

#### SpringBoard<sup>®</sup> Mathematics with Meaning<sup>™</sup> High School Levels At A Glance

			Algebra 1	
Unit	<b>Essential Questions</b>	Embedded Assessments	Unit Focus on Embedded Assessment Goals	Academic Vocabulary
Unit 1 Patterns and Equations	How are patterns, equations, and graphs related?  Why are the properties of real numbers important when solving equations?	EA#1: Multiple Representations of Data  EA#2: Properties and Solving Equations  EA#3: Inequalities and Absolute Value	<ul> <li>Embedded Assessment 1 - Shooting Stars         <ul> <li>Multiple representations of data</li> <li>Pattern recognition</li> <li>Linear versus nonlinear data</li> </ul> </li> <li>Embedded Assessment 2- Checking Group Work         <ul> <li>Solving multi-step equations</li> <li>Properties of numbers</li> <li>Solution of an equation</li> </ul> </li> <li>Embedded Assessment 3- A Healthy Pool</li> </ul>	expression variable distributive property equation solution compound inequality absolute value equation absolute value inequality
			<ul> <li>Writing and graphing linear inequalities on a number line</li> <li>Solving absolute value inequalities</li> <li>Translating information from a tabular display to a symbolic representation</li> </ul>	
Unit 2 Linear Functions	How can you show mathematical relationships?	EA#1: Representations of Functions	<ul> <li>Embedded Assessment 1- Bryce Canyon Hiking</li> <li>Definition of function</li> <li>Representations of functions</li> </ul>	dependent variable direct variation domain
	Why are linear functions useful in real-world settings?	EA#2: Linear Functions and Equations	<ul> <li>Function notation</li> <li>Slope</li> <li>Embedded Assessment 2 - Text Message Plans</li> <li>Discrete linear functions</li> </ul>	function independent variable inverse variation linear equation
		EA#3: Linear Equations and Slope as Rate of Change	Writing linear equations     Tabular and graphical representations     Domain and range     Evaluating functions     Direct and inverse variation      Embedded Assessment 3 - A 10K Run     Linear functions     Writing linear equations     Slope as a rate of change     Domain	range x-intercept y-intercept



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Unit 3 Extensions of Linear Concepts	Why would you use multiple representations of linear equations and inequalities?  How are systems of linear equations and Inequalities useful in interpreting real-world situations?	EA#1: Graphing Inequalities and Piecewise Functions  EA#2: Systems of Equations and Inequalities	Embedded Assessment 1 – Earnings on a Graph     Write linear inequalities     Graph linear inequalities     Write piecewise defined functions     Graph piecewise defined functions     Embedded Assessment 2 – All systems Go     Represent problem situations with systems of linear equations     Use multiple methods to solve systems of equations     Solve systems of linear inequalities	Substitution Method Elimination Method Linear inequality Piecewise defined function System of linear equations System of linear inequalities
Unit 4 Exponents, Radicals, and Polynomials	How do multiplicative patterns model the physical world?  How are adding and multiplying polynomial expressions different from each other?	EA#1: Exponential Functions  EA#2: Polynomial Operations and Factoring	<ul> <li>Embedded Assessment 1 – Decisions, Decisions         <ul> <li>Laws of exponents</li> <li>Simplifying radicals</li> <li>Exponential functions (growth and decay)</li> </ul> </li> <li>Embedded Assessment 2 – Measuring Up         <ul> <li>Multiplying and factoring polynomials</li> <li>Applying the properties of exponents</li> </ul> </li> </ul>	coefficient degree of a polynomial difference of two squares factor polynomial radical expression rational expression term
Unit 5 Quadratic Functions	How are quadratic functions used to model, analyze and interpret mathematical relationships?  Why is it advantageous to know a variety of ways to solve and graph quadratic functions?	EA#1: Graphing Quadratics EA#2: Solving Quadratic Equations	<ul> <li>Embedded Assessment 1 – Quadratic Introduction         <ul> <li>Graph quadratic functions with transformations of the form y</li> <li>a x² + c</li> <li>Identify quadratic functions</li> </ul> </li> <li>Embedded Assessment 2 – Egg Drop         <ul> <li>Modeling and solving quadratic equations</li> </ul> </li> </ul>	parabola parent function quadratic formula quadratic function real roots of an equation transformation vertex of a parabola
Unit 6 Data Analysis And Surveys	How do sampling methods affect the evaluation of survey results?  How can displays and summaries be used to interpret and communicate the results of surveys?	EA#1: Inferences Based on Data EA#2: Analyzing Group Project Results	Embedded Assessment 1 - Plots and Sampling         Stem-and-leaf plot         Box-and-whisker plot         Five-number summary         Mean absolute deviation         Random number table         Sampling and measurement error      Embedded Assessment 2 - Who Am I?         Develop survey questions         Select random samples         Conduct surveys         Present survey results         Identify bias	bias categorical variable census five-number summary margin of error mean absolute deviation quantitative variable sample simple random sample



