



# Math Connects

4

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## STANDARDS

## PAGE REFERENCES

### 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.

STANDARDS	PAGE REFERENCES
<p>M(N&amp;O)–4–1 <b>Demonstrates conceptual understanding of rational numbers with respect to: whole numbers from 0 to 999,999</b> through equivalency, composition, decomposition, or place value <b>using models, explanations, or other representations</b>; and <b>positive fractional numbers</b> (benchmark fractions: <math>\frac{a}{2}</math>, <math>\frac{a}{3}</math>, <math>\frac{a}{4}</math>, <math>\frac{a}{5}</math>, <math>\frac{a}{6}</math>, <math>\frac{a}{8}</math>, or <math>\frac{a}{10}</math>, where <math>a</math> is a whole number greater than 0 and less than or equal to the denominator) as a part to whole relationship in area, set, or <u>linear models</u> where the number of parts in the whole are equal to, and a <u>multiple or factor of the denominator</u>; and <b>decimals as hundredths</b> within the context of money, or tenths within the context of metric measurements (e.g., 2.3 cm) <b>using models, explanations, or other representations</b>. (State)</p>	<p><b>Student Edition:</b>  <i>Big Idea</i> 534  <i>Check What You Know</i> 18, 23, 538, 541, 580 #11, 589  <i>Example</i> 17, 18, 588  <i>Explore</i> 20-21  <i>Extra Practice</i> R2, R34, R36  <i>H.O.T. Problems</i> 19 #37, 25 #39-#41  <i>Practice and Problem Solving</i> 19, 24, 539, 542, 581 #31, #32, 589  <i>Real-World Example</i> 22, 23, 537, 538, 540, 541  <i>Real-World Problem Solving</i> 19, 24  <i>Study Guide and Review</i> 45</p> <p><b>Teacher Edition:</b>  A 539, 543; AE 18, 23, 538, 541; ATS 538, 541, 580; IWO 537B, 540B; SGO 17B, 537B, 579B, 596B</p>
<p>M(N&amp;O)–4–2 <b>Demonstrates understanding of the relative magnitude of numbers from 0 to 999,999</b> by ordering or comparing whole numbers; and ordering, comparing, or identifying equivalent proper positive <u>fractional numbers</u>; or <u>decimals</u> using models, number lines, or explanations. (State)</p>	<p><b>Student Edition:</b>  <i>Check What You Know</i> 29, 33, 555, 591  <i>Extra Practice</i> R3, R35, R37  <i>Practice and Problem Solving</i> 30, 34, 556, 592  <i>Real-World Example</i> 28, 29, 32, 33, 554, 590  <i>Study Guide and Review</i> 47, 569 #33-#38, 609 #23-#30</p> <p><b>Teacher Edition:</b>  A 30, 34, 557, 592; AE 29, 33, 555, 591; ATS 29, 33, 555, 591; IWO 32B; SGO 28B, 32B, 554B, 590B</p>
<p>M(N&amp;O)–4–3 <b>Demonstrates conceptual understanding of mathematical operations</b> by describing or illustrating <u>the relationship between repeated subtraction and division (no remainders)</u>; <u>the inverse relationship between multiplication and division of whole numbers</u>; or the addition or subtraction of <u>positive fractional numbers with like denominators</u> using models, number lines, or explanations. (State)</p>	<p><b>Student Edition:</b>  147  <i>Big Idea</i> 142  <i>Check What You Know</i> 148  <i>Example</i> 147  <i>Explore</i> 145-146  <i>Practice and Problem Solving</i> 149  <i>Real-World Example</i> 148, 155</p> <p><b>Teacher Edition:</b>  A 149; SGO 147B</p>

