



Geometry

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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:

13-20

Prerequisite Skills 778-779, 790-791, 798-799

Teacher Wraparound Edition

AE 22, 23; I 23; PA 23

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

Student Edition:

78 ex 1, 80 #9-#14, 85 ex 2, 90 #56-#61, 111, 112 ex 1 – ex 2, 114 #1-#3, 115 #8-#17, 117 #36-#37, 123 #19-#22, 135 #30-#33

Teacher Wraparound Edition

AE 9, 112; PA 82; TNT 79

STANDARDS	PAGE REFERENCES
<p>3. use number sense to estimate and justify the reasonableness of solutions to problems involving real numbers.</p>	<p>Student Edition: 19 #48-#51, 20 #56-#58, 22 ex 2, 47 #44-#49, 441 ex 1, 442 ex 2, 444 #4, 445 #34</p> <p>Teacher Wraparound Edition AE 22, 441, 442</p>
<p><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 	<p>This standard can be met in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006</p> <p>Student Edition: 774-783</p>
<ul style="list-style-type: none"> explain relationships among real numbers, complex numbers, and vectors using models. 	<p>Student Edition: 534-541, 546 #34-#38, 547 #23-#25, 561 #68-#71, 569 #62</p> <p><i>Graphing Calculator Lab</i> 542</p> <p>Teacher Wraparound Edition A 541; AE 535, 536, 537; F 537</p>
<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</p> <p><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.</i></p> <p><i>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>	
<p>1. model real-world phenomena (for example, distance-versus-time relationships, compound interest, amortization tables, mortality rates) using functions, equations, inequalities, and matrices;</p>	<p>Student Edition: 157 ex 2, 160 #3-#5, 161 #40-#42, 167 ex 5, 168 #11-#12, 169 #33-#34, 170 #45, 187 #44, 193 #23</p> <p>Teacher Wraparound Edition AE 158, 167</p>

STANDARDS	PAGE REFERENCES
<p>2. represent functional relationships using written explanations, tables, equations, and graphs, and describing the connections among these representations;</p>	<p>Student Edition: 165-170, 176 #7, 179 #39-#42, 193 #19-#23, 195 #12-#15 <i>Geometry Lab</i> 171 <i>Graphing Calculator Lab</i> 180 Teacher Wraparound Edition A 170; AE 166, 167; T 180</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: 165-170, 176 #7, 179 #39-#42, 193 #19-#23, 195 #12-#15 <i>Geometry Lab</i> 171 <i>Graphing Calculator Lab</i> 180 Teacher Wraparound Edition A 170; AE 166, 167; T 180</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: 162 #48 Teacher Wraparound Edition PA 187</p>
<p>5. interpret algebraic equations and inequalities geometrically and describing geometric relationships algebraically.</p>	<p>Student Edition: 156-163, 165-170, 175 ex 4, 184 ex 3, 187 #42-#43, 187 #42-#43, 192 #14 <i>Geometry Lab</i> 171 <i>Graphing Calculator Lab</i> 180 Teacher Wraparound Edition A 163; AE 157, 158, 159, 166, 167, 175; GL 158; PA 163, 187; T 171</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"> • use rational, polynomial, trigonometric, and inverse functions to model real-world phenomena; 	<p>Student Edition: 456-462, 463 #5, 464-470, 471-477 Teacher Wraparound Edition A 470; AE 458, 465, 466</p>
<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>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006 Student Edition: 112-118</p>

STANDARDS	PAGE REFERENCES
<ul style="list-style-type: none"> • solve systems of linear equations using matrices and vectors; 	<p>Solving systems of equations without matrices can be found on the following pages:</p> <p>Student Edition: 273 ex 2, 274 #3, 275 #16-#18 <i>Prerequisite Skills</i> 788-789</p> <p>Teacher Wraparound Edition AE 273</p>
<ul style="list-style-type: none"> • describe the concept of continuity of a function; 	<p>This standard can be met in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006</p> <p>Student Edition: 159-168</p>
<ul style="list-style-type: none"> • perform operations on and between functions; and 	<p>Student Edition: 456-462, 463 #5, 464-470, 471-477</p> <p>Teacher Wraparound Edition A 470; AE 458, 465, 466</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>
<p>Standard 3: Students use data collection and analysis, statistics, and probability in problem solving situations and communicate the reasoning used in solving these problems.</p>	
<p>RATIONALE</p> <p><i>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.</i></p>	
<ol style="list-style-type: none"> 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>Student Edition: <i>Graphing Calculator Lab</i> 155, 542</p> <p>Teacher Wraparound Edition T 542</p>
<ol style="list-style-type: none"> 2. analyze statistical claims for erroneous conclusions or distortions; 	<p>This standard can be met in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006</p> <p>Student Edition: 877, 927-932</p>

STANDARDS	PAGE REFERENCES
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;	Student Edition: <i>Cross-Curricular Project 23</i>
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);	Student Edition: 565 ex 3, 567 #9, 670 #19-#22, 843 #9, 847 #17-#18, 851 #19-#20, 856 #8
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: 587 #19, 665-671, 674 #23-#24, 675 #11-#13, 847 #19, 856 #9
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: 300 #29
<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"> create and interpret discrete and continuous probability distributions, and understand their application to real world situations (for example, insurance); 	<p>This standard can be met in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006</p> <p>Student Edition: 852 ex 1, 856 #12</p>
<ul style="list-style-type: none"> test hypotheses using appropriate statistics; 	<p>This standard can be met in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006</p> <p>Student Edition: 897-907, 908-917</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>This standard can be met in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2006</p> <p>Student Edition: 927-932</p>
<ul style="list-style-type: none"> solve real-world problems with formal use of combinations and permutations. 	Student Edition: 300 #29

