

Mathematics Content Specifications

Domain 1: Number Sense	
1.1 Numbers, Relationships Among Numbers, and Number Systems	Courses that address this content
a. Base ten place	MATH 110, 303A
b. Number theory concepts (<i>e.g.</i> greatest common factor)	MATH 303A
c. Structure of the whole, integer, rational, and real number systems	MATH 110, 115, 303A
d. Order integers, mixed numbers, rational numbers (including fractions, decimals, and percents) and real numbers	MATH 115, 303A
e. Represent numbers in exponential and scientific notation	MATH 110, 115, 303A
f. Describe the relationships between the algorithms for addition, subtraction, multiplication, and division	MATH 303A
g. Properties of number systems and their relationship the algorithms	MATH 303A
h. Perform operations with positive, negative, and fractional exponents as they apply to whole numbers and fractions.	MATH 110, 115, 303A, 303B
1.2 Computational Tools, Procedures, and Strategies	
a. Fluency in standard algorithms for computation	MATH 110, 115, 303A
b. Evaluate the correctness of nonstandard algorithms	MATH 303A
c. Order of operations	MATH 110, 115, 303A
d. Round numbers	MATH 303A
e. Estimate the results of calculations	MATH 303A
f. Place numbers accurately on a number line	MATH 303A
g. Demonstrate the ability to use technology, such as calculators or software, for complex calculations	MATH 110, 115, 303A, 303B

Domain 2: Algebra and Functions	
2.1 Patterns and Functional Relationships	Courses that address this content
a. Represent patterns, including relations, functions, through tables, graphs, verbal rules, or symbolic rules	MATH 110, 115, 303A, 303B
b. Use proportional reasoning such as ratios, equivalent fractions, and similar triangles to solve numerical, algebraic, and geometric problems	MATH 115, 303A, 303B
2.2 Linear and Quadratic Equations and Inequalities	
a. Find equivalent expressions for equalities and inequalities	MATH 115, 303A
b. Explain the meaning of symbolic expressions (<i>e.g.</i> relating an expression to a situation and vice versa)	MATH 110, 115, 303A, 303B
c. Find the solutions and represent them on graphs	MATH 110, 115, 303A, 303B
d. Recognize and create equivalent algebraic expressions	MATH 115, 303A
e. Represent geometric problems algebraically (<i>e.g.</i> the area of a triangle)	MATH 115, 303A, 303B
f. Basic understanding of linear equations and their properties (<i>e.g.</i> slope, perpendicularity)	MATH 115, 303B
g. Multiplication, division, and factoring of polynomials	MATH 115
h. Graphing and solving quadratic equations through factoring and	MATH 115

completing the square	
i. Interpret graphs of linear and quadratic equations and inequalities including solutions to systems of equations	MATH 115

Domain 3: Measurement and Geometry	
3.1 Two- and Three- Dimensional Geometric Objects	Courses that address this content
a. Characteristics of common two- and three- dimensional figures such as triangles (isosceles, right), quadrilaterals, and spheres	MATH 110, 115, 303B
b. Draw conclusions based on the congruence, similarity, or lack thereof, of two figures	MATH 303B
c. Identify different forms of symmetry, translations, rotations, and reflections	MATH 303B
d. Pythagorean Theorem and its converse	MATH 110, 115, 303A, 303B
e. Work with properties of parallel lines	MATH 115, 303B
3.2 Representational Systems, Including Concrete Models, Drawings, and Coordinate Geometry	
a. Use concrete representations such as manipulatives, drawings, and coordinate geometry to represent geometric objects	MATH 110, 115, 303B
b. Construct basic geometric figures using a compass and straight-edge	MATH 303B
c. Represent three-dimensional objects through two-dimensional drawings	MATH 115, 303B
d. Combine and dissect two- and three-dimensional figures into familiar shapes such as dissecting a parallelogram and rearranging the pieces to form a rectangle of equal area.	MATH 303B
3.3 Techniques, Tools, and Formulas for Determining Measurement	
a. Estimate and measure time, length, angles, perimeter, area, surface area, volume, weight/mass, and temperature through appropriate scales	MATH 303B
b. Identify relationships between different measures within the metric or customary systems of measurements and estimate an equivalent measurement across the two systems	MATH 303B
c. Calculate perimeters and areas of two-dimensional objects	MATH 115, 303B
d. Calculate surface areas and volumes of three-dimensional objects	MATH 115, 303B
e. Relate proportional reasoning to the construction of scale drawings or models	MATH 110, 115, 303A, 303B
f. Use measures such as miles per hour to analyze and solve problems	MATH 110, 115, 303B

Domain 4: Statistics, Data Analysis, and Probability	
4.1 Collection, Organization, and Representation of Data	Courses that address this content
a. Represent a collection of data through graphs, tables, or charts	MATH 110, 15, 303B
b. Understand the meaning of mean, median, mode, and range of a collection of data	MATH 303B
c. Understand the design of surveys such as the role of a random sample	MATH 303B
4.2 Inferences, Predictions, and Arguments Based on Data	
a. Interpret a graph, table, or chart representing a data set	MATH 110, 115, 303B
b. Draw conclusions about a population from a random sample	MATH 110, 303B
c. Identify potential sources and the effects of bias	MATH 110, 303B
4.3 Basic Notions of Chance and Probability	Courses that address

	this content
a. Define the concept of probability in terms of a sample space of equally likely outcomes	MATH 110, 303B
b. Use understanding of complementary, mutually exclusive, dependent, and independent events to calculate probabilities of simple events	MATH 110, 303B
c. Express probabilities in a variety of ways including ratios, proportions, decimals, and percents.	MATH 110, 303B

Part II: Subject Matter Skills and Abilities Applicable to the Content Domains in Mathematics	
Subject Matter Skills and Abilities	Courses that address these skills and abilities
a. Identify and prioritize relevant and missing information in mathematical problems	MATH 110, 115, 303A, 303B
b. Analyze complex problems to identify similar simple problems that might suggest solution strategies	MATH 110, 115, 303A, 303B
c. Represent a problem in alternate ways such as words, symbols, concrete models, and diagrams to gain greater insight	MATH 110, 115, 303A, 303B
d. Consider examples and patterns as a means to formulating a conjecture	MATH 110, 115, 303A, 303B
e. Apply logical reasoning and techniques from arithmetic, geometry, and probability/statistics to solve mathematical problems	MATH 110, 115, 303A, 303B
f. Evaluate the truth of mathematical statements (<i>i.e.</i> whether a given statement is always, sometimes, or never true)	MATH 110, 115, 303A, 303B
g. Apply different solution strategies (<i>e.g.</i> estimation) to check the reasonableness of a solution	MATH 110, 115, 303A, 303B
h. Demonstrate that a solution is correct	MATH 110, 115, 303A, 303B
i. Explain mathematical reasoning through a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and concrete models	MATH 110, 115, 303A, 303B
j. Use appropriate mathematical notation with clear and accurate language	MATH 110, 115, 303A, 303B
k. Explain how to derive a result based on previously developed ideas and explain how a result is related to other ideas.	MATH 110, 115, 303A, 303B