



MISSOURI
Mathematics Grade-Level Expectations Grades 9, 10
***Geometry: Concepts and Applications* © 2004**

OBJECTIVES	PAGE REFERENCES
GRADE 9	
Number and Operations	
1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers	
compare and order rational and irrational numbers, including finding their approximate locations on a number line MA 5 3.3 IX.a	SE: 50-55, 279 TWE: A 55 ICE 51, 279 RA 52 TT 51
B. Represent and use rational numbers	
C. Compose and decompose numbers	
D. Classify and describe numeric relationships	
2. Understand meanings of operations and how they relate to one another	
A. Represent operations	
B. Describe effects of operations	
describe the effects of operations, such as multiplication, division, and computing powers and roots on the magnitude of quantities MA 4 3.4,4.1 VIII.i	SE: <i>Preparing for Standardized Tests</i> 47 #2, 583 #4
C. Apply properties of operations	
apply properties of exponents (including order of operations) to simplify expressions MA 4 1.6,1.10 VIII.c & d	SE: 161 #39, 265 <i>Preparing for Standardized Tests</i> 86, 272, 715 #3, #6
D. Apply operations on real and complex numbers	
apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases MA 1,4,5 1.4,3.4 V.a, VIII.d, IX.6	This concept is used throughout the book. The following are examples: SE: 35-40, 52-55, 56-61, 76-81, 168-173, 504-509, 548-553, 612-617 <i>Preparing for Standardized Tests</i> 46-47, 86-87
3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies	
B. Develop and demonstrate fluency	

OBJECTIVES	PAGE REFERENCES
C. Compute problems	
apply all operations on real numbers MA 5 1.10,3.3 IX.a	This concept is used throughout the book. The following are examples: SE: 35-40, 52-55, 56-61, 76-81, 168-173, 504-509, 548-553, 612-617 <i>Preparing for Standardized Tests</i> 46-47, 86-87
D. Estimate and justify solutions	
judge the reasonableness of numerical computations and their results MA 1 3.8 V.a	See Glencoe's <i>Geometry</i> © 2005.
E. Use proportional reasoning	
solve problems involving proportions MA 1,4 3.3 V.a, VIII.e	SE: 350-355, 356-361, 362-367, 368-373, 382-387, 388-393 <i>Math in the Workplace</i> 379 <i>Preparing for Standardized Tests</i> 398-399 <i>Problem-Solving Workshop</i> 349 TWE: TT 351
Algebraic Relationships	
1. Understand patterns, relations and functions	
A. Recognize and extend patterns	
B. Create and analyze patterns	
generalize patterns using explicitly or recursively defined functions MA 4 1.6,3.5 VIII.1.b	Identifying and extending patterns is found on the following pages: SE: 4-9, 17 #38, 73 #44, 133 #32, 153 #50, 161 #38 <i>Graphing Calculator Exploration</i> 32 <i>Hands-On Geometry</i> 283 <i>Investigation</i> 10-11 <i>Problem-Solving Workshop</i> 3, 275
C. Classify objects and representations	
compare and contrast various forms of representations of patterns MA 4 1.6 VIII.a & h	Identifying and extending patterns is found on the following pages: SE: 4-9, 17 #38, 73 #44, 133 #32, 153 #50, 161 #38 <i>Graphing Calculator Exploration</i> 32 <i>Hands-On Geometry</i> 283 <i>Investigation</i> 10-11 <i>Problem-Solving Workshop</i> 3, 275
D. Identify and compare functions	
understand and compare the properties of linear and exponential functions (include intercepts) MA 4 1.6,3.6 VIII.b & c	Functions are discussed on pages SE: 492-493
E. Describe the effects of parameter changes	
describe the effects of parameter changes on linear functions MA 4 1.6,4.1 VIII.i	Functions are discussed on pages SE: 492-493