STANDARDS	PAGE REFERENCES
<p>M(N&amp;O)–4–4 <b>Accurately solves problems involving</b> multiple operations on whole numbers or the use of the properties of factors and multiples; and addition or subtraction of <u>decimals and positive proper fractions with like denominators</u>. (Multiplication limited to 2 digits by 2 digits, and division limited to 1 digit divisors.) (State)</p> <p>(IMPORTANT: <i>Applies the conventions of order of operations where the left to right computations are modified only by the use of parentheses.</i>)</p>	<p><b>Student Edition:</b>  <i>Check What You Know</i> 177 #9  <i>Concepts and Skills</i> R56  <i>H.O.T. Problems</i> 179 #38  <i>Practice and Problem Solving</i> 178 #29-#32  <i>Real-World Problem Solving</i> 178</p>
<p>M(N&amp;O)–4–6 <b>Mentally adds and subtracts whole number facts</b> through 20 (addends whose sum is at most 20 and related subtraction facts); <u>multiplies whole number facts to a product of 100, and calculates related division facts</u>; adds <u>two-digit whole numbers</u>, combinations of two-digit and 3-digit whole numbers that are multiples of ten, and <u>4-digit whole numbers that are multiples of 100</u> (limited to two addends) (e.g., <math>67 + 24</math>; <math>320 + 430</math>; <math>320 + 90</math>; <math>1,300 + 1,400</math>); and subtracts a one-digit whole number from a two-digit whole number (e.g., <math>67 - 9</math>); and <u>subtracts combinations of two-digit and three-digit whole numbers that are multiples of ten</u> (e.g., <math>50 - 20</math>, <math>230 - 80</math>, <math>520 - 200</math>). (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><b>Student Edition:</b>  <i>Check What You Know</i> 56 #4-#6, 238  <i>H.O.T. Problems</i> 57 #26  <i>Practice and Problem Solving</i> 57 #14-#19, 239  <i>Real-World Example</i> 237, 238  <i>Real-World Problem Solving</i> 239</p> <p><b>Teacher Edition:</b>  A 239; ATS 238</p>
<p>M(N&amp;O)–4–7 <b>Makes estimates</b> in a given situation by identifying when estimation is appropriate, selecting the appropriate method of estimation, and evaluating the reasonableness of solutions appropriate to <u>grade level GLEs</u> across content strands. (Local)</p> <p>(IMPORTANT: <i>The intent of this GLE is to embed estimation throughout the instructional program, not to teach it as a separate unit.</i>)</p>	<p><b>Student Edition:</b>  <i>Analyze the Skills</i> 63, 241  <i>Extra Practice</i> R5, R15  <i>Practice and Problem Solving</i> 60 #21-#24  <i>Practice the Skills</i> 63, 241  <i>Real-World Problem Solving</i> 60, 244, 619</p> <p><b>Teacher Edition:</b>  A 63, 241; ATS 63; IWO 36B; SGO 62B</p>

STANDARDS	PAGE REFERENCES
<p>M(N&amp;O)—4–8 <b>Applies properties of numbers</b> (odd, even, <u>multiplicative property of zero</u>, and <u>remainders</u>) and <b>field properties</b> (<u>commutative</u>, <u>associative</u>, and identity) <b>to solve problems and to simplify computations.</b> (Local)</p>	<p><b>Student Edition:</b>  <i>Check What You Know</i> 56, 152, 314  <i>Concepts and Skills</i> R58  <i>Extra Practice</i> R3, R10  <i>Key Concept</i> 55, 150  <i>Practice and Problem Solving</i> 57, 152, 315  <i>Real-World Example</i> 55, 314  <i>Real-World Problem Solving</i> 152, 315</p> <p><b>Teacher Edition:</b>  ATS 56, 151</p>
<b>Geometry and Measurement</b>	
<p><b>Purpose:</b> 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&amp;M)—4–1 <b>Uses properties or attributes of angles</b> (number of angles) <b>or sides</b> (number of sides, length of sides, <u>parallelism</u>, or <u>perpendicularity</u>) <b>to identify, describe, or distinguish among</b> triangles, squares, rectangles, rhombi, trapezoids, hexagons, or <u>octagons</u>; or <u>classify angles relative to 90°</u> as more than, less than, or equal to. (State)</p>	<p><b>Student Edition:</b>  368-370  <i>Are You Ready?</i> 358 #5-#11  <i>Check What You Know</i> 11, 363, 377  <i>Extra Practice</i> R23, R24  <i>Game Time</i> 379  <i>H.O.T. Problems</i> 365  <i>Key Concept</i> 362, 376  <i>Practice and Problem Solving</i> 364, 378  <i>Real-World Example</i> 362, 377  <i>Study Guide and Review</i> 385 #10-#13, 388 #28-#33</p> <p><b>Teacher Edition:</b>  A 365; AE 363, 377; ATS 363, 377; IC 356; IWO 368B; M 356H</p>

