

9-12 Number Sense & Operations Strand

Benchmark		Algebra 1	Algebra 1 Honors	Algebra 1-A	Algebra 1-B	Algebra 2	Algebra 2 Honors	Calculus Honors	Discrete Mathematics Honors	Geometry	Geometry Honors	Math for College Algebra	Math for College Liberal Arts	Math for College Statistics	Math for Data and Financial Literacy	Math for Data and Financial Literacy Honors	Precalculus Honors	Probability and Statistics Honors
MA.912.NSO.1.1	Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents.	X	X		X							X			X	X		
MA.912.NSO.1.2	Generate equivalent algebraic expressions using the properties of exponents.	X	X		X							X			X	X		
MA.912.NSO.1.3	Generate equivalent algebraic expressions involving radicals or rational exponents using the properties of exponents.					X	X					X						
MA.912.NSO.1.4	Apply previous understanding of operations with rational numbers to add, subtract, multiply and divide numerical radicals.	X	X		X													
MA.912.NSO.1.5	Add, subtract, multiply and divide algebraic expressions involving radicals.					X	X											
MA.912.NSO.1.6	Given a numerical logarithmic expression, evaluate and generate equivalent numerical expressions using the properties of logarithms or exponents.					X	X					X				X		
MA.912.NSO.1.7	Given an algebraic logarithmic expression, generate an equivalent algebraic expression using the properties of logarithms or exponents.					X	X					X				X		
MA.912.NSO.2.1	Extend previous understanding of the real number system to include the complex number system. Add, subtract, multiply and divide complex numbers.					X	X											
MA.912.NSO.2.2	Represent addition, subtraction, multiplication and conjugation of complex numbers geometrically on the complex plane.																X	
MA.912.NSO.2.3	Calculate the distance and midpoint between two numbers on the complex coordinate plane.																X	
MA.912.NSO.2.4	Solve mathematical and real-world problems involving complex numbers represented algebraically or on the coordinate plane.																X	
MA.912.NSO.2.5	Represent complex numbers on the complex plane in rectangular and polar forms.																X	
MA.912.NSO.2.6	Rewrite complex numbers to trigonometric form. Multiply complex numbers in trigonometric form.																X	
MA.912.NSO.3.1	Apply appropriate notation and symbols to represent vectors in the plane as directed line segments. Determine the magnitude and direction of a vector in component form.																X	

9-12 Algebraic Reasoning Strand

Benchmark		Algebra 1	Algebra 1 Honors	Algebra 1-A	Algebra 1-B	Algebra 2	Algebra 2 Honors	Calculus Honors	Discrete Mathematics Honors	Geometry	Geometry Honors	Math for College Algebra	Math for College Liberal Arts	Math for College Statistics	Math for Data and Financial Literacy	Math for Data and Financial Literacy Honors	Precalculus Honors	Probability and Statistics Honors
MA.912.AR.3.7	Given a table, equation or written description of a quadratic function, graph that function, and determine and interpret its key features.	x	x		x							x						
MA.912.AR.3.8	Solve and graph mathematical and real-world problems that are modeled with quadratic functions. Interpret key features and determine constraints in terms of the context.	x	x		x	x	x					x				x		
MA.912.AR.3.9	Given a mathematical or real-world context, write two-variable quadratic inequalities to represent relationships between quantities from a graph or a written description.					x	x											
MA.912.AR.3.10	Given a mathematical or real-world context, graph the solution set to a two-variable quadratic inequality.					x	x											
MA.912.AR.4.1	Given a mathematical or real-world context, write and solve one-variable absolute value equations.	x	x	x														
MA.912.AR.4.2	Given a mathematical or real-world context, write and solve one-variable absolute value inequalities. Represent solutions algebraically or graphically.		x			x	x					x						
MA.912.AR.4.3	Given a table, equation or written description of an absolute value function, graph that function and determine its key features.	x	x	x														
MA.912.AR.4.4	Solve and graph mathematical and real-world problems that are modeled with absolute value functions. Interpret key features and determine constraints in terms of the context.					x	x					x						
MA.912.AR.5.1	Solve one-variable exponential equations using the properties of exponents.																	
MA.912.AR.5.2	Solve one-variable equations involving logarithms or exponential expressions. Interpret solutions as viable in terms of the context and identify any extraneous solutions.					x	x					x						
MA.912.AR.5.3	Given a mathematical or real-world context, classify an exponential function as representing growth or decay.	x	x		x								x					
MA.912.AR.5.4	Write an exponential function to represent a relationship between two quantities from a graph, a written description or a table of values within a mathematical or real-world context.	x	x		x	x	x					x	x					