			Geometry	
Unit	Essential Questions	Embedded Assessments	Unit Focus on Embedded Assessment Goals	Academic Vocabulary
Unit 1 Proof, Parallel and Perpendicular Lines	Why are properties, postulates, and theorems important in mathematics?  How are angles and parallel and perpendicular lines used in real-world settings?	EA#1: Conditional Statements and Logic EA#2: Angles and Parallel Lines EA#3: Slope, Distance, and Midpoint	<ul> <li>Embedded Assessment 1 - Healthy Habits         <ul> <li>Conditional statements</li> <li>Logical Reasoning</li> </ul> </li> <li>Embedded Assessment 2 - Through the Looking Glass         <ul> <li>Classifying angles formed by parallel lines</li> <li>Using parallel line theorems to verify that lines are parallel</li> </ul> </li> <li>Embedded Assessment 3 - Graph of Steel         <ul> <li>Finding slope and equations of parallel and perpendicular lines</li> <li>Finding the midpoint and distance between points</li> </ul> </li> </ul>	angle bisector complementary angles conditional statement congruent conjecture counter example deductive reasoning inductive reasoning midpoint parallel perpendicular postulate proof supplementary angles theorem
Unit 2 Congruence, Triangles, and Quadrilaterals	How does proving theorems extend your understanding of geometry?  How are patterns, algebra, and geometry related?	EA#1: Angles and Sides of Polygons  EA#2: Congruence, Triangles, and Proof  EA#3: Quadrilaterals	<ul> <li>Embedded Assessment 1 - Leap Frog Festival         <ul> <li>Measures of the interior angles in a polygon</li> <li>Measures of the exterior angles in a polygon</li> <li>Triangle Inequality Theorem</li> </ul> </li> <li>Embedded Assessment 2 - Building a Fitness Center         <ul> <li>Flowchart, paragraph, and two-column proof</li> <li>Congruent triangles</li> <li>CPCTC</li> </ul> </li> <li>Embedded Assessment 3 - Mr. Howell's Logo         <ul> <li>Properties of quadrilaterals</li> <li>Recognizing and proving quadrilaterals to be special</li> <li>Direct and coordinate proofs</li> </ul> </li> </ul>	altitude circumscribe congruent triangles equiangular exterior angle indirect proof isosceles triangle regular polygon



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Unit 3 Similarity, Right Triangles, and Trigonometry	How are similar triangles used in solving problems in everyday life?  What mathematical tools do I have to solve right triangles?	EA#1: Similarity in Polygons  EA#2: The Pythagorean Theorem and Geometric Mean  EA#3: Special Right Triangles and Trigonometry	Embedded Assessment 1 - A New Resolution  Constant of proportionality  Similar polygons  Parallel postulate  Coordinate geometry and similarity  Embedded Assessment 2 - Right Triangle Regatta  Pythagorean theorem  Converse of the Pythagorean theorem  Geometric mean  Embedded Assessment 3 - Inclined to Be Safe  Trigonometric functions  Inverse trigonometric functions  Special right triangles	similar polygon sine scale factor cosine trigonometric ratio tangent Pythagorean theorem
Unit 4 Circles and Constructions	Why is it important to understand geometric constructions?  How are the geometric properties of circles, their angles and arcs, used to model and describe realworld phenomena?	EA#1: Angles and Segments in Circles  EA#2: Area and Arc Length, Equation of a Circle	Embedded Assessment 1 – Vertigo Round  Central angles, inscribed angles, and intercepted arcs Angles formed by chords, tangents and secants Lengths of chords and tangent and secant segments  Embedded Assessment 2 – Give Me a C-I-R-C-L-E Determining the area and circumference of a circle Determining the area and arc length of a sector Writing the equation of a circle given the center and radius	arc central angle chord circle construction inscribed angle sphere tangent



