



MathMatters 1

An Integrated Program

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STANDARDS	PAGE REFERENCES
<p>Standard 1: Students develop number sense and use numbers and number relationships in problem-solving situations and communicate the reasoning used in solving these problems.</p> <p>RATIONALE <i>Numbers play a vital role in our daily lives. It is essential to know both the symbols for and the meanings of various kinds of numbers; whole numbers, fractions, decimals, percents, roots, exponents, logarithms, and scientific notation. Number sense is the capacity a child has to be flexible and mentally agile with numbers; to have a working knowledge for what numbers mean and an ability to perform mental mathematics. Number sense enables a student to look at the world through the eyes of math and make comparisons and build new information (Case 1998). Developing number sense strengthens students' ability to acquire basic facts, to solve problems, and to determine the reasonableness of results.</i></p>	
<p>1. demonstrate meanings for real numbers, absolute value, and scientific notation using physical materials and technology in problem-solving situations;</p>	<p>Student Edition: 106 Example 4, 107 #47-#48, #56-#57, #62-#63, 121 #46-#48, 134 #56, 135 #58-#59, #69, 221 #56, 240, 263 #48-#50 <i>Assessment</i> 253 #28-#29 Annotated Teacher's Edition: EL 133</p>
<p>2. develop, test, and explain conjectures about properties of number systems and sets of numbers; and</p>	<p>Student Edition: 119 Example 2, 120 #8-#12, 243 #56-#57 <i>Think Back</i> 240 <i>Mid-Chapter Quiz</i> 123 #14-#19 Annotated Teacher's Edition: DI 136; EL 119; FG 123; LW 120, 138</p>

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3. use number sense to estimate and justify the reasonableness of solutions to problems involving real numbers.	Student Edition: 55 #49-#52, 91, 121 #46, 139 #62, 502-503 Annotated Teacher's Edition: AA 75; CE 503; EL 91, 502, 503; LW 503
<p style="text-align: center;"><i>For students continuing their mathematics education beyond these standards, what they will know and are able to do may include:</i></p>	
<ul style="list-style-type: none"> investigate limiting processes by examining infinite sequences and series; and 	Student Edition: 318 <i>Think Back</i> 319 Annotated Teacher's Edition: I 318
<ul style="list-style-type: none"> explain relationships among real numbers, complex numbers, and vectors using models. 	Student Edition: 110 #13, 126 #14, 127 #65, 129 #11-#12, #17, 424-425 Annotated Teacher's Edition: CE 425; LW 129; TT 424
<p>Standard 2: Students use algebraic methods to explore, model, and describe patterns and functions involving numbers, shapes, data, and graphs in problem-solving situations and communicate the reasoning used in solving these problems.</p>	
<p>RATIONALE <i>The study of patterns, functions, and helps learners to recognize and generalize patterns; identify and clarify functional relationships; and represent and manipulate these relationships verbally, numerically, symbolically, and graphically. Symbolic representation, including the many interpretations of the concept of a variable, is important but only one of many ways to represent patterns and functions. Students who are adept at identifying and classifying patterns and functional relationships are better able to use these relationships in real situations, both in and out of school. Because the understandings developed through this standard are critical to success in mathematics and to the appropriate use of quantitative reasoning in other disciplines, students should explore and use the ideas of functions, patterns, and algebra from kindergarten through 12th grade.</i></p>	
1. model real-world phenomena (for example, distance-versus-time relationships, compound interest, amortization tables, mortality rates) using functions, equations, inequalities, and matrices;	Student Edition: 209 Example 3, 213 Example 3, 265 Example 4, 271 Example 2, 274 Example 1, 285 Example 3, 291 Example 3, 317 #29-#34, 321 #33-#36, 331 #26-#30, 341 #25-#27 <i>MathWorks</i> 313, 333 Annotated Teacher's Edition: CE 209 Example 3, 261 Example 4; TT 270