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MA.912.AR.5.5	Given an expression or equation representing an exponential function, reveal the constant percent rate of change per unit interval using the properties of exponents. Interpret the constant percent rate of change in terms of a real-world context.					x	x						x					
MA.912.AR.5.6	Given a table, equation or written description of an exponential function, graph that function and determine its key features.	x	x		x							x	x					
MA.912.AR.5.7	Solve and graph mathematical and real-world problems that are modeled with exponential functions. Interpret key features and determine constraints in terms of the context.					x	x					x		x	x	x	x	
MA.912.AR.5.8	Given a table, equation or written description of a logarithmic function, graph that function and determine its key features.					x	x					x						
MA.912.AR.5.9	Solve and graph mathematical and real-world problems that are modeled with logarithmic functions. Interpret key features and determine constraints in terms of the context.					x	x					x					x	
MA.912.AR.6.1	Given a mathematical or real-world context, when suitable factorization is possible, solve one-variable polynomial equations of degree 3 or higher over the real and complex number systems.					x	x											
MA.912.AR.6.2	Explain and apply the Remainder Theorem to solve mathematical and real-world problems.						x											
MA.912.AR.6.3	Explain and apply theorems for polynomials to solve mathematical and real-world problems.																x	
MA.912.AR.6.4	Given a table, equation or written description of a polynomial function of degree 3 or higher, graph that function and determine its key features.																x	
MA.912.AR.6.5	Sketch a rough graph of a polynomial function of degree 3 or higher using zeros, multiplicity and knowledge of end behavior.					x	x											
MA.912.AR.6.6	Solve and graph mathematical and real-world problems that are modeled with polynomial functions of degree 3 or higher. Interpret key features and determine constraints in terms of the context.																x	

9-12 Functions Strand

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MA.912.F.1.1	Given an equation or graph that defines a function, determine the function type. Given an input-output table, determine a function type that could represent it.	x	x	x	x	x	x					x						
MA.912.F.1.2	Given a function represented in function notation, evaluate the function for an input in its domain. For a real-world context, interpret the output.	x	x	x	x							x		x	x	x		
MA.912.F.1.3	Calculate and interpret the average rate of change of a real-world situation represented graphically, algebraically or in a table over a specified interval.	x	x	x	x							x						
MA.912.F.1.4	Write an algebraic expression that represents the difference quotient of a function. Calculate the numerical value of the difference quotient at a given pair of points.																x	
MA.912.F.1.5	Compare key features of linear functions each represented algebraically, graphically, in tables or written descriptions.	x	x	x														
MA.912.F.1.6	Compare key features of linear and nonlinear functions each represented algebraically, graphically, in tables or written descriptions.	x	x		x							x	x					
MA.912.F.1.7	Compare key features of two functions each represented algebraically, graphically, in tables or written descriptions.					x	x										x	
MA.912.F.1.8	Determine whether a linear, quadratic or exponential function best models a given real-world situation.	x	x	x	x								x	x				
MA.912.F.1.9	Determine whether a function is even, odd or neither when represented algebraically, graphically or in a table.					x	x											
MA.912.F.2.1	Identify the effect on the graph or table of a given function after replacing $f(x)$ by $f(x)+k$, $kf(x)$, $f(kx)$ and $f(x+k)$ for specific values of k .	x	x	x	x							x						
MA.912.F.2.2	Identify the effect on the graph of a given function of two or more transformations defined by adding a real number to the x- or y-values or multiplying the x- or y-values by a real number.					x	x					x						

