



MISSOURI
Mathematics Grade-Level Expectations Grades 9, 10
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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: 734-735
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: 734-735, 744-745, 746-747, 748-749
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: 744-745, 746-747, 748-749
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	SE: 734-735
3. Compute fluently and make reasonable estimates	
A. Describe or represent mental strategies	
B. Develop and demonstrate fluency	
C. Compute problems	
apply all operations on real numbers MA 5 1.10,3.3 IX.a	SE: 14 #4, 16 #7-#8, 17 #22-#24, 734-735 TWE: ICE 14

OBJECTIVES	PAGE REFERENCES
D. Estimate and justify solutions	
judge the reasonableness of numerical computations and their results MA 1 3.8 V.a	SE: 142 #2, 263 #2, 284 #3, 292 #5, 344 #3, 345 #3, 353 #1, 571 #2, 605 #2, 625 #3
E. Use proportional reasoning	
solve problems involving proportions MA 1,4 3.3 V.a, VIII.e	SE: 282-284, 287 #41, 289-292, 298-300, 303 #32, 307-311, 316-319, 325-327 <i>Spreadsheet Investigation 288</i> TWE: ICE 283
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	SE: 325-327, 328 #11-#12, 329 #21-#24, 361 #32-#35, 483-485 <i>Geometry Activity 324, 489</i> <i>Spreadsheet Investigation 288</i> TWE: ICE 326, 327
C. Classify objects and representations	
compare and contrast various forms of representations of patterns MA 4 1.6 VIII.a & h	SE: 327, 483-485 <i>Geometry Activity 324, 483, 489</i> TWE: ICE 485
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	SE: 145-147
E. Describe the effects of parameter changes	
describe the effects of parameter changes on linear functions MA 4 1.6,4.1 VIII.i	SE: 143 #44-#46, 145-147 TWE: ICE 146
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: 145-147, 148 #13-#14, 149 #45, 327 TWE: ICE 146
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: 736, 746-747, 748-749, 750-751

OBJECTIVES	PAGE REFERENCES
C. Utilize equivalent forms	
use and solve equivalent forms of equations and inequalities (linear) MA 4 1.6,3.4 VIII.d & e	SE: 145-147, 148 #13-#14, 149 #52, 737-738, 739-740, 742-743 TWE: ICE 146
D. Utilize systems	
use and solve systems of linear equations with 2 variables MA 4 1.6 VIII.b & d	SE: 742-743
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	SE: 290-292, 296 #51-#52, 300 #3, 303 #32, 304 #41, 351 #1, 355 #41 <i>Geometry Activity 28</i> TWE: ICE 290, 300
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: 139-141, 145-147, 148 #35-#42, 737-738, 741 TWE: ICE 140, 146
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: 37-41, 42 #30, 43 #41, 107-110, 113 #27-#32, 128, 134, 350-352, 355 #43 <i>Geometry Activity 28</i>
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: 289-292, 293 #9, 294 #17-#20, 298-300, 303 #32, 304 #41-#42, 307-311, 316-319, 325-327, 330 #44
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: 21-22, 350-352, 354 #11, 355 #43, 597, 603, 618 #3 <i>Geometry Activity 28</i> TWE: ICE 351

OBJECTIVES	PAGE REFERENCES
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: 463-466, 468 #42, 470-471, 474 #35-#37, 476-478, 483-485 <i>Geometry Activity</i> 462, 489 TWE: ICE 471, 472
B. Use transformations on functions	
translate and reflect linear functions MA 4 3.1 VIII,I	SE: 467 #8, 472 #11, 482 #47, 509 #8, 510 #23 TWE: ICE 466
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: 89 #1, 92 #12-#15
B. Draw and use visual models	
draw or use visual models to represent and solve problems MA 2 3.1 VI.b & i	SE: 8 #4, 10 #30-#35, 11 #51-#53, 369 #59-#60, 636-639, 642 #46-#48 <i>Geometry Activity</i> 28, 165-166 <i>Reading Mathematics</i> 12 TWE: ICE 8
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	SE: 272 #28-#30
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: 29-33, 34 #28-#33, 35 #43, 178, 185-188, 190 #36-#38, 366-367, 371-373, 374 #14-#15, 561-564
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: 643-645, 646 #15-#23, 647 #35-#38, 649-651, 652 #16-#21, 655-656, 657 #13-#16, 660-662, 666-667, 671-673

OBJECTIVES	PAGE REFERENCES
D. Analyze precision	
analyze effects of computation on precision MA 2 1.7,3.8 VI.k	SE: 14, 16 #5-#6, 17 #16-#21, 18 #43-#45 TWE: ICE 14
E. Use relationships within a measurement system	
use unit analysis to solve problems involving rates MA 4 3.1 VIII.b	SE: 140 #2, 143 #44, 144 #50, 272 #28-#30, 730-731 TWE: ICE 141
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: 272 #28-#30, 303 #32, 327 #4, 436 #44 <i>Geometry Activity</i> 88, 249, 406 <i>Spreadsheet Investigation</i> 410, 695, 708
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: 18 #43-#45, 259 #28-#30, 296 #56-#58, 347 #42-#43, 531 #3, 533 #13, 614 #36- #38, 653 #34-#36, 705 #23-#26
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: 18 #43-#45, 62-63, 70 #3, 73 #41-#44, 622- 624, 626 #20-#23, 653 #34-#36 <i>Geometry Activity</i> 20 <i>Spreadsheet Investigation</i> 708-709
B. Compare data representations	
given one-variable quantitative data, display the distribution and describe its shape MA 3 1.8 VII.d & I	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	