OBJECTIVES	PAGE REFERENCES
2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations	
use symbolic algebra to represent and solve problems that involve linear relationships, including absolute value and recursive relationships MA 4,6 1.6,3.1 VIII.c & d, X.h	SE: 57 Example 2, 60 #17-#22, 64 Example 3, 67 #21 <i>Preparing for Standardized Tests</i> 306-307, 451 #2, #10b, 493 #2, #6, #8
B. Describe and use mathematical manipulation	
describe and use algebraic manipulations, including factoring and rules of integer exponents MA 4 3.1,4.1 VIII.a & d	SE: 161 #39, 680 #31 <i>Preparing for Standardized Tests</i> 47 #6, 185 #2, 272, 451 #8, 715 #3, #6
C. Utilize equivalent forms	
use and solve equivalent forms of equations and inequalities (linear) MA 4 1.6,3.4 VIII.d & e	SE: 175 Examples 4 and 5, 177 #3-#5 <i>Preparing for Standardized Tests</i> 673 #8
D. Utilize systems	
use and solve systems of linear equations with 2 variables MA 4 1.6 VIII.b & d	SE: 676-680, 681-686 <i>Study Guide and Assessment</i> 710-711 TWE: F 681 ICE 677 RA 684
3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models	
identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem MA 4 1.6,3.6 VIII.c	See Glencoe's <i>Geometry</i> © 2005.
4. Analyze change in various contexts	
A. Analyze change	
analyze linear functions by investigating rates of change and intercepts MA 4 1.6,4.1 VIII.a & c	SE: 174-179 <i>Preparing for Standardized Tests</i> 185 #8, 347 #1 <i>Study Guide and Assessment</i> 182 #39-#41 TWE: ICE 175

OBJECTIVES	PAGE REFERENCES
Geometric and Spatial Relationships	
1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships	
solve problems involving angle relationships (supplementary, complementary angles) and Pythagorean Theorem MA 2 1.6 VI.c	SE: 116-121, 256-261 <i>Problem-Solving Workshop 227</i> <i>Quiz 2 127</i> <i>Study Guide and Assessment 135 #25-#28, 270 #27-#30</i> TWE: EC 121 ICE 258 RA 259
B. Apply geometric relationships	
apply geometric properties and relationships, such as similarity, to solve multi-step problems in 2 dimensions MA 2 3.6 VI.c	SE: 205 Example 3, 207 #25-#26, #32, 357-358 Example 2, 358 Example 3, 360-361 #24-#27, 365 Example 3, 365-367 TWE: ICE 364, 365
C. Compose and decompose shapes	
2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems	
solve problems related to 2-dimensional objects by finding the distance on a Cartesian plane MA 2 3.2 VI.f	SE: 265 #10, 266 #24-#26, #29 <i>Problem-Solving Workshop 227</i> <i>Study Guide and Assessment 270 #34</i> TWE: ICE 264
3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects	
represent translations, reflections, rotations, and dilations of objects in the coordinate plane MA 2 1.10 VI.b	SE: 198-202, 687-690, 692-696, 697-702, 703-707 <i>Investigation 708-709</i> <i>Math in the Workplace 691</i> <i>Problem-Solving Workshop 187</i> TWE: EC 696
B. Use transformations on functions	
translate and reflect linear functions MA 4 3.1 VIII,I	See Glencoe's <i>Geometry</i> © 2005.
C. Use symmetry	
4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations	
draw and use vertex-edge graphs or networks to find optimal solutions MA 6 3.4 X.a	SE: <i>Investigation 11</i> <i>Problem-Solving Workshop 49</i>

OBJECTIVES	PAGE REFERENCES
B. Draw and use visual models	
draw or use visual models to represent and solve problems MA 2 3.1 VI.b & i	SE: 56, 563 #17 <i>Math in the Workplace</i> 115 <i>Preparing for Standardized Tests</i> 583 #10, 629 #10 <i>Problem-Solving Workshop</i> 349, 547 TWE: A 61, 109
Measurement	
1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement	
identify and justify appropriate units of measure for velocity MA 1,2 3.1,4.1 V.a, VI.d	See Glencoe's <i>Geometry</i> © 2005.
B. Identify equivalent measures	
C. Tell and use units of time	
D. Count and compute money	
2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement	
B. Use angle measurement	
solve problems of angle measure, including those involving triangles or other polygons MA 2 3.1,3.4 VI.i	SE: 96-101, 104-109, 116-121, 122-127, 193-197, 240-243, 246-250, 310-315, 316-321 <i>Math in the Workplace</i> 115
C. Apply geometric measurements	
determine the surface area and volume of geometric figures, including cones, spheres, and cylinders MA 2 1.10,3.4 VI. i	SE: 504-509, 510-515, 516-521, 522-527, 528-533 TWE: A 533 EC 515 ICE 524
D. Analyze precision	
analyze effects of computation on precision MA 2 1.7,3.8 VI.k	Precision is covered on the following pages: SE: 58, 428
E. Use relationships within a measurement system	
use unit analysis to solve problems involving rates MA 4 3.1 VIII.b	See Glencoe's <i>Geometry</i> © 2005.
Data and Probability	
1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions	
formulate questions, design studies and collect data about a characteristic MA 3 1.2 VII.a	SE: <i>Problem-Solving Workshop</i> 89