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MA.912.F.2.3	Given the graph or table of $f(x)$ and the graph or table of $f(x)+k$, $kf(x)$, $f(kx)$ and $f(x+k)$, state the type of transformation and find the value of the real number k .			x		x	x					x						
MA.912.F.2.4	Given the graph or table of values of two or more transformations of a function, state the type of transformation and find the values of the real number that defines the transformation.											x						
MA.912.F.2.5	Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the x - or y -values or multiplying the x - or y -values by a real number.					x	x					x						
MA.912.F.3.1	Given a mathematical or real-world context, combine two functions, limited to linear and quadratic, using arithmetic operations. When appropriate, include domain restrictions for the new function.		x															
MA.912.F.3.2	Given a mathematical or real-world context, combine two or more functions, limited to linear, quadratic, exponential and polynomial, using arithmetic operations. When appropriate, include domain restrictions for the new function.					x	x					x			x	x		
MA.912.F.3.3	Solve mathematical and real-world problems involving functions that have been combined using arithmetic operations.																x	
MA.912.F.3.4	Represent the composition of two functions algebraically or in a table. Determine the domain and range of the composite function.					x	x					x					x	
MA.912.F.3.5	Solve mathematical and real-world problems involving composite functions.																x	
MA.912.F.3.6	Determine whether an inverse function exists by analyzing tables, graphs and equations.					x	x					x						
MA.912.F.3.7	Represent the inverse of a function algebraically, graphically or in a table. Use composition of functions to verify that one function is the inverse of the other.					x	x					x					x	

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MA.912.F.3.8	Produce an invertible function from a non-invertible function by restricting the domain.																	x	
MA.912.F.3.9	Solve mathematical and real-world problems involving inverse functions.																	x	

9-12 Financial Literacy Stand

Benchmark		9-12 Financial Literacy Stand																	
		Algebra 1	Algebra 1 Honors	Algebra 1-A	Algebra 1-B	Algebra 2	Algebra 2 Honors	Calculus Honors	Discrete Mathematics Honors	Geometry	Geometry Honors	Math for College Algebra	Math for College Liberal Arts	Math for College Statistics	Math for Data and Financial Literacy	Math for Data and Financial Literacy Honors	Precalculus Honors	Probability and Statistics Honors	
MA.912.FL.1.1	Extend previous knowledge of operations of fractions, percentages and decimals to solve real-world problems involving money and business.														X	X	X		
MA.912.FL.1.2	Extend previous knowledge of ratios and proportional relationships to solve real-world problems involving money and business.															X	X		
MA.912.FL.1.3	Solve real-world problems involving weighted averages using spreadsheets and other technology.														X	X	X		
MA.912.FL.2.1	Given assets and liabilities, calculate net worth using spreadsheets and other technology.															X	X		
MA.912.FL.2.2	Solve real-world problems involving profits, costs and revenues using spreadsheets and other technology.															X	X		
MA.912.FL.2.3	Explain how consumer price index (CPI), gross domestic product (GDP), stock indices, unemployment rate and trade deficit are calculated. Interpret their value in terms of the context.																	X	
MA.912.FL.2.4	Given current exchange rates, convert between currencies. Solve real-world problems involving exchange rates.															X	X		
MA.912.FL.2.5	Develop budgets that fit within various incomes using spreadsheets and other technology.															X	X		
MA.912.FL.2.6	Given a real-world scenario, complete and calculate federal income tax using spreadsheets and other technology.															X	X		
MA.912.FL.3.1	Compare simple, compound and continuously compounded interest over time.					X	X							X		X	X		
MA.912.FL.3.2	Solve real-world problems involving simple, compound and continuously compounded interest.	X	X	X	X	X	X							X		X	X		
MA.912.FL.3.3	Solve real-world problems involving present value and future value of money.																X		
MA.912.FL.3.4	Explain the relationship between simple interest and linear growth. Explain the relationship between compound interest and exponential growth and the relationship between continuously compounded interest and exponential growth.	X	X	X	X	X	X							X					

