



Algebra 1

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STANDARDS

PAGE REFERENCES

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.

RATIONALE

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.

1. demonstrate meanings for real numbers, absolute value, and scientific notation using physical materials and technology in problem-solving situations;

Student Edition:

15-19, 46-52, 61, 322-328, 329-333, 717, 719

Graphing Calculator Lab 328

Teacher Wraparound Edition

AE 16-17, 47-50, 323-324, 330-331; DI 49;

FMC 48; I 47; PE 48; SM 330; SQ 46

2. develop, test, and explain conjectures about properties of number systems and sets of numbers; and

Student Edition:

10-14, 21-25, 26-31, 32-37, 38, 61-63, 358-363, 366-373, 426-431, 717-718

Algebra Lab 27-28

Teacher Wraparound Edition

AE 11-12, 22-23, 27-28, 34-35, 427; EA 29;

FMC 11, 427; SM 12; SQ 21, 26-27; ST 31, 37;

TOD 37

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3. use number sense to estimate and justify the reasonableness of solutions to problems involving real numbers.	Student Edition: 17 Ex 4, 19 #38-#39, 107 Ex 4, 306 #46, 482-484, 495-498, 502-507 <i>Algebra Lab</i> 500-501 Teacher Wraparound Edition AE 17 Ex 4, 483 Ex 6, 503-505
<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: 165-170 Teacher Wraparound Edition AE 167
<ul style="list-style-type: none"> explain relationships among real numbers, complex numbers, and vectors using models. 	See Glencoe’s <i>Geometry</i> © 2008 Student Edition: 534-541 <i>Graphing Calculator Lab</i> 542
<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: 117-120, 122-128, 134, 149-154, 155-161, 172-176, 215-216, 316-320, 471-472, 480-485, 495, 504-506, 510-513 <i>Algebra Lab</i> 59, 72, 500-501 <i>Graphing Calculator Lab</i> 203, 470 <i>Spreadsheet Lab</i> 129 Teacher Wraparound Edition AE 123-124, 215-216, 495

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<p>2. represent functional relationships using written explanations, tables, equations, and graphs, and describing the connections among these representations;</p>	<p>Student Edition: 53-58, 64, 70-75, 81, 143-148, 149-154, 155-161, 165-170, 172-176, 204-209, 214, 502-507 <i>Algebra Lab</i> 59, 72, 145, 237, 509 <i>Graphing Calculator Lab</i> 203, 210-211, 500-501</p>
<p>3. solve problems involving functional relationships using graphing calculators and/or computers as well as appropriate paper-and-pencil techniques;</p>	<p>Student Edition: 53-58, 64, 149-154, 155-161, 164, 172-176, 196-202, 204-209, 213-218 <i>Algebra Lab</i> 59 <i>Graphing Calculator Lab</i> 162-163, 197, 203, 210-211, 309, 478-479, 500-501, 543, 547 Teacher Wraparound Edition FCA 59, 163; PAA 154</p>
<p>4. analyze and explain the behaviors, transformations, and general properties of types of equations and functions (for example, linear, quadratic, exponential); and</p>	<p>Student Edition: 155-161, 196-202, 204-209, 236-241 <i>Algebra Lab</i> 237 <i>Graphing Calculator Lab</i> 197, 210-211, 328, 478-479, 504, 547 Teacher Wraparound Edition AE 156-158, 197-199; FCA 211; FMC 156, 504; I 158; PE 156</p>
<p>5. interpret algebraic equations and inequalities geometrically and describing geometric relationships algebraically.</p>	<p>Student Edition: 31 #49, 53-58, 64, 149-154, 164, 172-176, 196-202, 204-209, 213-218, 294-299, 360-362, 377-380, 389, 401-403 <i>Algebra Lab</i> 142 <i>Graphing Calculator Lab</i> 203, 210-211 Teacher Wraparound Edition AE 54-56, 150-151, 173-174, 295-296; FCA 142</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: 147, 377-380, 384-388, 391-394, 412-414, 577-582, 584-587, 591-593, 596-598, 626-630 <i>Graphing Calculator Lab</i> 470, 500-501 Teacher Wraparound Edition AE 385, 391, 578-579, 584, 591, 596 Ex 3, 627-628; PAA 381</p>