OBJECTIVES	PAGE REFERENCES
B. Classify and organize data	
C. Represent and interpret data	
select, create and use appropriate graphical representation of data MA 6 1.8, 3.6 X.b	SE: 9 #36, 101 #29, 179 #36, #38, 219 #29, 354 #42, 473 #31 <i>Preparing for Standardized Tests</i> 184-185, 347 #7, 715 #4 <i>Problem-Solving Workshop</i> 89
2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data	
apply statistical concepts to solve problems MA 3 1.10,3.4 VII.g	SE: 22 #39, 219 #29, 418 #30, 665 #32 <i>Preparing for Standardized Tests</i> 184-185, 224-225, 307 #5, 715 #4 <i>Problem-Solving Workshop</i> 89
B. Compare data representations	
given one-variable quantitative data, display the distribution and describe its shape MA 3 1.8 VII.d & I	SE: 347 #10 (<i>Preparing for Standardized Tests</i>) Also see Glencoe's <i>Algebra 1</i> © 2005.
C. Represent data algebraically	
given a scatter plot, determine an equation for a line of best fit MA 3 1.6 VII.b	See Glencoe's <i>Algebra 1</i> © 2005.
3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences	
make conjectures about possible relationships between 2 characteristics of a sample on the basis of scatter plots of the data and approximate lines of fit	See Glencoe's <i>Algebra 1</i> © 2005.
B. Analyze basic statistical techniques	
4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability	
construct sample spaces and distributions MA 3 3.1 VII.f	The use of a tree diagram to count outcomes is a way to define sample space. SE: 139 #10 Also see Glencoe's <i>Geometry</i> © 2005.
B. Use and describe compound events	

OBJECTIVES	PAGE REFERENCES
GRADE 10	
Number and Operations	
1. Understand numbers, ways of representing numbers, relationships among numbers and number systems	
A. Read, write and compare numbers	
B. Represent and use rational numbers	
use real numbers to solve problems MA 1 3.4 V.1.a	This concept is used throughout the book. The following are examples: SE: 35-40, 52-55, 56-61, 76-81, 168-173, 504-509, 548-553, 612-617 <i>Preparing for Standardized Tests</i> 46-47, 86-87
C. Compose and decompose numbers	
use a variety of representations to demonstrate an understanding of very large and very small numbers MA 5 3.6 IX.a & d	SE: 214 #28 <i>Preparing for Standardized Tests</i> 46-47, 347 #3, 583 #2
D. Classify and describe numeric relationships	
2. Understand meanings of operations and how they relate to one another	
A. Represent operations	
B. Describe effects of operations	
C. Apply properties of operations	
apply properties of exponents to simplify expressions or solve equations MA 4 1.6,1.10 VIII.c & d	SE: 161 #39, 265 <i>Preparing for Standardized Tests</i> 86, 185 #2, 272, 715 #3, #6
D. Apply operations on real and complex numbers	
apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases MA 1,4,5 1.4,3.4 V.a, VIII.d, IX.6	This concept is used throughout the book. The following are examples: SE: 35-40, 52-55, 56-61, 76-81, 168-173, 504-509, 548-553, 612-617 <i>Preparing for Standardized Tests</i> 46-47, 86-87
3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies	
B. Develop and demonstrate fluency	
C. Compute problems	
D. Estimate and justify solutions	
judge the reasonableness of numerical computations and their results MA 1 3.8 V.a	See Glencoe's <i>Geometry</i> © 2005.

