



MISSOURI
Mathematics Grade-Level Expectations Grade 11
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OBJECTIVES	PAGE REFERENCES
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	
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	
C. Apply properties of operations	
apply properties of logarithms to simplify expressions or solve equations MA 4 1.6, 1.10 VIII.c & d	SE: 600-603 ATE: ETL 601
D. Apply operations on real and complex numbers	
apply operations to matrices and complex 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	The following references do not include complex numbers. SE: 358-361, 362-365, 368-371, 372-373, 405 #23-#24, 409 #16-#18 ATE: AA 365 ETL 368 FG 363, 371
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: 20-23 ATE: TT 427 Close relationships also can be found on the following pages. SE: 22 #9, 74 #8, 107 #20, 162 #9, 175 #30, 215 #17, 299 #33, 405 #10, 582 #15
E. Use proportional reasoning	
solve problems involving proportions MA 1,4 3.3 V.a, VIII.e	SE: 296-299, 300-303, 306-309, 316-319, 320-323, 584-587, 618-621 ATE: ETL 299, 319, 322 FG 298

OBJECTIVES	PAGE REFERENCES
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: 26, 38, 52-55, 79 #37-#42, 584, 600 ATE: DI 55 ETL 53 FG 52
C. Classify objects and representations	
compare and contrast various forms of representations of patterns MA 4 1.6 VIII.a & h	SE: 52-55, 472-475, 524-527, 580, 584, 600, 603 #44-#45, 614 <i>Reading About Math</i> 483 ATE: DI 600
D. Identify and compare functions	
understand and compare the properties of linear, quadratic, exponential, logarithmic, and rational functions (include asymptotes) MA 4 1.6,3.6 VIII.b & c	SE: 62-65, 244-247, 520-523, 524-527, 530-533, 594, 595 Ex 2 ATE: TT 520
E. Describe the effects of parameter changes	
describe the effects of parameter changes on logarithmic and exponential functions MA 4 1.6,4.1 VIII.i	SE: 594-597, 600-603 ATE: DI 600 TT 594
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 exponential and logarithmic relationships, including recursive and parametric relationships MA 4,6 1.6,3.1 VIII.c & d, X.h	SE: 594-597, 600-603 ATE: DI 600
B. Describe and use mathematical manipulation	
describe and use algebraic manipulations, including inverse of functions, composition of functions and rules of exponents MA 4 3.1,4.1 VIII.a & d & g	SE: 34-37, 38-41, 352-355, 468-471, 472-475, 478-481, 614-617, 612-621 ATE: ETL 37 FG 35 Lesson 2-2 also could be used to address this objective.
C. Utilize equivalent forms	
use and solve equivalent forms of equations and inequalities (exponential, logarithmic and rational) MA 4 1.6,3.4 VIII.d	SE: 244-247, 248-251, 254-257, 264-267, 268-271 ATE: AA 244, 255, 268 TT 254, 264
D. Utilize systems	
use and solve systems of linear and quadratic equations or inequalities with 2 variables MA 4 1.6 VIII.b & d	SE: 258-261, 264-267, 268-271, 274-275, 276-279, 282-285, 590-593 ATE: AA 266, 268 ETL 259

OBJECTIVES	PAGE REFERENCES
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 (including recursive forms) MA 4 1.6,3.6 VIII.c & h	The following references apply to linear functions. SE: 254-257, 258-261, 264-267, 268-271, 276-279, 282-285, 520-523, 594-597, 600-603
4. Analyze change in various contexts	
A. Analyze change	
analyze exponential and logarithmic functions by investigating rates of change, intercepts and asymptotes MA 4 1.6,4.1 VIII.a & c	SE: 594-597, 600-603 ATE: DI 595, 600
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 trigonometric relationships with right triangles to determine lengths and angle measures MA 2 1.6,1.10 VI.i	SE: 614-617, 618-621 ATE: AA 620 DI 615 ETL 618 FG 617, 621
B. Apply geometric relationships	
determine the effect on surface area or volume of changing one measurement MA 2 3.5 VI.i	SE: 227 #19, 233 #19-#20
C. Compose and decompose shapes	
2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
A. Use coordinate systems	
use vectors to represent and analyze problems involving velocity and direction MA 2 3.6,4.1 VI.h	See Glencoe's <i>Geometry</i> © 2005 to meet this objective.
3. Apply transformations and use symmetry to analyze mathematical situations	
A. Use transformations on objects	
use and apply matrices to represent translations, reflections, rotations, and dilations MA 2 1.10 VI.g	SE: 368-371 ATE: ETL 368 FG 371 TT 369
B. Use transformations on functions	
perform simple transformations and their compositions on linear, quadratic, logarithmic and exponential functions MA 4 3.1 VIII.i	SE: 522 #13-#16, 584 ATE: TT 594 Lessons 6-3, 13-8, & 13-9 begin with a short discovery activity that could be expanded by the classroom teacher to meet this objective.
C. Use symmetry	