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<ul style="list-style-type: none"> represent and solve problems using linear programming and difference equations; 	<p>This standard can be met in Glencoe's <i>Algebra 2</i> © 2008</p> <p>Student Edition: 138-144, 152 #35, 167 #37</p>
<ul style="list-style-type: none"> solve systems of linear equations using matrices and vectors; 	<p>This standard can be met in Glencoe's <i>Algebra 2</i> © 2008</p> <p>Student Edition: 216-222, 224 #69-#70, 251 #55, 258 #60</p>
<ul style="list-style-type: none"> describe the concept of continuity of a function; 	<p>Student Edition: 55-56, 58</p> <p>Teacher Wraparound Edition AE 56 Ex 5; PAA 161</p>
<ul style="list-style-type: none"> perform operations on and between functions; and 	<p>Student Edition: 149-154, 155-161, 172-176, 196-201, 213-218, 220-225, 236-241, 253-257, 261-265, 266-270, 272-278, 280-285, 286-288, 289, 543</p> <p><i>Graphing Calculator Lab</i> 210-211, 259</p> <p>Teacher Wraparound Edition AE 150-151, 156-158, 173-174, 237-239; FCA 211; SQ 155</p>
<ul style="list-style-type: none"> make the connections between trigonometric functions and polar coordinates, complex numbers, and series. 	<p>This standard can be met in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006</p> <p>Student Edition: 553-560, 568-573</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: 672-676, 677-683, 743, 755 <i>Algebra Lab</i> 678 <i>Graphing Calculator Lab</i> 234-235 Teacher Wraparound Edition AE 673-674, 678-679; FCA 235; FMC 678; M 673; PAA 676; SQ 672, 677</p>
<p>2. analyze statistical claims for erroneous conclusions or distortions;</p>	<p>This standard can be met in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006 Student Edition: 877, 927-932</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: 227-233, 246, 247, 320 #53, 515-516 <i>Algebra Lab</i> 228 Teacher Wraparound Edition AE 228-230; FCA 516; PAA 233; SM 230; SQ 227-228</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: 84 #54, 672-676, 677-683, 743, 755 <i>Algebra Lab</i> 678 <i>Graphing Calculator Lab</i> 234-235 Teacher Wraparound Edition AE 673-674, 678-679; FCA 235; FMC 678; M 673; PAA 676; SQ 672, 677</p>

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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	Student Edition: 663-669, 672-676, 677-683, 743, 755 <i>Algebra Lab</i> 678 Teacher Wraparound Edition AE 664-666, 673-674, 678-679; DI 664; FMC 665; I 666; PAA 680; SQ 663-664, 672, 677
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).	Student Edition: 655-661, 686, 689, 742, 755 Teacher Wraparound Edition AE 656-657; PAA 662; PE 656, 658
For students continuing their mathematics education beyond these standards, what they know and are able to do may include	
<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); 	Student Edition: 672-676, 687, 743, 755 Teacher Wraparound Edition AE 673-674; M 673; PAA 676; SQ 672
<ul style="list-style-type: none"> test hypotheses using appropriate statistics; 	Student Edition: 677-683, 688, 743, 755 Teacher Wraparound Edition AE 678-679
<ul style="list-style-type: none"> explore the effect of sample size on the results of statistical surveys using experiments and simulations; and 	Student Edition: 677-683, 743 <i>Algebra Lab</i> 678 Teacher Wraparound Edition AE 679; FMC 678
<ul style="list-style-type: none"> solve real-world problems with formal use of combinations and permutations. 	Student Edition: 655-661, 686, 689, 742, 755 Teacher Wraparound Edition AE 656-657; PAA 662; PE 656, 658

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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.

1. find and analyze relationships among geometric figures using transformations (for example, reflections, translations, rotations, dilations) in coordinate systems;	Student Edition: 66, 363 #64, 373 #56 <i>Algebra Lab</i> 237, 365 Teacher Wraparound Edition SQ 236
2. derive and use methods to measure perimeter, area, and volume of regular and irregular geometric figures;	Student Edition: 8 #23, 9 #44 & #46-#48, 14 #47, 31, 32 #21, 35 #9, 67 #7-#8, 72, 74-75, 96 #42, 100 Ex 4, 101 #10, 102 #44, 121 #35, 333 #41, 360-362, 370-371, 373, 377-381, 400-402 <i>Algebra Lab</i> 27-28, 72, 142, 365 Teacher Wraparound Edition AE 72, 100 Ex 4; FA 142; FCA 142
3. make and test conjectures about geometric shapes and their properties, incorporating technology where appropriate; and	Student Edition: 31 #46 & #49, 43 #35-#38, 238-241, 305 #12, 306 #46, 373 #56 <i>Algebra Lab</i> 72, 142, 365 Teacher Wraparound Edition AE 238 Ex 2; FA 142; FCA 142; GC 239; PAA 241
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).	This standard can be met in Glencoe's <i>Geometry</i> © 2008 Student Edition: 460 #9, 461 #50-#51, 463 #5, 464-470, 474 ex 3, 475 #5, 476 #28, 477 #40-#41, 489 #27-#30, 491 #20, 503 #5, 509 #47