OBJECTIVES	PAGE REFERENCES
E. Use proportional reasoning	
solve problems involving proportions MA 1,4 3.3 V.a, VIII.e	SE: 350-355, 356-361, 362-367, 368-373, 382-387, 388-393 <i>Math in the Workplace</i> 379 <i>Preparing for Standardized Tests</i> 398-399 <i>Problem-Solving Workshop</i> 349 TWE: TT 351
Algebraic Relationships	
1. Understand patterns, relations and functions	
A. Recognize and extend patterns	
B. Create and analyze patterns	
generalize patterns using explicitly or recursively defined functions MA 4 1.6,3.5 VIII.1.b	Identifying and extending patterns is found on the following pages: SE: 4-9, 17 #38, 73 #44, 133 #32, 153 #50, 161 #38 <i>Graphing Calculator Exploration</i> 32 <i>Hands-On Geometry</i> 283 <i>Investigation</i> 10-11 <i>Problem-Solving Workshop</i> 3, 275
C. Classify objects and representations	
compare and contrast various forms of representations of patterns MA 4 1.6 VIII.a & h	Identifying and extending patterns is found on the following pages: SE: 4-9, 17 #38, 73 #44, 133 #32, 153 #50, 161 #38 <i>Graphing Calculator Exploration</i> 32 <i>Hands-On Geometry</i> 283 <i>Investigation</i> 10-11 <i>Problem-Solving Workshop</i> 3, 275
D. Identify and compare functions	
understand and compare the properties of linear, exponential and quadratic functions (include domain and range) MA 4 1.6,3.6 VIII.b & c	Functions are discussed on pages SE: 492-493
E. Describe the effects of parameter changes	
describe the effects of parameter changes on quadratic and exponential functions MA 4 1.6,4.1 VIII.i	Functions are discussed on pages SE: 492-493
2. Represent and analyze mathematical situations and structures using algebraic symbols	
A. Represent mathematical situations	
use symbolic algebra to represent and solve problems that involve quadratic relationships, including recursive relationships MA 4,6 1.6,3.1 VIII.c & d, X.h	SE: <i>Preparing for Standardized Tests</i> 545 #10

OBJECTIVES	PAGE REFERENCES
B. Describe and use mathematical manipulation	
describe and use algebraic manipulations, including factoring and rules of integer exponents MA 4 3.1,4.1 VIII.a & d	SE: 161 #39, 680 #31 <i>Preparing for Standardized Tests</i> 47 #6, 185 #2, 272, 451 #8, 715 #3, #6
C. Utilize equivalent forms	
use and solve equivalent forms of equations and inequalities (piece-wise and quadratic) MA 4 1.6,3.4 VIII.d	Using and solving equivalent forms of linear equations is found on the following pages: SE: 175 Examples 4 and 5, 177 #3-#5 <i>Preparing for Standardized Tests</i> 673 #8
D. Utilize systems	
use and solve systems of linear equations or inequalities with 2 variables MA 4 1.6 VIII.b & d	SE: 676-680, 681-686 TWE: F 681 ICE 677, 682 RA 684
3. Use mathematical models to represent and understand quantitative relationships	
A. Use mathematical models	
identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem MA 4 1.6,3.6 VIII.c	See Glencoe's <i>Geometry</i> © 2005.
4. Analyze change in various contexts	
A. Analyze change	
analyze quadratic functions by investigating rates of change, intercepts and zeros MA 4 1.6,4.1 VIII.a & c	See Glencoe's <i>Algebra 1</i> © 2005.
Geometric and Spatial Relationships	
1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
A. Describe and use geometric relationships	
use inductive and deductive reasoning to establish the validity of geometric conjectures, proved theorems and critique arguments made by others MA 2 3.5 VI.d	SE: 4-9, 638-643, 644-648, 649-653, 654-659 <i>Problem-Solving Workshop</i> 631 TWE: F 660 ICE 645
B. Apply geometric relationships	
apply relationships among surface areas and among volumes of similar objects MA 2 3.6 VI.c & i	SE: 534-539 <i>Study Guide and Assessment</i> 542 #26-#28 TWE: EC 539 FC 535 RA 536 TT 535

