem Solving</i> 33-34, 61-62, 91-92, 245-246, 343-344 <i>Problem Solving Projects</i> P11-P14 <i>Problem Solving Strategy</i> 243</p> <p>Teacher Edition: A/C 10; CL 15, 99, 203, 315; CCL 13H(M), 67G(T), 201G(S), 225H(S), 313G(H); IWO 19B, 43B, 131B, 205B; LA 5A; MF 10; RA 16, 100, 178, 228; RW 251</p>