STANDARDS	PAGE REFERENCES
<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; 	This standard can be met in Glencoe's <i>Geometry</i> © 2008 Student Edition: 534-541 <i>Graphing Calculator Lab</i> 542
<ul style="list-style-type: none"> apply transformations, coordinates, and vectors in problem-solving situations; and 	Student Edition: <i>Graphing Calculator Lab</i> 504 Teacher Wraparound Edition FMC 504
<ul style="list-style-type: none"> describe, analyze, and extend patterns produced by processes of geometric change (for example, limits and fractals). 	Student Edition: 31 #49, 36 #23, 43 #37-#38, 51 #61-#63, 373 #56 <i>Graphing Calculator Lab</i> 589 Teacher Wraparound Edition PAA 559
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.	
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>	
1. measure quantities indirectly using techniques of algebra, geometry, or trigonometry;	Student Edition: 31 #46 & #49, 43 #37-#38, 329, 331, 345 #44, 377-381, 389, 400-403, 412-414, 549-554, 555-559, 560-565 Teacher Wraparound Edition AE 377 Ex 2, 550-551, 556, 561-562; PAA 551, 565

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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;	Student Edition: 322-323, 326 #37-#38, 327 #52, 329, 331, 345 #44 Teacher Wraparound Edition AE 323; RWC 331; SQ 322
3. determine the degree of accuracy of a measurement (for example, by understanding and using significant digits); and	Student Edition: 322-323, 326 #37-#38, 327 #52, 329, 331, 345 #44 <i>Graphing Calculator Lab</i> 234-235 Teacher Wraparound Edition RWC 331; TT 234
4. demonstrate the meanings of area under a curve and length of an arc.	This standard can be met in Glencoe's <i>Geometry</i> © 2008 Student Edition: 578-586, 587 #14, 596 #40-#42, 606 #50-#52, 622 #35-#40, 625 #9, 627 #9 <i>Geometry Lab</i> 587-598
<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"> demonstrate the meanings of area under a curve and length of an arc. 	This standard can be met in Glencoe's <i>Geometry</i> © 2008 Student Edition: 578-586, 587 #14, 596 #40-#42, 606 #50-#52, 622 #35-#40, 625 #9, 627 #9 <i>Geometry Lab</i> 587-598

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<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>	
<p>1. use ratios, proportions, and percents in problem-solving situations;</p>	<p>Student Edition: 105-110, 111-115, 116, 133, 187-195, 196-201, 560-565, 570, 577-582 <i>Algebra Lab</i> 186 Teacher Wraparound Edition AE 106-107, 112-113, 189-191, 561-562, 578-579; FMC 107; I 106; PAA 112, 195; PE 113; SQ 187-188</p>
<p>2. select and use appropriate algorithms for computing with real numbers in problem-solving situations and determine whether the results are reasonable; and</p>	<p>Student Edition: 10-14, 78-83, 85-90, 92-97, 98-103, 105-109, 390-395, 398-403, 404-409, 411-414, 426-431, 434-439, 441-445, 447-452, 454-460, 462-464 <i>Algebra Lab</i> 77, 91 Teacher Wraparound Edition AE 11-12, 79-80; FMC 11; SM 12; SQ 10</p>
<p>3. describe the limitations of estimation, and assess the amount of error resulting from estimation within acceptable limits.</p>	<p>Student Edition: 322, 326 #37-#38, 327 #52, 482-484 Teacher Wraparound Edition AE 484 Ex 6; SQ 322</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"> analyze and solve optimization problems; 	<p>This standard can be met in Glencoe's <i>Algebra 2</i> © 2008 Student Edition: 140-141 Example 3, 142-144 #13-#14, #32-#33, #38, #43, 152 #35, 239-240 Example 4, 241-243 #11, #53-#54, #56, #66, 300 #44-#45</p>

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<ul style="list-style-type: none"> analyze different algorithms (for example, sorting) for efficiency; 	<p>This standard can be met in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006</p> <p>Student Edition: 175 ex 4, 176 #13, 178 #35-#37</p>
<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 	<p>This standard can be met in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006</p> <p>Student Edition: 504 #39, 606 #38</p>
<ul style="list-style-type: none"> investigate problem situations that arise in connection with computer validation and the application of algorithms. 	<p>This standard can be met in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006</p> <p>Student Edition: 504 #39, 606 #38</p>