OBJECTIVES	PAGE REFERENCES
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 from different perspectives using a variety of tools MA 2 1.4 VI.a	SE: 104-107, 220-223 The teacher could integrate this objective into the lessons when using pages 224-227, 230-233.
B. Draw and use visual models	
draw or use visual models to represent and solve problems MA 2 3.1 VI.b & i	SE: 66, 72, 150-153, 164-167, 172-175, 182-185, 206-209, 212-215, 220-223, 224-227, 326-327
Measurement	
1. Understand measurable attributes of objects and the units, systems and processes of measurement	
A. Determine unit of measurement	
B. Identify equivalent measures	
compare and contrast intensity levels within a system of measure (decibels, ph) MA 1 3.1 V.c	See the ENRICHMENT Ancillary 13-9
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	
C. Apply geometric measurements	
D. Analyze precision	
apply concepts of successive approximation MA 2 1.6,3.4 VI.k	See Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 page 962.
E. Use relationships within a measurement system	
use unit analysis to solve problems involving rates, such as speed, density, or population density MA 4 3.1 VIII.b	The following references can be used/expanded to meet this objective. SE: 202-205, 247 #48-#56 ATE: ETL 204
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: 85 #16 <i>Chapter Investigation</i> 49, 89 #20 ATE: FG 383, 408 The Data File on pages 644-653 also can be used to meet this objective.
B. Classify and organize data	

OBJECTIVES	PAGE REFERENCES
C. Represent and interpret data	
describe the characteristics of well designed studies, including the role of randomization in survey and experimental research MA 3 1.2,3.1 VII.c & e	This objective can be met using the following: SE: 92-93 TWE: ETL 93 This objective also can be integrated with the previous objective.
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: 82-85, 86-89, 153 #25-#26, 323 #25-#26, 406-409 ATE: ETL 83, 406 FG 408 PE 407
B. Compare data representations	
given one variable quantitative data, display the distribution, describe its shape and calculate summary statistics MA 3 1.8,1.10 VII.d & i	SE: 82-85, 86-89, 406-409, 412-415 ATE: AA 409 ETL 83 FG 415
C. Represent data algebraically	
given a scatterplot, determine a type of function which models the data MA 3 1.6 VII.b	SE: 406-409 (applies to linear functions)
3. Develop and evaluate inferences and predictions that are based on data	
A. Develop and evaluate inferences	
use simulations to describe the variability of sample statistics from a known population and to construct sampling distributions MA 3 1.2 VII.f	SE: 388-389 ATE: TT 388, 389
B. Analyze basic statistical techniques	
4. Understand and apply basic concepts of probability	
A. Apply basic concepts of probability	
compute and interpret the expected value of random variables MA 3 3.1 VII.h	SE: 384-387, 392-395, 396-399 ATE: ETL 386, 399 FG 385 PE 384
B. Use and describe compound events	
use and describe how to compute the probability of a compound event MA 2 3.1 VI.g	SE: 392-395, 396-399 ATE: ETL 395, 399 PE 394 TT 393

Codes Used for ATE Pages

AA	Alternative Assessment
DI	Differentiated Instruction
ETL	Extend the Lesson
FG	Flexible Grouping
PE	Predictable Error
TT	Teaching Tip