OBJECTIVES	PAGE REFERENCES
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	SE: 623 #2, 624 #3, 627 #33
B. Use and describe compound events	
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	SE: 13-15, 16 #7-8, 17 #22-#23, 730-731, 734-735
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	See Glencoe's <i>Algebra 1</i> © 2005.
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: 736, 744-745, 746-747, 748-749
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	SE: <i>Spreadsheet Investigation</i> 288, 410, 695, 708-709
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	SE: 142 #2, 263 #2, 284 #3, 292 #5, 344 #3, 345 #3, 353 #1, 571 #2, 605 #2, 625 #3

OBJECTIVES	PAGE REFERENCES
E. Use proportional reasoning	
solve problems involving proportions MA 1,4 3.3 V.a, VIII.e	SE: 282-284, 287 #41, 289-292, 298-300, 303 #32, 307-311, 316-319, 325-327 <i>Spreadsheet Investigation 288</i> TWE: ICE 283
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	SE: 325-327, 328 #11-#12, 329 #21-#24, 361 #32-#35, 483-485 <i>Geometry Activity 324, 489</i> <i>Spreadsheet Investigation 288</i> TWE: ICE 326, 327
C. Classify objects and representations	
compare and contrast various forms of representations of patterns MA 4 1.6 VIII.a & h	SE: 327, 483-485 <i>Geometry Activity 324, 483, 489</i> TWE: ICE 485
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	SE: 575-577, 737-738, 741
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	See Glencoe's <i>Algebra 1</i> © 2005.
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	See Glencoe's <i>Algebra 1</i> © 2005.
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: 750-751
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	SE: 145-147, 148 #13-#14, 149 #52, 737-738, 739-740, 742-743 TWE: ICE 146

OBJECTIVES	PAGE REFERENCES
D. Utilize systems	
use and solve systems of linear equations or inequalities with 2 variables MA 4 1.6 VIII.b & d	SE: 742-743
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	SE: 290-292, 296 #51-#52, 300 #3, 303 #32, 304 #41, 351 #1, 355 #41 <i>Geometry Activity 28</i>
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: 62-63, 65 #29-#36, 66 #42, 82-83, 84 #10-#11, 87 #36-#38, 89-91, 93 #35 TWE: ICE 63, 83
B. Apply geometric relationships	
apply relationships among surface areas and among volumes of similar objects MA 2 3.6 VI.c & i	SE: 707-710, 711 #27-#30, 712 #32, 713 #43, 722 <i>Spreadsheet Investigation 695</i> TWE: ICE 709
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: 47 #3, 180 Ex #4, 194 #2, 201 #2, 241 #3, 359 #4, 420 #5, 432 #3, 603 #3, 618 #3
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	SE: 464-465, 476 #1, 491 #2, 492-493 <i>Geometry Activity 489</i> <i>Geometry Software Investigation 477</i> TWE: ICE 464, 465, 477, 492

OBJECTIVES	PAGE REFERENCES
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: 466, 478, 479 #11, 642 #46-#48 TWE: ICE 466 TT 478
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: 636-639, 640 #13-#15, 643 #1, 646 #9-#14 TWE: ICE 644, 645
B. Draw and use visual models	
draw or use visual models to represent and solve problems MA 2 3.1 VI.b & i	SE: 193 Ex #1, 204 #9, 375 #25, 483-485, 643-645, 649-651, 660-661, 718 #35 <i>Geometry Activity</i> 489, 677
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: 133-135, 136 #14-#19, 137 #42, 138 #45, 144 #51-#56, 157 #45 <i>Geometry Software Investigation</i> 132 TWE: ICE 133, 135, 153
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: 643-645, 646 #15-#23, 647 #35-#38, 649-651, 652 #16-#21, 655-656, 657 #13-#16, 660-662, 666-667, 671-673
D. Analyze precision	
analyze effects of computation on precision MA 2 1.7, 3.8 VI.k	SE: 14, 16 #5-#6, 17 #16-#21, 18 #43-#45 TWE: ICE 14
E. Use relationships within a measurement system	

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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: 272 #28-#30, 303 #32, 327 #4, 436 #44 <i>Geometry Activity</i> 88, 249, 406 <i>Spreadsheet Investigation</i> 410, 695, 708
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: 18 #43-#45, 259 #28-#30, 296 #56-#58, 347 #42-#43, 531 #3, 533 #13, 614 #36-#38, 653 #34-#36, 705 #23-#26
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: 18 #43-#45, 62-63, 70 #3, 73 #41-#44, 622-624, 626 #20-#23, 653 #34-#36 <i>Geometry Activity</i> 20 <i>Spreadsheet Investigation</i> 708-709
B. Compare data representations	
given one-variable quantitative data, display the distribution and describe its shape MA 3 1.8 VII.d & i	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	See Glencoe's <i>Algebra 1</i> © 2005.

Codes Used for TWE Pages

ICE	In-Class Example
TT	Teaching Tip