STANDARDS

PAGE REFERENCES

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: 497-503, 504-509, 510-517, 518 #7-#8, 525-532 <i>Geometry Lab</i> 496</p> <p>Teacher Wraparound Edition A 503, 509; AE 498, 499, 505, 506, 511, 512, 513, 526, 527; DI 505, 512; F 512; PA 509</p>
<p>2. derive and use methods to measure perimeter, area, and volume of regular and irregular geometric figures;</p>	<p>Student Edition: 19 #43-#44, 51 ex 2, 52 ex 3, 53 ex 4, 54 #5, 55 #20-#23, 56 #31-#36, 57 #31-#32, 66 #36-#39, 71 #32, 73 #17-#18, 75 #7, 630-636, 638-647 <i>Graphing Calculator</i> 637</p> <p>Teacher Wraparound Edition A 57; AE 51, 52, 53, 639</p>
<p>3. make and test conjectures about geometric shapes and their properties, incorporating technology where appropriate; and</p>	<p>Student Edition: 37 #41-#43, 56 #48, 57 #31-#32, 79 ex 2, 80 #3-#4, 133 #11-#12, 318 <i>Geometry Lab</i> 22, 30, 158, 209, 235, 282, 320 <i>Geometry Software Lab</i> 58-59, 148 <i>Graphing Calculator Lab</i> 155</p> <p>Teacher Wraparound Edition A 59; AE 79; T 58</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: 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</p> <p>Teacher Wraparound Edition A 470; AE 465, 466, 474; DI 466; PA 465; T 464</p>

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; 	<p>Student Edition: 534-541 <i>Graphing Calculator Lab 542</i></p>
<ul style="list-style-type: none"> apply transformations, coordinates, and vectors in problem-solving situations; and 	<p>Student Edition: 500 ex 3, 502 #33-#34, 505 ex 2, 505 ex 2, 507 #18-#19, 513 ex 3, 528 ex 5, 530 #32-#33, 538 #8, 540 #51-#53, 544 #14, 546 #33, 547 #26, 549 #11 <i>Graphing Calculator Lab 542</i></p> <p>Teacher Wraparound Edition AE 500, 528, 537</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: <i>Geometry Lab 423</i></p> <p>Teacher Wraparound Edition A 423; T 423</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.</i></p> <p><i>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>	
<ol style="list-style-type: none"> measure quantities indirectly using techniques of algebra, geometry, or trigonometry; 	<p>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</p> <p>Teacher Wraparound Edition A 470; AE 465, 466, 474; DI 466; PA 465; T 464</p>

STANDARDS	PAGE REFERENCES
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; and	Student Edition: 14 ex 3, 17 #5-#6, 18 #16-#21, 19 #48-#51, 69 #14 <i>Study Tip</i> 14 Teacher Wraparound Edition AE 14; PA 14
3. determine the degree of accuracy of a measurement (for example, by understanding and using significant digits).	Student Edition: 14 ex 3, 17 #5-#6, 18 #16-#21, 19 #48-#51, 69 #14 <i>Study Tip</i> 14 Teacher Wraparound Edition AE 14; PA 14
4. demonstrate the meanings of area under a curve and length of an arc.	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 Teacher Wraparound Edition A 586; AE 579, 580, 581, 582; PA 586
<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. 	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 Teacher Wraparound Edition A 586; AE 579, 580, 581, 582; PA 586

STANDARDS

PAGE REFERENCES

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.

RATIONALE

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.

1. use ratios, proportions, and percents in problem-solving situations;

Student Edition:

380 ex 1, 382 ex 4, 383 #8-#11, 384 #30-#34, 385 #35-#36, 389 ex 2, 391 ex 5, 392 #3, 393 #20-#21, 394 #24-#25, 400 ex 3, 401 #12-#13, 408 ex 4, 410 #10

Teacher Wraparound Edition

AE 381, 382, 389, 390, 391, 408

2. select and use appropriate algorithms for computing with real numbers in problem-solving situations and determine whether the results are reasonable; and

This standard is met throughout the text, see the following representatives:

Student Edition:

380 ex 1, 382 ex 4, 383 #8-#11, 384 #30-#34, 385 #35-#36, 389 ex 2, 391 ex 5, 392 #3, 393 #20-#21, 394 #24-#25, 400 ex 3, 401 #12-#13, 408 ex 4, 410 #10, 882-840

Teacher Wraparound Edition

AE 381, 382, 389, 390, 391, 408

3. describe the limitations of estimation, and assess the amount of error resulting from estimation within acceptable limits.

Student Edition:

14 ex 3, 17 #5-#6, 18 #16-#21, 19 #48-#51, 69 #14
Study Tip 14

Teacher Wraparound Edition

AE 14; PA 14

For students continuing their mathematics education beyond these standards, what they know and are able to do may include:

- analyze and solve optimization problems;

Student Edition:

139 #9

STANDARDS	PAGE REFERENCES
<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>