STANDARDS	PAGE REFERENCES
<p>M(G&amp;M)—4—3 <b>Uses properties or attributes</b> (shape of bases or number of lateral faces) to <b>identify, compare, or describe three-dimensional shapes</b> (rectangular prisms, triangular prisms, <u>cylinders</u>, or <u>spheres</u>). (State)</p>	<p><b>Student Edition:</b>  <i>Are You Ready?</i> 358 #5-#11  <i>Check What You Know</i> 10, 360  <i>Extra Practice</i> R23  <i>Key Concept</i> 359  <i>Practice and Problem Solving</i> 361  <i>Real-World Example</i> 359  <i>Study Guide and Review</i> 385 #7, #8</p> <p><b>Teacher Edition:</b>  A 361; AR 356G; ATS 360; IC 356; M 356H;  SC 356H</p>
<p>M(G&amp;M)—4—4 <b>Demonstrates conceptual understanding of congruency</b> by matching congruent figures using reflections, translations, or rotations (flips, slides, or turns), or as the result of composing or decomposing shapes using models or explanations. (State)</p>	<p>The following page references can be expanded to meet this standard.</p> <p><b>Student Edition:</b>  <i>Big Idea</i> 391  <i>Check What You Know</i> 414, 419  <i>Example</i> 412, 413, 418  <i>Explore</i> 410-411  <i>Extend</i> 421  <i>Practice and Problem Solving</i> 414, 420  <i>Real-World Example</i> 413, 419  <i>Study Guide and Review</i> 431 #22-#25</p> <p><b>Teacher Edition:</b>  AE 413; ATS 413, 419; IWO 412B, 418B;  SGO 412B, 418B</p>
<p>M(G&amp;M)—4—5 <b>Demonstrates conceptual understanding of similarity</b> by applying scales on maps, or applying characteristics of similar figures (same shape but not necessarily the same size) to identify similar figures, or to solve problems involving similar figures. Describes relationships using models or<sup>sc</sup> explanations. (State)</p>	<p><b>Student Edition:</b>  <i>Concepts and Skills</i> R65</p>
<p>M(G&amp;M)—4—6 <b>Demonstrates conceptual understanding of perimeter of polygons, and the area of rectangles, polygons or irregular shapes on grids</b> using a variety of models, manipulatives, or <u>formulas</u>. Expresses all measures using appropriate units. (State)</p>	<p><b>Student Edition:</b>  <i>Check What You Know</i> 457, 461  <i>Concepts and Skills</i> R66-R69  <i>Extend</i> 464-465  <i>Practice and Problem Solving</i> 458, 462</p> <p><b>Teacher Edition:</b>  ATS 457, 461; IWO 456B, 460B; M 436J;  SGO 460B</p>