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2. represent functional relationships using written explanations, tables, equations, and graphs, and describing the connections among these representations;	<p>Student Edition: 306-307, 314-317, 318-321</p> <p>Annotated Teacher's Edition: AA 317; CE 307, 315; EL 307; FG 315, 316</p>
3. solve problems involving functional relationships using graphing calculators and/or computers as well as appropriate paper-and-pencil techniques;	<p>Student Edition: 111 #50, 220 #37-#39, 316 #11, 317 #29-#32, 318-321</p> <p><i>MathWorks</i> 313, 333</p> <p><i>Theme</i> 302-303</p> <p>Annotated Teacher's Edition: CE 319; FG 315, 316; LW 320</p>
4. analyze and explain the behaviors, transformations, and general properties of types of equations and functions (for example, linear, quadratic, exponential); and	<p>Student Edition: 318, 320 #12, 324, 328, 338, 340 #5-#8</p> <p><i>Review</i> 343 Lesson 7-4, 344 Lesson 7-8</p> <p>Annotated Teacher's Edition: AA 317, 325, 328; I 318</p>
5. interpret algebraic equations and inequalities geometrically and describing geometric relationships algebraically.	<p>Student Edition: 211 #55, 212, 214 #14, 215 #61, 220 #12, 221 #57, 223 Example 2</p> <p>Annotated Teacher's Edition: CE 213 Example 2, 223 Example 1; EL 213</p>
<p>For students continuing their mathematics education beyond these standards, what they know and are able to do may include:</p>	
<ul style="list-style-type: none"> use rational, polynomial, trigonometric, and inverse functions to model real-world phenomena; 	<p>Student Edition: 306-307, 316 #11, 317 #28-#32, 320 #10-#11, 321 #31-#36, 330 #7-#11, 331 #26-#30, 397 #48-#52, 400 #41-#45, 407 #51-#53</p> <p>Annotated Teacher's Edition: CE 307, 319 Example 4</p>
<ul style="list-style-type: none"> represent and solve problems using linear programming and difference equations; 	<p>Prerequisite skills for this standard, such as the study of linear equations, are found on pages:</p> <p>Student Edition: 318-321</p> <p>Also see Glencoe's <i>MathMatters 2: An Integrated Program</i> © 2006</p> <p>Student Edition: 362-365, 368 #35-#40</p>

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<ul style="list-style-type: none"> • solve systems of linear equations using matrices and vectors; 	<p>The following examples introduce students to concepts and skills needed for solving systems of linear equations.</p> <p>Student Edition: 318-321, 324-327, 328-331, 334, 339-341 <i>MathWorks</i> 333 <i>Review and Practice Your Skills</i> 332</p> <p>Annotated Teacher's Edition: CE 339</p>
<ul style="list-style-type: none"> • describe the concept of continuity of a function; 	<p>Student Edition: 319 <i>Think Back</i> 319</p>
<ul style="list-style-type: none"> • perform operations on and between functions; and 	<p>Student Edition: 318-321, 338-341 <i>Review</i> 343 Lesson 7-4, 344 Lesson 7-8</p> <p>Annotated Teacher's Edition: CE 319, 339; LW 320; TT 319, 338</p>
<ul style="list-style-type: none"> • make the connections between trigonometric functions and polar coordinates, complex numbers, and series. 	<p>Prerequisite skills for this standard, such as patterns are listed in the following references.</p> <p>Student Edition: 128-129</p> <p>Annotated Teacher Edition: 5MW 128</p>

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Standard 3:

Students use data collection and analysis, statistics, and probability in problem solving situations and communicate the reasoning used in solving these problems.

RATIONALE

Statistics are used to understand how information is processed and translated into usable knowledge. Through the study of statistics, students learn to collect, organize, and summarize data. In addition, statistics requires students to use data to ask and answer questions. Students also need to know how to analyze data and make decisions based on their interpretations. Probability extends statistical analysis to predicting the likelihood of future events and outcomes. Students learn probability — the study of chance — so that numerical data can be used to predict future events as well as record the past.

