



9th Grade Correlation to Frameworks

	Mathematics Curriculum Framework	Lesson Number	Lesson Title
NUMBER, NUMBER SENSE AND OPERATIONS			
1.	Identify and justify whether properties (closure, identity, inverse, commutative and associative) hold for a given set and operations; e.g., even integers and multiplication.	HA1-130	Identifying Postulates, Theorems, and Properties
2.	Compare, order and determine equivalent forms for rational and irrational numbers.	HA1-015	Graphing Real Numbers Using a Number Line
		HA1-020	Classifying Numbers into Subsets of Real Numbers
		HA1-025	Comparing and Ordering Real Numbers
3.	Explain the effects of operations such as multiplication or division, and of computing powers and roots on the magnitude of quantities.	HA1-030	Using Opposites and Absolute Values
		HA1-035	Adding Real Numbers Using a Number Line
		HA1-040	The Addition Rule for Real Numbers
		HA1-045	Subtracting Real Numbers
		HA1-050	Multiplying Real Numbers
		HA1-055	Dividing Real Numbers
		HA1-062	Adding, Subtracting, Multiplying, and Dividing Real Numbers
		HA1-860	Using the Laws of Exponents
		HA1-480	Finding the Square Roots of Rational Numbers
4.	Demonstrate fluency in computations using real numbers.	HA1-040	The Addition Rule for Real Numbers
		HA1-045	Subtracting Real Numbers
		HA1-050	Multiplying Real Numbers
		HA1-055	Dividing Real Numbers
		HA1-062	Adding, Subtracting, Multiplying, and Dividing Real Numbers
5.	Estimate the solutions for problem situations involving square and cube roots.	HA1-492	Simplifying Square and Cube Roots (Future Release)
MEASUREMENT			
1.	Convert rates within the same measurement system; e.g., miles per hour to feet per second; kilometers per hour to meters per second.	HA1-160	Writing an Equation to Solve Distance, Rate, and Time Problems
		MPA-062	Converting Units in Customary System
		MPA-061	Converting Metric Units of Length, Capacity, and Mass
2.	Use unit analysis to check computations involving measurement.	HA1-890	Using Models to Derive Formulas for Two-Dimensional Geometric Figures
		HA1-891	Using Models to Derive Formulas for Three-Dimensional Solids
		MPA-115	Finding the Volumes of Prisms, Cylinders, Pyramids, and Cones Using Models
		MPA-111	Comparing Perimeters, Areas, and Volumes of Similar Geometric Figures and Solids
3.	Use the ratio of lengths in similar two-dimensional figures or three-dimensional objects to calculate the ratio of their areas or volumes respectively.	MPA-111	Comparing Perimeters, Areas, and Volumes of Similar Geometric Figures and Solids
4.	Use scale drawings and right triangle trigonometry to solve problems that include unknown distances and angle measures.	HA1-515	Using the Pythagorean Theorem