STANDARDS	PAGE REFERENCES
<p>M(G&amp;M)—4—7 <b>Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems</b> across the content strands. (State)</p> <p>See Benchmarks in Appendix B.</p>	<p><b>Student Edition:</b>  <i>Check What You Know</i> 442, 445, 451, 470  <i>Extra Practice</i> R28, R29, R30  <i>Key Concept</i> 441  <i>Practice and Problem Solving</i> 443, 445, 452, 470-471  <i>Real-World Example</i> 441, 444, 450, 468  <i>Study Guide and Review</i> 473, 475, 478</p> <p><b>Teacher Edition:</b>  ATS 442, 445, 451, 469; IWO 441B, 444B, 450B, 468B; SGO 441B, 450B</p>
<p>M(G&amp;M)—4—9 <b>Demonstrates understanding of spatial relationships using location and position</b> by interpreting and giving directions between locations on a map or coordinate grid (first quadrant); <u>plotting points in the first quadrant in context (e.g., games, mapping); and finding the horizontal and vertical distances between points on a coordinate grid in the first quadrant.</u> (Local)</p>	<p><b>Student Edition:</b>  <i>Check What You Know</i> 407  <i>Data File</i> 408  <i>Extra Practice</i> R26  <i>H.O.T. Problems</i> 408 #27  <i>Practice and Problem Solving</i> 408  <i>Study Guide and Review</i> 430 #18-#21</p> <p><b>Teacher Edition:</b>  IWO 406B; SGO 406B</p>
<p>M(G&amp;M)—4—10 <b>Demonstrates conceptual understanding of spatial reasoning and visualization</b> by copying, comparing, and drawing models of triangles, squares, rectangles, rhombi, trapezoids, hexagons, <u>octagons</u>, and circles; and builds models of rectangular prisms from <u>two-</u> or three-dimensional representations. (Local)</p>	<p><b>Student Edition:</b>  360  <i>H.O.T. Problems</i> 361 #23-#25, 365 #27</p> <p><b>Teacher Edition:</b>  AR 356G; ATS 363; IWO 359B; SGO 359B; TOD 361</p>

STANDARDS	PAGE REFERENCES
<b>Functions and Algebra</b>	
<p><b>Purpose:</b> 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&amp;A)–4–1 <b>Identifies and extends to specific cases a variety of patterns</b> (linear and nonlinear) represented in models, tables or sequences; and writes a rule in words or<sup>sc</sup> symbols to find the next case. (State)</p>	<p><b>Student Edition:</b>  <i>Analyze the Strategy</i> 367  <i>Are You Ready?</i> 144 #9-#12, 192 #15-#17  <i>Check What You Know</i> 6, 206, 209, 221  <i>Example</i> 208  <i>Extra Practice</i> R13, R14, R15, R23  <i>Mixed Problem Solving</i> 119 #1, 251 #7, 331 #2, 381 #3, #7, 519 #7, 565 #4, #9  <i>Practice and Problem Solving</i> 206, 210, 222  <i>Practice the Strategy</i> 367  <i>Problem-Solving Investigation</i> 40  <i>Real-World Example</i> 204, 205, 209, 220, 221  <i>Study Guide and Review</i> 134 #12, 227, 228, 230 #48, #49, 350 #41, 386</p> <p><b>Teacher Edition:</b>            AE 205, 209; ATs 205, 221; IWO 218B; SGO 204B</p>
<p>M(F&amp;A)–4–2 <b>Demonstrates conceptual understanding of linear relationships</b> (<math>y = kx</math>) as a constant rate of change by identifying, describing, or comparing situations that represent constant rates of change. (Local)</p>	<p>The following page references can be used during teacher/class discussion to meet this standard.</p> <p><b>Student Edition:</b>  <i>Chapter Test</i> 231 #15, #16  <i>Check What You Know</i> 221  <i>Extra Practice</i> R15  <i>Practice and Problem Solving</i> 222  <i>Real-World Example</i> 220, 221  <i>Study Guide and Review</i> 230 #48, #49</p> <p><b>Teacher Edition:</b>            ATS 221; IWO 220B; SGO 220B</p>

