



COLORADO
Content Standards Mathematics Grades 9-12
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OBJECTIVES	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. In order to meet this standard, a student will	
<ul style="list-style-type: none"> construct and interpret number meanings through real-world experiences* and the use of hands-on materials; 	SE: 13-19, 21-27, 282-287, 325-331, 342-348, 352-353 Ex 4 <i>Geometry Activity 28, 349</i> <i>Spreadsheet Investigation 288</i>
<ul style="list-style-type: none"> represent and use numbers in a variety of equivalent forms (<i>for example, fractions, decimals, percents, exponents*, scientific notation*</i>); 	SE: 13-19, 21-27, 145-150, 222-226, 282-287
<ul style="list-style-type: none"> know the structure and properties of the real number system* (<i>for example, primes*, factors, multiples, relationships among sets of numbers</i>); and 	SE: <i>Prerequisite Skills 744-745, 750-751</i>
<ul style="list-style-type: none"> use number sense, including estimation and mental arithmetic, to determine the reasonableness of solutions. 	SE: 21-22 Ex 2, 43 #44-49, 49 #29-31, 350-355, 364-370, 371-376, 377-383, 385-390, 601-609, 610-616
GRADES 9-12 As students in grades 9-12 extend their knowledge, what they know and are able to do includes	
<ul style="list-style-type: none"> demonstrating meanings for real numbers, absolute value*, and scientific notation using physical materials and technology in problem-solving situations; 	SE: 21-27, 342-348, 350-356, 357-363 <i>Prerequisite Skills 734-735, 744-745</i>
<ul style="list-style-type: none"> developing, testing, and explaining conjectures about properties of number systems and sets of numbers; and 	SE: 97 #4-#7, 98 #20, 106 #32-#34, 119 #39-#40 <i>Practice Quiz 100 #1</i>
<ul style="list-style-type: none"> using number sense to estimate and justify the reasonableness of solutions to problems involving real numbers. 	SE: 21-22 Ex 2, 43 #44-49, 49 #29-31, 350-355, 364-370, 371-376, 377-383, 385-390, 601-609, 610-616
For students continuing their mathematics education beyond these standards, what they will know and are able to do may include	
<ul style="list-style-type: none"> investigating limiting processes by examining infinite sequences and series; and 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 774-783, 786-793, 794-800, 805 #40
<ul style="list-style-type: none"> explaining relationships among real numbers, complex numbers*, and vectors* using models. 	SE: Vectors can be found on pages 498-505.

OBJECTIVES	PAGE REFERENCES
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.	
In order to meet this standard, a student will	
<ul style="list-style-type: none"> identify, describe, analyze, extend, and create a wide variety of patterns in numbers, shapes, and data; 	SE: 62 Ex 1, 140, 325-331, 357-363, 404 <i>Geometry Activity</i> 38, 88, 324, 365 <i>Spreadsheet Investigation</i> 708-709
<ul style="list-style-type: none"> describe patterns using mathematical language; 	SE: 62 Ex 1, 140, 325-331, 357-363, 404 <i>Geometry Activity</i> 38, 88, 324, 365 <i>Spreadsheet Investigation</i> 708-709
<ul style="list-style-type: none"> solve problems and model real-world situations using patterns and functions; 	SE: 364-370, 371-376, 377-383, 385-390 TWE: DI 372
<ul style="list-style-type: none"> compare and contrast different types of functions; and 	SE: 364-370, 371-376 <i>Geometry Activity</i> 365, 391
<ul style="list-style-type: none"> describe the connections among representations of patterns and functions, including words, tables, graphs, and symbols. 	SE: 27 #58, 146 Ex 3, 147 Ex 5, 164 #39-#43
GRADES 9-12	
As students in grades 9-12 extend their knowledge, what they know and are able to do includes	
<ul style="list-style-type: none"> modeling real-world phenomena (<i>for example, distance-versus-time relationships, compound interest, amortization tables, mortality rates</i>) using functions, equations, inequalities, and matrices*; 	SE: 149 #48
<ul style="list-style-type: none"> representing functional relationships using written explanations, tables, equations, and graphs, and describing the connections among these representations; 	SE: 364-370, 371-376 <i>Geometry Activity</i> 365 <i>Geometry Software Investigation</i> 384
<ul style="list-style-type: none"> solving problems involving functional relationships using graphing calculators and/or computers as well as appropriate paper-and-pencil techniques; 	SE: 364-370, 371-376, 377-383, 385-390 <i>Geometry Activity</i> 391 <i>Geometry Software Investigation</i> 384
<ul style="list-style-type: none"> analyzing and explaining the behaviors, transformations*, and general properties of types of equations and functions (<i>for example, linear, quadratic*, exponential*</i>); and 	SE: 149 #52
<ul style="list-style-type: none"> interpreting algebraic equations and inequalities geometrically and describing geometric relationships algebraically. 	SE: 133-138, 139-144, 159-164, 200-206, 207-213, 222-226, 463-469, 470-475, 476-482, 490-497
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"> using rational, polynomial, trigonometric, and inverse functions to model real-world phenomena; 	SE: 364-370, 371-376, 377-383, 385-390 <i>Geometry Activity</i> 365 TWE: DI 372
<ul style="list-style-type: none"> representing and solving problems using linear programming and difference equations; 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 112-118, 122 #51, 123 #54