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5.	Solve problems involving unit conversion for situations involving distances, areas, volumes and rates within the same measurement system.	HA1-516	Applications of the Pythagorean Theorem
		HA1-160	Writing an Equation to Solve Distance, Rate, and Time Problems
		MPA-062	Converting Units in Customary System
		MPA-061	Converting Metric Units of Length, Capacity, and Mass
GEOMETRY AND SPATIAL SENSE			
1.	Define the basic trigonometric ratios in right triangles: sine, cosine and tangent.	HGM-215	Investigating Properties of 30-60-90 Traingles (Future Release)
		HGM-220	Investigating Properties of 45-45-90 Traingles (Future Release)
		HGM-225	Applying Properties of Special Right Triangles (Future Release)
2.	Apply proportions and right triangle trigonometric ratios to solve problems involving missing lengths and angle measures in similar figures.	HGM-215	Investigating Properties of 30-60-90 Traingles (Future Release)
		HGM-220	Investigating Properties of 45-45-90 Traingles (Future Release)
3.	Analyze two-dimensional figures in a coordinate plane; e.g., use slope and distance formulas to show that a quadrilateral is a parallelogram.	HGM-220 <i>Future Release</i>	
PATTERNS, FUNCTIONS AND ALGEBRA			
1.	Define function with ordered pairs in which each domain element is assigned exactly one range element.	HA1-436	Identifying Relations
		HA1-437	Identifying Relations as Functions
		HA1-438	Finding the Domain and Range of Functions
2.	Generalize patterns using functions or relationships (linear, quadratic and exponential), and freely translate among tabular, graphical and symbolic representations.	HA1-447	Identifying Number Patterns
		HA1-448	Finding the nth Term of a Pattern
3.	Describe problem situations (linear, quadratic and exponential) by using tabular, graphical and symbolic representations.	HA1-447	Identifying Number Patterns
		HA1-448	Finding the nth Term of a Pattern
4.	Demonstrate the relationship among zeros of a function, roots of equations, and solutions of equations graphically and in words.	HA1-382	Solving Linear Equations Using the Graphing Calculator
		HA1-380	Graphing Linear Equations
		HA1-398	Graphing Linear Equations Using Slope and y-Intercept or Slope and a Point
		HA1-536	Solving Quadratic Equations Using the Graphing Calculator
		HA1-436	Identifying Relations
5.	Describe and compare characteristics of the following families of functions: linear, quadratic and exponential functions; e.g., general shape, number of roots, domain, range, rate of change, maximum or minimum.	HA1-437	Identifying Relations as Functions
		HA1-438	Finding the Domain and Range of Functions
		HA1-955	Analyzing Linear Functions
		HA1-927	Graphing $f(x) = ax^2$ Using Dilations
		HA1-928	Graphing $f(x) = ax^2$ Using Dilations and Reflections
		HA1-945	Real-World Applications of Quadratic Functions
		HA1-394	Interchanging Linear Equations Between Standard Form and Slope-Intercept Form
7.	Use formulas to solve problems involving exponential growth and decay.	HA1-104	Translating Word Statements into Equations
		HA1-105	Translating Word Statements into Inequalities
		HA1-855	Solving Exponential Equations
8.	Find linear equations that represent lines that pass through a given set of ordered pairs, and find linear equations that represent lines parallel	HA1-380	Graphing Linear Equations