STANDARDS	PAGE REFERENCES
<p>M(F&amp;A)–4–3 <b>Demonstrates conceptual understanding of algebraic expressions</b> by using letters or symbols to represent unknown quantities to write simple linear algebraic expressions involving any one of the four operations; or by evaluating simple linear algebraic expressions using whole numbers. (State)</p>	<p><b>Student Edition:</b>  <i>Big Idea</i> 190  <i>Check What You Know</i> 194, 215  <i>Example</i> 194, 214  <i>Extra Practice</i> R12, R14  <i>Game Time</i> 217  <i>Practice and Problem Solving</i> 195, 216  <i>Real-World Example</i> 193, 214  <i>Study Guide and Review</i> 225 #8-#16, 229</p> <p><b>Teacher Edition:</b>  A 195, 216; AE 194, 215; ATS 194, 215</p>
<p>M(F&amp;A)–4–4 <b>Demonstrates conceptual understanding of equality</b> by showing equivalence between two expressions using models or different representations of the expressions, by <u>simplifying numerical expressions where left to right computations may be modified only by the use of parentheses [e.g., <math>14 - (2 \times 5)</math>]</u> (expressions consistent with the parameters of M:F&amp;A:4–3), and by <u>solving one-step linear equations of the form <math>ax = c</math>, <math>x \pm b = c</math>, where <math>a</math>, <math>b</math>, and <math>c</math> are whole numbers with <math>a \neq 0</math>.</u> (State)</p>	<p><b>Student Edition:</b>  <i>Check What You Know</i> 199  <i>Concepts and Skills</i> R56  <i>Example</i> 199  <i>Explore</i> 196-197  <i>Extra Practice</i> R13  <i>Practice and Problem Solving</i> 200  <i>Real-World Example</i> 198  <i>Real-World Problem Solving</i> 200  <i>Study Guide and Review</i> 225 #17-#22</p> <p><b>Teacher Edition:</b>  A 201; AE 199; ATS 199; SGO 198B</p>
<b>Data, Statistics, and Probability</b>	
<p><b>Purpose:</b> 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)–4–1 <b>Interprets a given representation</b> (line plots, tables, bar graphs, <u>pictographs</u>, or <u>circle graphs</u>) to answer questions related to the data, to analyze the data to formulate or <u>justify</u> conclusions, to make predictions, or to <u>solve problems</u>. (State)</p> <p>(IMPORTANT: Analyzes data consistent with concepts and skills in M(DSP)–4–2).</p>	<p><b>Student Edition:</b>  <i>Check What You Know</i> 12, 13, 105 #5, #6, 109  <i>Concepts and Skills</i> R72-R73  <i>Example</i> 108, 109  <i>Extra Practice</i> R8  <i>Practice and Problem Solving</i> 110  <i>Real-World Example</i> 105  <i>Real-World Problem Solving</i> 106  <i>Study Guide and Review</i> 135 #18, #19</p> <p><b>Teacher Edition:</b>  ATS 109</p>

STANDARDS	PAGE REFERENCES
<p>M(DSP)–4–2 <b>Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using measures of central tendency (median or mode), or range.</b> (State)</p>	<p><b>Student Edition:</b>  <i>Check What You Know</i> 99  <i>Concepts and Skills</i> R74  <i>Extra Practice</i> R7  <i>Practice and Problem Solving</i> 100  <i>Real-World Example</i> 98, 99  <i>Study Guide and Review</i> 133 #9-#11</p> <p><b>Teacher Edition:</b>  A 101; AE 99; SGO 98B</p>
<p>M(DSP)–4–3 <b>Organizes and displays data</b> using tables, <u>line plots</u>, bar graphs, and <u>pictographs</u> to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (Local)</p> <p>(IMPORTANT: <i>Analyzes data consistent with concepts and skills in M(DSP)–4–2.</i>)</p>	<p><b>Student Edition:</b>  <i>Check What You Know</i> 105 #1, #2  <i>Extend</i> 116-117  <i>Extra Practice</i> R6  <i>Practice and Problem Solving</i> 106 #7-#10  <i>Real-World Example</i> 104  <i>Study Guide and Review</i> 135 #16, #17</p> <p><b>Teacher Edition:</b>  ATS 105; IWO 112B; SGO 104B, 112B</p>
<p>M(DSP)–4–4 <b>Uses counting techniques to solve problems</b> in context involving combinations or simple permutations (e.g., Given a map – Determine the number of paths from point A to point B.) using a variety of strategies (e.g., organized lists, tables, tree diagrams, or<sup>sc</sup> others). (State)</p>	<p><b>Student Edition:</b>  <i>Analyze the Strategy</i> 405  <i>Check What You Know</i> 125  <i>Example</i> 124, 125  <i>Explore</i> 122-123  <i>Extra Practice</i> R9  <i>Practice and Problem Solving</i> 126  <i>Practice the Strategy</i> 405  <i>Study Guide and Review</i> 138 #30  <i>Test Practice</i> 141 #12</p> <p><b>Teacher Edition:</b>  A 127; AE 125; ATS 125; IWO 404B; SGO 404B</p>
<p>M(DSP)–4–5 <b>For a probability event in which the sample space may or may not contain equally likely outcomes, predicts</b> the likelihood of an event <u>as a part to whole relationship</u> (e.g., two out of five, zero out of five, five out of five) and tests the prediction through experiments; and determines if a game is fair. (Local)</p>	<p>The following page references can be expanded through class activities to meet this standard.</p> <p><b>Student Edition:</b>  <i>Check What You Know</i> 129  <i>Extend</i> 131  <i>Practice and Problem Solving</i> 130</p> <p><b>Teacher Edition:</b>  A 130; ATS 129; IWO 128B; SGO 128B</p>