OBJECTIVES	PAGE REFERENCES
<ul style="list-style-type: none"> solving systems of linear equations using matrices and vectors; 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 98-105, 122 #45-#48, 123 #54
<ul style="list-style-type: none"> describing the concept of continuity of a function; 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 159-168, 179 #41, 199 #35-#37 <i>Graphing Calculator Exploration</i> 169
<ul style="list-style-type: none"> performing operations on and between functions; and 	SE: 364-370, 371-376, 377-383, 385-390 <i>Geometry Activity</i> 391 <i>Geometry Software Investigation</i> 384
<ul style="list-style-type: none"> making the connections between trigonometric functions and polar coordinates, complex numbers, and series. 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 553-560, 561-567, 568-573, 586-591, 593-598
STANDARD 3: Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning used in solving these problems. In order to meet this standard, a student will	
<ul style="list-style-type: none"> solve problems by systematically collecting, organizing, describing, and analyzing data using surveys, tables, charts, and graphs; 	SE: 791 #2-#4 <i>WebQuest</i> 23
<ul style="list-style-type: none"> make valid inferences, decisions, and arguments based on data analysis; and 	SE: 20, 245 #35-#38, 296 #58
<ul style="list-style-type: none"> use counting techniques, experimental probability, or theoretical probability, as appropriate, to represent and solve problems involving uncertainty. 	SE: 265 #48-49, 527 #56-57, 622-627, 700 #28 <i>Geometry Activity</i> 20
GRADES 9-12 As students in grades 9-12 extend their knowledge, what they know and are able to do includes	
<ul style="list-style-type: none"> designing and conducting a statistical experiment to study a problem, and interpreting and communicating the results using the appropriate technology (<i>for example, graphing calculators, computer software</i>); 	SE: <i>Geometry Activity</i> 406 <i>Spreadsheet Investigation</i> 288 <i>WebQuest</i> 23, 164 TWE: GA 406 TS 401
<ul style="list-style-type: none"> analyzing statistical claims for erroneous conclusions or distortions; 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 927-932, 936 #36-#39 <i>Graphing Calculator Exploration</i> 877
<ul style="list-style-type: none"> fitting 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; 	SE: <i>WebQuest</i> 23
<ul style="list-style-type: none"> drawing conclusions about distributions of data based on analysis of statistical summaries (<i>for example, the combination of mean and standard deviation, and differences between the mean and median</i>); 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 111 #33, 150 #43, 897-907, 908-917, 925 #23, 934 #14-#18, 935 #19-#22, 937 #41, 939 #9