<p>1. design and conduct a statistical experiment to study a problem, and interpret and communicate the results using the appropriate technology (for example, graphing calculators, computer software);</p>	<p>Student Edition: 10 #1-#6, 16 #1-#5, 449 #40, 453 #42, 467 #24 <i>Review 470 Chapter Investigation Theme 3, 101, 433</i></p> <p>Annotated Teacher's Edition: AA 442; CI 433; EL 11, 16, 460, 466; FG 440; T 470</p>
<p>2. analyze statistical claims for erroneous conclusions or distortions;</p>	<p>Student Edition: 443 #30-#31, 460-461</p> <p>Annotated Teacher's Edition: EL 460, 466; FG 440; I 436</p>
<p>3. fit curves to scatter plots, using informal methods or appropriate technology, to determine the strength of the relationship between two data sets and to make predictions;</p>	<p>Student Edition: 35 Example 2, 36 #6, #10, #20, 37 #22</p> <p>Annotated Teacher's Edition: CE 35 Example 2; EL 35; I 34; TT 34</p>
<p>4. draw conclusions about distributions of data based on analysis of statistical summaries (for example, the combination of mean and standard deviation, and differences between the mean and median);</p>	<p>Student Edition: 20-21, 24-27, 28-31, 34-37, 41 #28-#30</p> <p>Annotated Teacher's Edition: CE 21, 25, 29, 35; LW 26</p>
<p>5. use experimental and theoretical probability to represent and solve problems involving uncertainty (for example, the chance of playing professional sports if a student is a successful high school athlete); and</p>	<p>Student Edition: 440-443, 446-449, 450-453, 456-459, 460-461</p> <p>Annotated Teacher's Edition: CE 441, 444, 447, 451, 457, 461</p>

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<p>6. solve real-world problems with informal use of combinations and permutations (for example, determining the number of possible meals at a restaurant featuring a given number of side dishes).</p>	<p>Student Edition: 450-453, 456-459 <i>Review and Practice Your Skills</i> 454 #15-#25, 462 #19-#45</p> <p>Annotated Teacher's Edition: CE 451, 454; DI 450; TT 451, 452, 453</p>
<p><i>For students continuing their mathematics education beyond these standards, what they know and are able to do may include</i></p>	
<ul style="list-style-type: none"> create and interpret discrete and continuous probability distributions, and understand their application to real world situations (for example, insurance); 	<p>Student Edition: 436-439, 440-443, 456-459 <i>Review</i> 468 Lesson 10-1, 469 Lesson 10-2, 470</p> <p>Annotated Teacher's Edition: AA 442; CE 437, 457; EL 439, 458</p>
<ul style="list-style-type: none"> test hypotheses using appropriate statistics; 	<p>Student Edition: 4-9, 24-27, 28-31, 494 #13-#15</p> <p>Annotated Teacher's Edition: CE 29, 33; EL 16; LW 8</p>
<ul style="list-style-type: none"> explore the effect of sample size on the results of statistical surveys using experiments and simulations; and 	<p>Student Edition: 443 #30-#31</p> <p>Annotated Teacher's Edition: FG 440; I 436</p>
<ul style="list-style-type: none"> solve real-world problems with formal use of combinations and permutations. 	<p>Student Edition: 450-453, 456-459 <i>Review and Practice Your Skills</i> 454 #15-#25, 462 #19-#45</p> <p>Annotated Teacher's Edition: CE 451, 454; DI 450; TT 451, 452, 453</p>

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Standard 4:

Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems.