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	or perpendicular to a given line through a specific point.		
		HA1-395	Drawing a Line Using Slope-Intercept and Determining if Two Lines are Parallel
		HA1-866	Drawing a Line Using Slope-Intercept Form and Determining if Two Lines are Parallel or Perpendicular
9.	Solve and interpret the meaning of 2 by 2 systems of linear equations graphically, by substitution and by elimination, with and without technology.	HA1-455	Solving Systems of Linear Equations by Graphing
		HA1-460	Solving Systems of Linear Equations by the Substitution Method
		HA1-465	Solving Systems of Linear Equations by the Addition/Subtraction Method
		HA1-470	Solving Systems of Linear Equations by the Multiply/Add/Subtract Method
		HA1-806	Solving Systems of Linear Equations Using the Graphing Calculator
10.	Solve quadratic equations with real roots by factoring, graphing, using the quadratic formula and with technology.	HA1-935	Analyzing Graphs of Quadratic Functions
		HA1-525	Solving Quadratic Equations Involving Perfect Square Expressions
		HA1-530	Solving Quadratic Equations by Completing the Square
		HA1-535	Developing the Quadratic Formula and Using it to Solve Equations
		HA1-536	Solving Quadratic Equations Using the Graphing Calculator
11.	Add, subtract, multiply and divide monomials and polynomials (division of polynomials by monomials only).	HA1-220	Identifying and Multiplying Monomials
		HA1-225	Dividing Monomials and Simplifying Expressions Having an Exponent of Zero
		HA1-230	Raising a Monomial or Quotient of Monomials to a Power
		HA1-240	Identifying the Degree of Polynomials and Simplifying by Combining Like Terms
		HA1-245	Adding and Subtracting Polynomials
		HA1-920	Simplifying Algebraic Expressions Using the Distributive Property
		HA1-255	Multiplying Two Binomials Using the FOIL Method
		HA1-260	Squaring a Binomial and Finding the Product of a Sum and Difference
		HA1-355	Dividing Polynomials
12.	Simplify rational expressions by eliminating common factors and applying properties of integer exponents.	HA1-315	Defining Rational Expressions and Determining the Restricted Values
		HA1-320	Simplifying Rational Expressions
		HA1-325	Multiplying Rational Expressions
		HA1-330	Dividing Rational Expressions
		HA1-335	Finding the LCD of Rational Expressions and Changing Fractions to Equivalent Fractions
		HA1-340	Adding and Subtracting Rational Expressions
		HA1-345	Adding and Subtracting Polynomials and Rational Expressions
13.	Model and solve problems involving direct and inverse variation using proportional reasoning.	HA1-450	Solving Problems Involving Direct Variation
		HA1-453	Solving Problems Involving Inverse Variation
14.	Describe the relationship between slope and the graph of a direct variation and inverse variation.	HA1-398	Graphing Linear Equations Using Slope and y-Intercept or Slope and a Point
15.	Describe how a change in the value of a constant in a linear or quadratic equation affects the related graphs.	HA1-401	How Variations of "m" and "b" Affect the Graph of $y = mx + b$
		HA1-927	Graphing $f(x) = ax^2$ Using Dilations
		HA1-928	Graphing $f(x) = ax^2$ Using Dilations and Reflections
		HA1-929	Graphing $f(x) = ax^2 + c$ Using Dilations, Reflections, and Vertical Translations
DATA ANALYSIS AND PROBABILITY			
1.	Classify data as univariate (single variable) or bivariate (two variables) and as quantitative (measurement) or qualitative (categorical) data.	HA1-541	Analyzing Data Using the Measures of Central Tendency and the Range
2.	Create a scatter plot for a set of bivariate data, sketch the line of best fit, and interpret the slope of the line of best fit.	HA1-892	Data Analysis Using the Graphing Calculator
		HA1-965	Determining the Best-Fitting Line
3.	Analyze and interpret frequency distributions based on spread,	HA1-545	Making a Frequency Distribution Table

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	symmetry, skewness, clusters and outliers.		
		HA1-885	Histograms and the Normal Distribution
4.	Describe and compare various types of studies (survey, observation, experiment), and identify possible misuses of statistical data.		
5.	Describe characteristics and limitations of sampling methods, and analyze the effects of random versus biased sampling; e.g., determine and justify whether the sample is likely to be representative of the population.		
6.	Make inferences about relationships in bivariate data, and recognize the difference between evidence of relationship (correlation) and causation.	HA1-965	Determining the Best-Fitting Line
7.	Use counting techniques and the Fundamental Counting principle to determine the total number of possible outcomes for mathematical situations.	HA1-879	Applying Counting Techniques to Permutations and Combinations
		HA1-560	Determining Probability of an Event and Complementary Event from a Random Experiment
8.	Describe, create and analyze a sample space and use it to calculate probability.	HA1-560	Determining Probability of an Event and Complementary Event from a Random Experiment
9.	Identify situations involving independent and dependent events, and explain differences between, and common misconceptions about, probabilities associated with those events.	HA1-565	Solving Problems Involving Independent, Dependent, and Mutually Exclusive and Inclusive Events
10.	Use theoretical and experimental probability, including simulations or random numbers, to estimate probabilities and to solve problems dealing with uncertainty; e.g., compound events, independent events, simple dependent events.	HA1-565	Solving Problems Involving Independent, Dependent, and Mutually Exclusive and Inclusive Events

MM1-Fundamentals of Mathematics

MPA- Pre-Algebra

HA1-Algebra 1

Note: Standards were taken from the Ohio K-12 Benchmark and Indicators by Grade Level document adopted by the Ohio State Board of Education in December, 2001.