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MA.912.FL.3.5	Compare the advantages and disadvantages of using cash versus personal financing options.														X	X		
MA.912.FL.3.6	Calculate the finance charges and total amount due on a bill using various forms of credit using estimation, spreadsheets and other technology.														X	X		
MA.912.FL.3.7	Compare the advantages and disadvantages of different types of student loans by manipulating a variety of variables and calculating the total cost using spreadsheets and other technology.														X	X		
MA.912.FL.3.8	Calculate using spreadsheets and other technology the total cost of purchasing consumer durables over time given different monthly payments, down payments, financing options and fees.														X	X		
MA.912.FL.3.9	Compare the advantages and disadvantages of different types of mortgage loans by manipulating a variety of variables and calculating fees and total cost using spreadsheets and other technology.														X	X		
MA.912.FL.3.10	Analyze credit scores qualitatively. Explain how short-term and long-term purchases, including deferred payments, may increase or decrease credit scores. Explain how credit scores influence buying power.														X	X		
MA.912.FL.3.11	Given a real-world scenario, establish a plan to pay off debt.														X	X		
MA.912.FL.3.12	Given fixed costs, per item costs and selling price, determine the break-even point for sales volume.																	
MA.912.FL.4.1	Calculate and compare various options, deductibles and fees for various types of insurance policies using spreadsheets and other technology.														X	X		
MA.912.FL.4.2	Compare the advantages and disadvantages for adding on a one-time warranty to a purchase using spreadsheets and other technology.															X		
MA.912.FL.4.3	Compare the advantages and disadvantages of various retirement savings plans using spreadsheets and other technology.														X	X		

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MA.912.FL.4.4	Collect, organize and interpret data to determine an effective retirement savings plan to meet personal financial goals using spreadsheets and other technology.														x	x		
MA.912.FL.4.5	Compare different ways that portfolios can be diversified in investments.														x	x		
MA.912.FL.4.6	Simulate the purchase of a stock portfolio with a set amount of money, and evaluate its worth over time considering gains, losses and selling, taking into account any associated fees.														x	x		

9-12 Geometric Reasoning Strand

Benchmark		Algebra 1	Algebra 1 Honors	Algebra 1-A	Algebra 1-B	Algebra 2	Algebra 2 Honors	Calculus Honors	Discrete Mathematics Honors	Geometry	Geometry Honors	Math for College Algebra	Math for College Liberal Arts	Math for College Statistics	Math for Data and Financial Literacy	Math for Data and Financial Literacy Honors	Precalculus Honors	Probability and Statistics Honors
MA.912.GR.1.1	Prove relationships and theorems about lines and angles. Solve mathematical and real-world problems involving postulates, relationships and theorems of lines and angles.									x	x							
MA.912.GR.1.2	Prove triangle congruence or similarity using Side-Side-Side, Side-Angle-Side, Angle-Side-Angle, Angle-Angle-Side, Angle-Angle and Hypotenuse-Leg.									x	x							
MA.912.GR.1.3	Prove relationships and theorems about triangles. Solve mathematical and real-world problems involving postulates, relationships and theorems of triangles.									x	x							
MA.912.GR.1.4	Prove relationships and theorems about parallelograms. Solve mathematical and real-world problems involving postulates, relationships and theorems of parallelograms.									x	x							
MA.912.GR.1.5	Prove relationships and theorems about trapezoids. Solve mathematical and real-world problems involving postulates, relationships and theorems of trapezoids.									x	x							
MA.912.GR.1.6	Solve mathematical and real-world problems involving congruence or similarity in two-dimensional figures.									x	x		x					
MA.912.GR.2.1	Given a preimage and image, describe the transformation and represent the transformation algebraically using coordinates.									x	x							
MA.912.GR.2.2	Identify transformations that do or do not preserve distance.									x	x							
MA.912.GR.2.3	Identify a sequence of transformations that will map a given figure onto itself or onto another congruent or similar figure.									x	x							
MA.912.GR.2.4	Determine symmetries of reflection, symmetries of rotation and symmetries of translation of a geometric figure.								x		x		x					
MA.912.GR.2.5	Given a geometric figure and a sequence of transformations, draw the transformed figure on a coordinate plane.									x	x							
MA.912.GR.2.6	Apply rigid transformations to map one figure onto another to justify that the two figures are congruent.									x	x							