OBJECTIVES	PAGE REFERENCES
<ul style="list-style-type: none"> using experimental and theoretical probability to represent and solve problems involving uncertainty (<i>for example, the chance of playing professional sports if a student is a successful high school athlete</i>); and 	SE: 265 #48-49, 527 #56-57, 622-627, 700 #28 <i>Geometry Activity 20</i>
<ul style="list-style-type: none"> solving real-world problems with informal use of combinations and permutations* (<i>for example, determining the number of possible meals at a restaurant featuring a given number of side dishes</i>). 	SE: 265 #48, 278 #4
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"> creating and interpreting discrete and continuous probability distributions, and understanding their application to real-world situations (<i>for example, insurance</i>); 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 852 Ex 1, 856 #12
<ul style="list-style-type: none"> testing hypotheses using appropriate statistics; 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 111 #33, 150 #43, 897-907, 908-917, 925 #23, 934 #14-#18, 935 #19-#22, 937 #41, 939 #9
<ul style="list-style-type: none"> exploring the effect of sample size on the results of statistical surveys using experiments and simulations; and 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 928
<ul style="list-style-type: none"> solving real-world problems with formal use of combinations and permutations. 	SE: 265 #48, 278 #4
STANDARD 4: Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems. In order to meet this standard, a student will	
<ul style="list-style-type: none"> connect various physical objects with their geometric representation; 	SE: 49 #15-18, 189 #11-14, 212 #29, 251 #16, 271 #9, 304 #41-42, 321 #28, 355 #40-43, 607 #38-39, 665 #32
<ul style="list-style-type: none"> connect mathematical concepts from across the standards with their geometric representations; 	SE: 62-66, 139-144, 159-164, 342-348, 350-356, 364-370, 377-383 <i>Geometry Activity 349, 365</i> <i>Geometry Software Investigation 384</i>
<ul style="list-style-type: none"> recognize, draw, describe, and analyze geometric shapes in one, two, and three dimensions; 	SE: 6-11, 29-36, 45-50, 126-131, 178-183, 666-670, 671-676 <i>Reading Mathematics 12</i> <i>Geometry Activity 44, 126</i> TWE: RM 12
<ul style="list-style-type: none"> make, investigate, and test conjectures about geometric ideas; and 	SE: 62-66, 94-100, 101-106, 107-114 <i>Geometry Activity 22, 28, 32, 38, 184</i> <i>Geometry Software Investigation 101</i>
<ul style="list-style-type: none"> solve problems and model real-world situations using geometric concepts. 	SE: 26 #46-47, 156 #40-41, 259 #31, 265 #45-46, 300 Ex 3, 305 #43, 314 #43, 615 #45-47, 658 #22

OBJECTIVES	PAGE REFERENCES
GRADES 9-12	
As students in grades 9-12 extend their knowledge, what they know and are able to do includes	
<ul style="list-style-type: none"> finding and analyzing relationships among geometric figures using transformations (<i>for example, reflections, translations, rotations, dilations</i>*) in coordinate systems*; 	SE: 463-469, 470-475, 476-482, 483-488, 490-497, 498-505 <i>Geometry Activity</i> 462, 506-511 TWE: UM 466
<ul style="list-style-type: none"> deriving and using methods to measure perimeter, area, and volume of regular and irregular geometric figures; 	SE: 601-609, 610-616, 617-621, 649-654, 660-665 <i>Geometry Activity</i> 595, 601, 611, 672 <i>Geometry Software Investigation</i> 51-52
<ul style="list-style-type: none"> making and testing conjectures about geometric shapes and their properties, incorporating technology where appropriate; and 	SE: 140, 298, 404 <i>Construction</i> 200, 202, 207 <i>Geometry Activity</i> 184, 365, 524, 672 <i>Geometry Software Investigation</i> 384
<ul style="list-style-type: none"> using trigonometric ratios* in problem-solving situations (<i>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</i>). 	SE: 364-370, 371-376, 377-383, 385-390 <i>Geometry Activity</i> 365 TWE: DI 372 TT 375
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"> deducing properties of figures using vectors*; 	SE: 498-505
<ul style="list-style-type: none"> applying transformations, coordinates, and vectors in problem-solving situations; and 	SE: 463-469, 470-475, 476-482, 483-488, 490-497, 498-505 <i>Geometry Activity</i> 462, 506-511 TWE: UM 466
<ul style="list-style-type: none"> describing, analyzing, and extending patterns produced by processes of geometric change (<i>for example, limits and fractals</i>). 	SE: 325-331, 356 #56-59 <i>Geometry Activity</i> 324 TWE: DI 327 OEA 331
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.	
In order to meet this standard, a student will	
<ul style="list-style-type: none"> understand and apply the attributes of length, capacity*, weight, mass, time, temperature, perimeter, area, volume, and angle measurement in problem-solving situations; 	SE: 13-19, 21-27, 29-36, 595-600, 601-609, 610-616, 617-621, 688-694, 696-701, 702-706
<ul style="list-style-type: none"> make and use direct and indirect measurements to describe and compare real-world phenomena; 	SE: 13-19, 29-36, 159-164, 304-305 #41-43, 321 #28, 364-370 <i>Construction</i> 200, 202, 207
<ul style="list-style-type: none"> understand the structure and use of systems of measurement; 	SE: 13-19, 29-36 <i>Prerequisite Skills</i> 730-731, 732-733
<ul style="list-style-type: none"> describe and use rates of change (<i>for example, temperature as it changes throughout the day, or speed as the rate of change of distance over time</i>) and other derived measures; and 	SE: 140 Ex 2, 143 #39-41