STANDARDS	PAGE REFERENCES
<p>M(DSP)–4–5 <b>For a probability event in which the sample space may or may not contain equally likely outcomes, determines the <u>theoretical probability of an event and expresses the result as part to whole (e.g., two out of five).</u></b> (State)</p>	<p><b>Student Edition:</b>  <i>Check What You Know</i> 129 #5  <i>Example</i> 129  <i>Extend</i> 131  <i>Practice and Problem Solving</i> 130 #13-#18</p>
<p>M(DSP)–4–6 <b>In response to a teacher or student generated question or hypothesis, groups decide the most effective method (e.g., survey, observation, experimentation) to collect the data (numerical or categorical) necessary to answer the question; collects, organizes, and appropriately displays the data; analyzes the data to draw conclusions about the question or hypothesis being tested, and when appropriate makes predictions; and <u>asks new questions and makes connections to real world situations.</u></b> (Local)</p> <p>(IMPORTANT: Analyzes data consistent with concepts and skills in M(DSP)–4–2.)</p>	<p><b>Student Edition:</b>  95, 96  <i>Check What You Know</i> 96  <i>Practice and Problem Solving</i> 97  <i>Real-World Example</i> 95  <b>Teacher Edition:</b>  ATS 96; IWO 95B; SGO 95B; T 95</p>

STANDARDS	PAGE REFERENCES
<b>Problem Solving, Reasoning, and Proof</b>	
<p><b>Purpose:</b> 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>	
<b>Grades 3-5</b>	
<p><b>M(PRP)–5–1 Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content and be able to:</b></p> <ul style="list-style-type: none"> <li>• Determine the reasonableness of solutions to real-world problems.</li> <li>• Generalize solutions and apply strategies to new problem situations.</li> <li>• Add to the repertoire of problem-solving strategies (e.g., looking for similar problems) and use those strategies in more sophisticated ways.</li> <li>• Solve problems with multiple solutions, recognize when a problem has no solution, and recognize problems where more information is needed.</li> <li>• Translate results of a computation into solutions that fit the real-world problem (e.g., when a computation shows that one needs 3.2 gallons of paint to paint a room, how much paint do you buy?).</li> </ul>	<p><b>Student Edition:</b>  <i>Analyze the Skill</i> 103, 203, 241, 281, 321, 367, 405, 447, 503, 545, 587, 627  <i>Extra Practice</i> R7, R13, R15, R18, R20, R23, R26, R28, R32, R34, R37, R40  <i>Practice the Skill</i> 103, 203, 241, 281, 321, 367, 405, 447, 503, 545, 587, 627  <i>Review and Practice Your Skills</i> 134, 226, 263, 302, 348, 386, 430 #16, #17, 474, 527, 608 #17-#20, 646</p> <p><b>Teacher Edition:</b>  ATS 103, 203, 241, 281, 321, 367, 405, 447, 503, 545, 587, 627; IWO 102B, 202B, 240B, 280B, 320B, 404B; SGO 102B, 404B, 502B, 586B, 626B</p>
<p><b>M(PRP)–5–2 Students will use mathematical reasoning and proof and be able to:</b></p> <ul style="list-style-type: none"> <li>• Draw conclusions and solve problems using elementary deductive reasoning and reasoning by analogy.</li> <li>• Make and defend conjectures and generalizations.</li> <li>• Use models, known facts, properties, and relationships to explain thinking and to justify answers and solution processes.</li> <li>• Recognize the pervasive use and power of reasoning as a part of mathematics.</li> </ul>	<p><b>Student Edition:</b>  <i>Analyze the Skill</i> 447, 503  <i>Extra Practice</i> R28, R32  <i>Practice the Skill</i> 447, 503  <i>Study Guide and Review</i> 474, 527</p> <p><b>Teacher Edition:</b>  ATS 447, 503; SGO 446B, 502B</p>