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MA.912.GR.2.7	Justify the criteria for triangle congruence using the definition of congruence in terms of rigid transformations.										x							
MA.912.GR.2.8	Apply an appropriate transformation to map one figure onto another to justify that the two figures are similar.									x	x							
MA.912.GR.2.9	Justify the criteria for triangle similarity using the definition of similarity in terms of non-rigid transformations.										x							
MA.912.GR.3.1	Determine the weighted average of two or more points on a line.									x	x							
MA.912.GR.3.2	Given a mathematical context, use coordinate geometry to classify or justify definitions, properties and theorems involving circles, triangles or quadrilaterals.									x	x							
MA.912.GR.3.3	Use coordinate geometry to solve mathematical and real-world geometric problems involving lines, circles, triangles and quadrilaterals.									x	x							
MA.912.GR.3.4	Use coordinate geometry to solve mathematical and real-world problems on the coordinate plane involving perimeter or area of polygons.									x	x							
MA.912.GR.4.1	Identify the shapes of two-dimensional cross-sections of three-dimensional figures.									x	x							
MA.912.GR.4.2	Identify three-dimensional objects generated by rotations of two-dimensional figures.									x	x							
MA.912.GR.4.3	Extend previous understanding of scale drawings and scale factors to determine how dilations affect the area of two-dimensional figures and the surface area or volume of three-dimensional figures.									x	x		x					
MA.912.GR.4.4	Solve mathematical and real-world problems involving the area of two-dimensional figures.									x	x		x					
MA.912.GR.4.5	Solve mathematical and real-world problems involving the volume of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres.									x	x		x					
MA.912.GR.4.6	Solve mathematical and real-world problems involving the surface area of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres.									x	x		x					

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MA.912.GR.7.5	Graph and solve mathematical and real-world problems that are modeled with an equation of a parabola. Determine and interpret key features in terms of the context.																x	
MA.912.GR.7.6	Given a mathematical or real-world context, derive and create the equation of an ellipse using key features.																x	
MA.912.GR.7.7	Graph and solve mathematical and real-world problems that are modeled with an equation of an ellipse. Determine and interpret key features in terms of the context.																x	
MA.912.GR.7.8	Given a mathematical or real-world context, derive and create the equation of a hyperbola using key features.																x	
MA.912.GR.7.9	Graph and solve mathematical and real-world problems that are modeled with an equation of a hyperbola. Determine and interpret key features in terms of the context.																x	

9-12 Trigonometry Strand

Benchmark		Algebra 1	Algebra 1 Honors	Algebra 1-A	Algebra 1-B	Algebra 2	Algebra 2 Honors	Calculus Honors	Discrete Mathematics Honors	Geometry	Geometry Honors	Math for College Algebra	Math for College Liberal Arts	Math for College Statistics	Math for Data and Financial Literacy	Math for Data and Financial Literacy Honors	Precalculus Honors	Probability and Statistics Honors
MA.912.T.3.1	Given a mathematical or real-world context, choose sine, cosine or tangent trigonometric functions to model periodic phenomena with specified amplitude, frequency, horizontal shift and midline.																x	
MA.912.T.3.2	Given a table, equation or written description of a trigonometric function, graph that function and determine key features.																x	
MA.912.T.3.3	Solve and graph mathematical and real-world problems that are modeled with trigonometric functions. Interpret key features and determine constraints in terms of the context.																x	
MA.912.T.4.1	Define and plot polar coordinates. Convert between polar coordinates and rectangular coordinates with and without the use of technology.																x	
MA.912.T.4.2	Represent equations given in rectangular coordinates in terms of polar coordinates. Represent equations given in polar coordinates in terms of rectangular coordinates.																x	
MA.912.T.4.3	Graph equations in the polar coordinate plane with and without the use of graphing technology.																x	
MA.912.T.4.4	Identify and graph special polar equations, including circles, cardioids, limacons, rose curves and lemniscates.																x	
MA.912.T.4.5	Sketch the graph of a curve in the plane represented parametrically, indicating the direction of motion.																x	
MA.912.T.4.6	Convert from a parametric representation of a plane curve to a rectangular equation, and convert from a rectangular equation to a parametric representation of a plane curve.																x	
MA.912.T.4.7	Apply parametric equations to model applications involving motion in the plane.																x	