RATIONALE

The process of recording and analyzing shapes and their properties became the branch of mathematics called geometry. Students who understand the concepts and language of geometry are better prepared to learn number and measurement ideas as well as other advanced mathematical topics. Students' spatial capabilities frequently exceed their numerical skills and tapping these strengths can foster an interest in mathematics and improve number understandings and skills. The goals of studying geometry include: understanding of shapes and of two- and three-dimensional relationships, how objects are located in a plane or in space, symmetry and rotation, and visualization from different perspectives. Encouraging students to make and test hypotheses about geometric concepts can begin in the primary grades.

<p>1. find and analyze relationships among geometric figures using transformations (for example, reflections, translations, rotations, dilations) in coordinate systems;</p>	<p>Student Edition: 370-373, 374-375, 380-383 <i>Review</i> 385, 386 <i>Review and Practice Your Skills</i> 378, 379</p> <p>Annotated Teacher's Edition: 5MW 370, 380; AA 374; CE 371, 375, 378, 381; QA 372</p>
<p>2. derive and use methods to measure perimeter, area, and volume of regular and irregular geometric figures;</p>	<p>Student Edition: 62-65, 66-69, 72-73, 80-83, 184-187, 188-191, 194-197</p> <p>Annotated Teacher's Edition: 5MW 90; AA 62, 67, 185, 195; CE 62, 67, 73, 81, 185, 189, 195; EL 81, 189</p>
<p>3. make and test conjectures about geometric shapes and their properties, incorporating technology where appropriate; and</p>	<p>Student Edition: 62 #1-#4, 65 #29, 80 #1-#7</p> <p>Annotated Teacher's Edition: AA 67; DI 68, 82; EL 63, 91; FG 71, TT 89</p>
<p>4. use trigonometric ratios in problem-solving situations (for example, finding the height of a building from a given point, if the distance to the building and the angle of elevation are known).</p>	<p>Student Edition: 84-87</p> <p>Annotated Teacher's Edition: CE 85; DI 84; I 84; LW 86</p>

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<i>For students continuing their mathematics education beyond these standards, what they know and are able to do may include:</i>	
<ul style="list-style-type: none"> deduce properties of figures using vectors; 	<p>This standard can be met in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006</p> <p>Student Edition: 485-492, 493-499, 500-504, 505-511</p>
<ul style="list-style-type: none"> apply transformations, coordinates, and vectors in problem-solving situations; and 	<p>Student Edition: 371 Example 3, 373 #20, 377 #22, #28, #33, 380 #1-#3 <i>MathWorks</i> 379</p> <p>Annotated Teacher's Edition: AA 374; CE 371 Example 3, 381 Example 4</p>
<ul style="list-style-type: none"> describe, analyze, and extend patterns produced by processes of geometric change (for example, limits and fractals). 	<p>Student Edition: 371 Example 373 #21-#23, 381</p> <p>Annotated Teacher's Edition: CE 371 Example 3, 381 Example 4</p>
<p>Standard 5: Students use a variety of tools and techniques to measure, apply the results in problem-solving situations, and communicate the reasoning used in solving these problems.</p>	
<p>RATIONALE <i>Using agreed-upon units, such as inches, kilograms, heartbeats, paces, or degrees, we quantify the world in which we live. Measurement is one way to make numbers meaningful to students. Naturally, measurement is closely allied with geometry (for example, through angular, linear, area, and volume measurements), but measurement involves more than using a ruler and a protractor. Measuring diverse quantities involves making connections within mathematics and across the curriculum. Students need to identify attributes they wish to measure and select the appropriate tools. Further, comparisons of attributes, estimation and approximation allow students to apply measurement to solving problems.</i></p>	
<p>1. measure quantities indirectly using techniques of algebra, geometry, or trigonometry;</p>	<p>Student Edition: 76 #50-#53, 77 #59-#60, 334-337 <i>Are You Ready?</i> 305 <i>Review</i> 334</p> <p>Annotated Teacher's Edition: CE 335</p>
<p>2. select and use appropriate techniques and tools to measure quantities in order to achieve specified degrees of precision, accuracy, and error (or tolerance) of measurements;</p>	<p>Student Edition: 52-55 <i>Practice</i> 60, 61 <i>Review</i> 94</p> <p>Annotated Teacher's Edition: CE 53, 60; QA 54</p>