## STANDARDS

## PAGE REFERENCES

## Communication, Connections, and Representations

**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.

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.

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.

M(CCR)–5–1 **Students will communicate their understanding of mathematics** and be able to:

- Discuss mathematical ideas and write convincing arguments.
- Understand, explain, analyze, and evaluate mathematical arguments and conclusions presented by others.
- Ask clarifying and extending questions related to mathematics they have heard or read about.
- Understand and appreciate the economy and power of mathematical symbolism and its role in the development of mathematics.
- Demonstrate an understanding of mathematical concepts and relationships through a variety of methods (e.g., writing, graphing, charts, diagrams, number sentences, or symbols).
- Use a variety of technologies (e.g., computers, calculators, video, probes) to represent and communicate mathematical ideas.

The following page references use the concept of estimation to meet this standard.

**Student Edition:**

*Analyze the Skill* 63 #1-#4

*Check What You Know* 38 #8, 59 #8

*H.O.T. Problems* 39 #26, 61 #28, #29

*Practice the Skill* 63 #12

*Practice and Problem Solving* 38 #21, #22

**Teacher Edition:**

A 39, 61; IWO 36B

STANDARDS	PAGE REFERENCES
<p>M(CCR)–5–2 <b>Students will create and use representations to communicate mathematical ideas and to solve problems</b> and be able to:</p> <ul style="list-style-type: none"> <li>• Use physical models and diagrams to represent important mathematical ideas (e.g., multiplication).</li> <li>• Use appropriate representations to solve problems or to portray, clarify, or extend a mathematical idea.</li> <li>• Recognize equivalent representations of concepts and procedures and translate among them as appropriate (for example, understand how the addition of whole numbers, fractions, and decimals are related).</li> </ul>	<p>The following page references use geometric concepts to meet this standard.</p> <p><b>Student Edition:</b>  <i>Explore</i> 410-411  <i>Hands-On Mini Activity</i> 260, 418</p> <p><b>Teacher Edition:</b>  ATS 360, 363, 373, 413, 419; I 368, 372, 376;  IWO 359B, 372B, 412B, 418B; SGO 359B, 366B, 412B; T 362</p>
<p>M(CCR)–5–3 <b>Students will recognize, explore, and develop mathematical connections</b> and be able to:</p> <ul style="list-style-type: none"> <li>• See mathematics as an integrated whole.</li> <li>• Recognize relationships among different topics in mathematics.</li> <li>• Recognize and use mathematics in other curriculum areas and in their daily lives.</li> <li>• Link concepts and procedures.</li> <li>• Use mathematical skills, concepts, and applications in other disciplines (e.g., graphs in social studies, patterns in art, or music and geometry in technology education).</li> </ul>	<p>The following page references use the concept of measurement to meet this standard.</p> <p><b>Student Edition:</b>  <i>Game Time</i> 463  <i>H.O.T. Problems</i> 452 #14  <i>Real-World Math</i> 455  <i>Real-World Problem Solving</i> 458, 488</p> <p><b>Teacher Edition:</b>  CP 436, 482; H 482I; SC 436J, 482J; SGO 441B, 450B, 460B, 486B; SS 436I</p>