9-12 Data Analysis and Probability Strand

Benchmark		Algebra 1	Algebra 1 Honors	Algebra 1-A	Algebra 1-B	Algebra 2	Algebra 2 Honors	Calculus Honors	Discrete Mathematics Honors	Geometry	Geometry Honors	Math for College Algebra	Math for College Liberal Arts	Math for College Statistics	Math for Data and Financial Literacy	Math for Data and Financial Literacy Honors	Precalculus Honors	Probability and Statistics Honors
MA.912.DP.1.1	Given a set of data, select an appropriate method to represent the data, depending on whether it is numerical or categorical data and on whether it is univariate or bivariate.	x	x		x								x	x				x
MA.912.DP.1.2	Interpret data distributions represented in various ways. State whether the data is numerical or categorical, whether it is univariate or bivariate and interpret the different components and quantities in the display.	x	x		x								x	x	x	x		x
MA.912.DP.1.3	Explain the difference between correlation and causation in the contexts of both numerical and categorical data.	x	x	x										x				x
MA.912.DP.1.4	Estimate a population total, mean or percentage using data from a sample survey; develop a margin of error through the use of simulation.	x	x		x													x
MA.912.DP.1.5	Interpret the margin of error of a mean or percentage from a data set. Interpret the confidence level corresponding to the margin of error.																	x
MA.912.DP.2.1	For two or more sets of numerical univariate data, calculate and compare the appropriate measures of center and measures of variability, accounting for possible effects of outliers. Interpret any notable features of the shape of the data distribution.												x	x				x
MA.912.DP.2.2	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate.																	x
MA.912.DP.2.3	Estimate population percentages from data that has been fit to the normal distribution.																	x
MA.912.DP.2.4	Fit a linear function to bivariate numerical data that suggests a linear association and interpret the slope and y-intercept of the model. Use the model to solve real-world problems in terms of the context of the data.	x	x	x									x	x	x	x		x

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MA.912.DP.2.5	Given a scatter plot that represents bivariate numerical data, assess the fit of a given linear function by plotting and analyzing residuals.		x											x				x
MA.912.DP.2.6	Given a scatter plot with a line of fit and residuals, determine the strength and direction of the correlation. Interpret strength and direction within a real-world context.	x	x	x										x				x
MA.912.DP.2.7	Compute the correlation coefficient of a linear model using technology. Interpret the strength and direction of the correlation coefficient.													x				x
MA.912.DP.2.8	Fit a quadratic function to bivariate numerical data that suggests a quadratic association and interpret any intercepts or the vertex of the model. Use the model to solve real-world problems in terms of the context of the data.					x	x									x		
MA.912.DP.2.9	Fit an exponential function to bivariate numerical data that suggests an exponential association. Use the model to solve real-world problems in terms of the context of the data.					x	x						x	x		x		x
MA.912.DP.3.1	Construct a two-way frequency table summarizing bivariate categorical data. Interpret joint and marginal frequencies and determine possible associations in terms of a real-world context.	x	x		x									x	x	x		x
MA.912.DP.3.2	Given marginal and conditional relative frequencies, construct a two-way relative frequency table summarizing categorical bivariate data.		x											x	x	x		x
MA.912.DP.3.3	Given a two-way relative frequency table or segmented bar graph summarizing categorical bivariate data, interpret joint, marginal and conditional relative frequencies in terms of a real-world context.		x												x	x		x
MA.912.DP.3.4	Given a relative frequency table, construct and interpret a segmented bar graph.															x		x
MA.912.DP.3.5	Solve real-world problems involving univariate and bivariate categorical data.													x				x

9-12 Data Analysis and Probability Strand

Benchmark		Algebra 1	Algebra 1 Honors	Algebra 1-A	Algebra 1-B	Algebra 2	Algebra 2 Honors	Calculus Honors	Discrete Mathematics Honors	Geometry	Geometry Honors	Math for College Algebra	Math for College Liberal Arts	Math for College Statistics	Math for Data and Financial Literacy	Math for Data and Financial Literacy Honors	Precalculus Honors	Probability and Statistics Honors
MA.912.DP.4.1	Describe events as subsets of a sample space using characteristics, or categories, of the outcomes, or as unions, intersections or complements of other events.						x		x				x	x				x
MA.912.DP.4.2	Determine if events A and B are independent by calculating the product of their probabilities.						x						x	x				x
MA.912.DP.4.3	Calculate the conditional probability of two events and interpret the result in terms of its context.						x						x	x				x
MA.912.DP.4.4	Interpret the independence of two events using conditional probability.						x						x	x				x
MA.912.DP.4.5	Given a two-way table containing data from a population, interpret the joint and marginal relative frequencies as empirical probabilities and the conditional relative frequencies as empirical conditional probabilities. Use those probabilities to determine whether characteristics in the population are approximately independent.												x	x				x
MA.912.DP.4.6	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.												x	x				x
MA.912.DP.4.7	Apply the addition rule for probability, taking into consideration whether the events are mutually exclusive, and interpret the result in terms of the model and its context.												x	x				x
MA.912.DP.4.8	Apply the general multiplication rule for probability, taking into consideration whether the events are independent, and interpret the result in terms of the context.												x	x				x
MA.912.DP.4.9	Apply the addition and multiplication rules for counting to solve mathematical and real-world problems, including problems involving probability.						x		x				x	x				x
MA.912.DP.4.10	Given a mathematical or real-world situation, calculate the appropriate permutation or combination.						x		x				x	x				x
MA.912.DP.5.1	Distinguish between a population parameter and a sample statistic.													x				x