OBJECTIVES	PAGE REFERENCES
C. Compose and decompose shapes	
2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems	
make conjectures and solve problems involving 2-dimensional objects represented with Cartesian coordinates MA 2 3.6,4.1 VI.f	SE: 265 #10, 266 #24-#26, #29, 660-665 <i>Problem-Solving Workshop 227</i> <i>Study Guide and Assessment 270 #34</i> TWE: EC 665 ICE 264
3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects	
use and apply constructions to represent translations, reflections, rotations, and dilations of objects MA 2 1.10 VI.b	Transformations are found on the following pages: SE: 198-202, 687-690, 692-696, 697-702, 703-707 <i>Investigation 708-709</i> <i>Math in the Workplace 675, 691</i> TWE: EC 696
B. Use transformations on functions	
translate, dilate and reflect quadratic and exponential functions MA 4 3.1 VIII.i	See Glencoe's <i>Algebra 1</i> © 2005.
C. Use symmetry	
identify types of symmetries of 2- and 3-dimensional figures MA 2 1.6,1.10 VI.f	SE: 434-439, 443 #18b, 444 #21, 458 #33, 617 #25 <i>Study Guide and Assessment 448 #27-#30</i> TWE: F 440 RA 436
4. Use visualization, spatial reasoning and geometric modeling to solve problems	
A. Recognize and draw three-dimensional representations	
draw representations of 3-dimensional geometric objects using a variety of tools MA 2 1.4 VI.a	SE: 498 #1, 500 #32, 531 #2 <i>Problem-Solving Workshop 495</i> TWE: FA 499
B. Draw and use visual models	
draw or use visual models to represent and solve problems MA 2 3.1 VI.b & i	SE: 56, 563 #17 <i>Math in the Workplace 115</i> <i>Preparing for Standardized Tests 583 #10, 629 #10</i> <i>Problem-Solving Workshop 349, 547</i> TWE: A 61, 109

OBJECTIVES	PAGE REFERENCES
Measurement	
1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement	
B. Identify equivalent measures	
C. Tell and use units of time	
D. Count and compute money	
2. Apply appropriate techniques, tools and formulas to determine measurements	
A. Use standard or non-standard measurement	
B. Use angle measurement	
solve problems of angle measure of parallel lines cut by a transversal MA 2 3.1,3.4 VI.f & i	SE: 148-153, 156-161, 162-167 TWE: EC 153 ICE 150, 163
C. Apply geometric measurements	
determine the surface area and volume of geometric figures, including cones, spheres, and cylinders MA 2 1.10,3.4 VI.i	SE: 504-509, 510-515, 516-521, 522-527, 528-533 TWE: A 533 EC 515 ICE 524
D. Analyze precision	
analyze effects of computation on precision MA 2 1.7, 3.8 VI.k	Precision is covered on the following pages: SE: 58, 428
E. Use relationships within a measurement system	
Data and Probability	
1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them	
A. Formulate questions	
formulate questions, design studies and collect data about a characteristic MA 3 1.2 VII.a	SE: <i>Problem-Solving Workshop 89</i>
B. Classify and organize data	
C. Represent and interpret data	
select, create and use appropriate graphical representation of data MA 6 1.8,3.6 X.b	SE: 9 #36, 101 #29, 179 #36, #38, 219 #29, 354 #42, 473 #31 <i>Preparing for Standardized Tests 184-185, 347 #7, 715 #4</i> <i>Problem-Solving Workshop 89</i>
2. Select and use appropriate statistical methods to analyze data	
A. Describe and analyze data	
apply statistical concepts to solve problems and distinguish between a statistic and a parameter MA 3 1.10,3.4 VII.g	SE: 22 #39, 219 #29, 418 #30, 665 #32 <i>Preparing for Standardized Tests 184-185, 224-225, 307 #5, 715 #4</i> <i>Problem-Solving Workshop 89</i>

OBJECTIVES	PAGE REFERENCES
B. Compare data representations	
given one-variable quantitative data, display the distribution and describe its shape MA 3 1.8 VII.d & i	SE: 347 #10 (Preparing for Standardized Tests) Also see Glencoe's <i>Algebra 1</i> © 2005.
C. Represent data algebraically	
display and analyze bivariate data where one variable is categorical and the other is numerical MA 3 1.6 VII.e	See Glencoe's <i>Algebra 1</i> © 2005.
3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences	
describe how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal inference MA 3 3.5 VII.a	See Glencoe's <i>Algebra 2</i> © 2005 Lesson 12-9.
B. Analyze basic statistical techniques	
4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability	
describe the concepts of sample space and probability distribution MA 3 4.1 VII.e	See Glencoe's <i>Algebra 1</i> © 2005.
B. Use and describe compound events	
use and describe the concepts of conditional probability and independent events MA 6 1.10,4.1 X.d	Probability problems can be found on the following pages: SE: 438 #29, 484-487 <i>Preparing for Standardized Tests</i> 138-139, 185 #9, 347 #2, 451 #6, 545 #5, 629 #2

Codes Used for TWE Pages

A	Assess
EC	Extra Credit
F	Focus
FA	Family Activity
FC	From the Classroom of...
ICE	In-Class Examples
RA	Reteaching Activity
TT	Teaching Tip