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3. determine the degree of accuracy of a measurement (for example, by understanding and using significant digits); and	Student Edition: 56, 58 #17, #31, 70-73 Annotated Teacher's Edition: 5MW 52; CE 57 Example 1
4. demonstrate the meanings of area under a curve and length of an arc.	See Glencoe's <i>MathMatters 2: An Integrated Program</i> © 2006 Student Edition: 226-229, 230 #18, 236 #44-#45
<p style="text-align: center;">For students continuing their mathematics education beyond these standards, what they know and are able to do may include:</p>	
<ul style="list-style-type: none"> demonstrate the meanings of area under a curve and length of an arc. 	See Glencoe's <i>MathMatters 2: An Integrated Program</i> © 2006 Student Edition: 226-229, 230 #18, 236 #44-#45
<p>Standard 6: Students link concepts and procedures as they develop and use computational techniques, including estimation, mental arithmetic, paper-and-pencil, calculators, and computers, in problem-solving situations and communicate the reasoning used in solving these problems.</p>	
<p>RATIONALE <i>Computation is an indispensable part of mathematics and our daily lives. We use it to balance our checkbooks, figure our taxes, and make business decisions. The basic facts of addition, subtraction, multiplication, and division are similarly indispensable. Today's students must be able to effectively use a variety of computational tools and techniques including estimation, mental arithmetic, paper-and-pencil, calculators, and computers. Estimation and mental arithmetic serve a practical function in our daily lives, and help students develop meaning for numbers and understanding of number relationships. Computational skill is related to "operation sense". Students build operation sense by modeling their understanding of number operations and their properties, by describing how number operations are related to one another, and by seeing how the use of a particular operation changes the value of the numbers involved.</i></p>	
1. use ratios, proportions, and percents in problem-solving situations;	Student Edition: 84-87, 223 Example 3, 260-263 <i>Review and Practice Your Skills</i> 88 #25-#54 Annotated Teacher's Edition: CE 85; DI 84; I 84; LW 86
2. select and use appropriate algorithms for computing with real numbers in problem-solving situations and determine whether the results are reasonable; and	Student Edition: 12 #23-#27, 69 #29, 72-73, 117 #63, 177 #38-39, 197 #26-#29, 248 #31-#32, 262-263 #40-#43, 270-273, 274-277, 280-283, 284-287, 453 #36-#42, 485 #16-#17 Annotated Teacher's Edition: CE 73

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3. describe the limitations of estimation, and assess the amount of error resulting from estimation within acceptable limits.	Student Edition: 52-55, 63, 70, 91-93, 143, 261 <i>MathWorks</i> 61 Annotated Teacher's Edition: CE 63, 91
<p style="text-align: center;"><i>For students continuing their mathematics education beyond these standards, what they know and are able to do may include:</i></p>	
<ul style="list-style-type: none"> analyze and solve optimization problems; 	Student Edition: 499-501, 506 Annotated Teacher's Edition: CE 499; EL 466
<ul style="list-style-type: none"> analyze different algorithms (for example, sorting) for efficiency; 	The following pages could be used to help meet this standard. See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006 Student Edition: 175 ex 4, 176 #13, 178 #35-#37
<ul style="list-style-type: none"> analyze and use critical path algorithms (for example, determining in which order to perform a set of tasks in a large project); and 	Student Edition: 482, 506 Example 1 Annotated Teacher's Edition: EL 507
<ul style="list-style-type: none"> investigate problem situations that arise in connection with computer validation and the application of algorithms. 	Student Edition: 21 #16, 41 #28, 55 #49-#52, 277 #41-#44, 483 Example 1 Annotated Teacher's Edition: TT 483