9-12 Data Analysis and Probability Strand

Benchmark		Algebra 1	Algebra 1 Honors	Algebra 1-A	Algebra 1-B	Algebra 2	Algebra 2 Honors	Calculus Honors	Discrete Mathematics Honors	Geometry	Geometry Honors	Math for College Algebra	Math for College Liberal Arts	Math for College Statistics	Math for Data and Financial Literacy	Math for Data and Financial Literacy Honors	Precalculus Honors	Probability and Statistics Honors
MA.912.DP.5.2	Explain how random sampling produces data that is representative of a population.													x				x
MA.912.DP.5.3	Compare and contrast sampling methods.													x				x
MA.912.DP.5.4	Generate multiple samples or simulated samples of the same size to measure the variation in estimates or predictions.													x				x
MA.912.DP.5.5	Determine if a specific model is consistent within a given process by analyzing the data distribution from a data-generating process.													x				x
MA.912.DP.5.6	Determine the appropriate design, survey, experiment or observational study, based on the purpose. Articulate the types of questions appropriate for each type of design.													x				x
MA.912.DP.5.7	Compare and contrast surveys, experiments and observational studies.													x				x
MA.912.DP.5.8	Draw inferences about two populations using data and statistical analysis from two random samples.																	x
MA.912.DP.5.9	Compare two treatments using data from an experiment in which the treatments are assigned randomly.																	x
MA.912.DP.5.10	Determine whether differences between parameters are significant using simulations.																	x
MA.912.DP.5.11	Evaluate reports based on data from diverse media, print and digital resources by interpreting graphs and tables; evaluating data-based arguments; determining whether a valid sampling method was used; or interpreting provided statistics.													x	x	x		x
MA.912.DP.6.1	Define a random variable for a quantity of interest by assigning a numerical value to each individual outcome in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.																	x
MA.912.DP.6.2	Develop a probability distribution for a discrete random variable using theoretical probabilities. Find the expected value and interpret it as the mean of the discrete distribution.																	x

9-12 Data Analysis and Probability Strand

Benchmark		Algebra 1	Algebra 1 Honors	Algebra 1-A	Algebra 1-B	Algebra 2	Algebra 2 Honors	Calculus Honors	Discrete Mathematics Honors	Geometry	Geometry Honors	Math for College Algebra	Math for College Liberal Arts	Math for College Statistics	Math for Data and Financial Literacy	Math for Data and Financial Literacy Honors	Precalculus Honors	Probability and Statistics Honors	
MA.912.DP.6.3	Develop a probability distribution for a discrete random variable using empirical probabilities. Find the expected value and interpret it as the mean of the discrete distribution.																		x
MA.912.DP.6.4	Given a binomial distribution, calculate and interpret the expected value. Solve real-world problems involving binomial distributions.																		x
MA.912.DP.6.5	Solve real-world problems involving geometric distributions.																		x
MA.912.DP.6.6	Solve real-world problems involving Poisson distributions.																		
MA.912.DP.6.7	Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values and standard deviations. Evaluate and compare strategies on the basis of the calculated expected values and standard deviations.																		x
MA.912.DP.6.8	Apply probabilities to make fair decisions, such as drawing from lots or using a random number generator.																		x