OBJECTIVES	PAGE REFERENCES
<ul style="list-style-type: none"> select appropriate units, including metric and U.S. customary, and tools (<i>for example, rulers, protractors, compasses, thermometers</i>) to measure to the degree of accuracy required to solve a given problem. 	SE: 13-19, 29-36 <i>Geometry Activity</i> 38, 365 TWE: DI 300, 372 TT 375
GRADES 9-12	
As students in grades 9-12 extend their knowledge, what they know and are able to do includes	
<ul style="list-style-type: none"> measuring quantities indirectly using techniques of algebra, geometry, or trigonometry*; 	SE: 282-287, 289-297, 300 Ex 4, 303 #32, 304 #41-43, 350-356, 357-362, 364-370, 371-376 TWE: DI 372
<ul style="list-style-type: none"> selecting and using appropriate techniques and tools to measure quantities in order to achieve specified degrees of precision, accuracy, and error (or tolerance) of measurements; and 	SE: 13-19, 29-36 <i>Geometry Activity</i> 38, 365 TWE: DI 300, 372 TT 375
<ul style="list-style-type: none"> determining the degree of accuracy of a measurement (<i>for example, by understanding and using significant digits</i>). 	SE: 14, 17 #16-21, 18 #50
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"> demonstrating the meanings of area under a curve and length of an arc. 	SE: 532, 620 #25-27
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.	
In order to meet this standard, a student will	
<ul style="list-style-type: none"> model, explain, and use the four basic operations - addition, subtraction, multiplication, and division - in problem-solving situations; 	SE: 21-27, 37-43, 133-138, 178-183, 185-191, 238-245, 282-287, 357-363, 431-437, 522-528
<ul style="list-style-type: none"> develop, use, and analyze algorithms*; and 	SE: 62-66, 139-144, 145-149, 222-226, 241-242 Ex 3, 255-260 <i>Geometry Activity</i> 22, 601, 611
<ul style="list-style-type: none"> select and apply appropriate computational techniques to solve a variety of problems and determine whether the results are reasonable. 	SE: 21-27, 133-138, 139-144, 145-149, 222-226, 357-363, 364-370, 385-390, 655-659, 689-694
GRADES 9-12	
As students in grades 9-12 extend their knowledge, what they know and are able to do includes	
<ul style="list-style-type: none"> using ratios, proportions, and percents in problem-solving situations; 	SE: 282-287, 289-297, 298-306, 307-315, 316-323, 599 #32-35 TWE: DI 283, 300 TT 291
<ul style="list-style-type: none"> selecting and using appropriate methods for computing with real numbers in problem-solving situations from among mental arithmetic, estimation, paper-and-pencil, calculator, and computer methods, and determining whether the results are reasonable; and 	SE: 26 #48-49, 298-306, 350-356, 364-370, 377-383, 424-430 <i>Geometry Activity</i> 20 <i>Spreadsheet Investigation</i> 288, 410, 695

OBJECTIVES	PAGE REFERENCES
<ul style="list-style-type: none"> describing the limitations of estimation, and assessing the amount of error resulting from estimation within acceptable limits. 	SE: 19 #52-#55
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"> analyzing and solving optimization problems*; 	SE: 123 #14
<ul style="list-style-type: none"> analyzing different algorithms (<i>for example, sorting</i>) for efficiency; 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 171, 175 Ex 4, 176 #12, 178 #35-#37, 201 #61
<ul style="list-style-type: none"> analyzing and using critical path algorithms (<i>for example, determining in which order to perform a set of tasks in a large project</i>); and 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 504 #39, 606 #38
<ul style="list-style-type: none"> investigating problem situations that arise in connection with computer validation and the application of algorithms. 	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 SE: 504 #39, 606 #38

Codes Used for TWE Pages

DI	Differentiated Instruction
GA	Geometry Activity
OEA	Open-Ended Assessment
RM	Reading Mathematics
TS	Teaching Suggestions
TT	Teacher to Teacher
UM	Unlocking Misconceptions