9-12 Logic and Discrete Theory Strand

Benchmark		Algebra 1	Algebra 1 Honors	Algebra 1-A	Algebra 1-B	Algebra 2	Algebra 2 Honors	Calculus Honors	Discrete Mathematics Honors	Geometry	Geometry Honors	Math for College Algebra	Math for College Liberal Arts	Math for College Statistics	Math for Data and Financial Literacy	Math for Data and Financial Literacy Honors	Precalculus Honors	Probability and Statistics Honors
MA.912.LT.1.1	Apply recursive and iterative thinking to solve problems.								x									
MA.912.LT.1.2	Solve problems involving recurrence relations.								x									
MA.912.LT.1.3	Apply mathematical induction in a variety of applications.																	
MA.912.LT.2.1	Define and explain the basic concepts of Graph Theory.								x									
MA.912.LT.2.2	Solve problems involving paths in graphs.								x									
MA.912.LT.2.3	Solve scheduling problems using critical path analysis and Gantt charts. Create a schedule using critical path analysis.								x									
MA.912.LT.2.4	Apply graph coloring techniques to solve problems.								x									
MA.912.LT.2.5	Apply spanning trees, rooted trees, binary trees and decision trees to solve problems.								x									
MA.912.LT.2.6	Solve problems concerning optimizing resource usage using bin-packing techniques.																	
MA.912.LT.2.7	Solve problems involving optimal strategies in Game Theory.																	
MA.912.LT.3.1	Define and explain the basic concepts of Election Theory and voting.								x									
MA.912.LT.3.2	Analyze election data using election theory techniques. Explain how Arrow's Impossibility Theorem may be related to the fairness of the outcome of the election.								x									
MA.912.LT.3.3	Decide voting power within a group using weighted voting techniques. Provide real-world examples of weighted voting and its pros and cons.								x									
MA.912.LT.3.4	Solve problems using fair division and apportionment techniques.								x									
MA.912.LT.4.1	Translate propositional statements into logical arguments using propositional variables and logical connectives.								x				x					
MA.912.LT.4.2	Determine truth values of simple and compound statements using truth tables.								x				x					
MA.912.LT.4.3	Identify and accurately interpret "if...then," "if and only if," "all" and "not" statements. Find the converse, inverse and contrapositive of a statement.								x	x	x		x					

9-12 Logic and Discrete Theory Strand

Benchmark		Algebra 1	Algebra 1 Honors	Algebra 1-A	Algebra 1-B	Algebra 2	Algebra 2 Honors	Calculus Honors	Discrete Mathematics Honors	Geometry	Geometry Honors	Math for College Algebra	Math for College Liberal Arts	Math for College Statistics	Math for Data and Financial Literacy	Math for Data and Financial Literacy Honors	Precalculus Honors	Probability and Statistics Honors
MA.912.LT.4.4	Represent logic operations, such as AND, OR, NOT, NOR, and XOR, using logical symbolism to solve problems.								x				x					
MA.912.LT.4.5	Determine whether two propositions are logically equivalent.								x				x					
MA.912.LT.4.6	Apply methods of direct and indirect proof and determine whether a logical argument is valid.								x									
MA.912.LT.4.7	Identify and give examples of undefined terms; axioms; theorems; proofs, including proofs using mathematical induction; and inductive and deductive reasoning.								x									
MA.912.LT.4.8	Construct proofs, including proofs by contradiction.								x		x							
MA.912.LT.4.9	Construct logical arguments using laws of detachment, syllogism, tautology, contradiction and Euler Diagrams.								x				x					
MA.912.LT.4.10	Judge the validity of arguments and give counterexamples to disprove statements.								x	x	x		x					
MA.912.LT.5.1	Given two sets, determine whether the two sets are equivalent and whether one set is a subset of another. Given one set, determine its power set.								x				x					
MA.912.LT.5.2	Given a relation on two sets, determine whether the relation is a function, determine the inverse of the relation if it exists and identify if the relation is bijective.								x									
MA.912.LT.5.3	Partition a set into disjoint subsets and determine an equivalence class given the equivalence relation on a set.								x									
MA.912.LT.5.4	Perform the set operations of taking the complement of a set and the union, intersection, difference and product of two sets.								x				x	x				
MA.912.LT.5.5	Explore relationships and patterns and make arguments about relationships between sets using Venn Diagrams.								x				x	x				
MA.912.LT.5.6	Prove set relations, including DeMorgan's Laws and equivalence relations.								x				x					