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Unit 5 Coordinate Geometry and Transformations	What connections exist between transformations and dilations and congruence and similarity?  How are transformations and tessellations used in real-world settings?	EA#1: Transformations  EA#2: Tessellations  EA#3: Matrices, Transformations, and Vectors	■ Embedded Assessment 1 – In Mutatio nos Fidos	
Unit 6 Measurement	How do two-dimensional figures help you visualize three-dimensional figures?  Why are geometric formulas useful in solving real-world problems	EA#1: 3-Dimensional Figures  EA#2: Surface Area and  Volume	Embedded Assessment 1 – Info Net	
Unit 7 Probability	How do independence and dependence of events affect the computation of probabilities in two-stage experiments?  Why are area models and simulations powerful tools in determining probabilities?	EA#1: Counting and Probability  EA#2: Compound Events, Geometric Probability, Simulation	<ul> <li>Embedded Assessment 1 – Dressed for Success         <ul> <li>Multiplication rule</li> <li>Probability of dependent events</li> <li>Conditional probability</li> </ul> </li> <li>Embedded Assessment 2 – A Probability Potpourri         <ul> <li>Compound events</li> <li>Tree diagrams</li> <li>Independent and dependent events</li> <li>Conditional probability</li> <li>Geometric probability</li> <li>Simulation</li> </ul> </li> </ul>	

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			Algel	ora 2	
Unit	Essential Questions	Embedded Assessments		Unit Focus on Embedded Assessment Goals	Academic
					Vocabulary
Unit 1	How are systems of	EA#1: Linear Programming and	•	Embedded Assessment 1 - Gaming Systems	Absolute value function
Linear Systems	equations and inequalities	SystemsEA#2: Composite and		<ul> <li>Linear programming</li> </ul>	Composite functions
and Matrices	used to model and solve	Inverse Functions		<ul> <li>Systems of equations</li> </ul>	Determinant
	real-world situations?		•	Embedded Assessment 2 - Currency Conversion	Feasible region
		EA#3: Matrices		<ul> <li>Composition of functions</li> </ul>	Inverse function
	How are composite and			<ul> <li>Inverse functions</li> </ul>	Matrix
	inverse functions useful in		•	Embedded Assessment 3 - Matrices	Parent function
	problem solving?			<ul> <li>Matrix properties</li> </ul>	Piecewise-defined
				<ul> <li>Matrix multiplication</li> </ul>	function
				<ul> <li>Inverse matrix</li> </ul>	Scalar
				<ul> <li>Solving a system of equations using a matrix</li> </ul>	Transformations
				equation	
Unit 2	How are functions that	EA#1: Sequence and Series	•	Embedded Assessment 1 - The Chessboard Problem	exponential function
Series,	grow at a constant rate			<ul> <li>Arithmetic sequences and series</li> </ul>	extraneous solution
Exponential	distinguished from those	EA#2: Exponential Functions		<ul> <li>Geometric sequences and series</li> </ul>	increasing/decreasing
and Logarithmic	that do not grow at a	and Common Logarithms	•	Embedded Assessment 2 - Whether or Not	logarithm
Functions	constant rate?			<ul> <li>Exponential patterns and functions</li> </ul>	sequence
		EA#3: Exponential and		<ul> <li>Graphing exponential functions</li> </ul>	series
	How are logarithmic and	Logarithmic Equations		<ul> <li>Common logarithms and their properties</li> </ul>	
	exponential equations used		•	Embedded Assessment 3 - Evaluating Your Interest	
	to model real-world			<ul><li>Logarithms</li></ul>	
	problems?			<ul> <li>Graphing logarithmic functions</li> </ul>	
				<ul> <li>Solving exponential and logarithmic equations</li> </ul>	
Unit 3	Why are some solutions of	EA#1: Applications of	•	Embedded Assessment 1 - No Horsing Around	completing the square
Quadratic	quadratic equations	Quadratic Function		<ul> <li>Solving quadratic equations</li> </ul>	complex conjugate
Functions and	meaningful in real-life			<ul> <li>Writing quadratic equations given solutions</li> </ul>	complex number
Complex	applications while others	EA#2: Graphs of Quadratic		<ul> <li>Complex numbers</li> </ul>	discriminant
Numbers	are not?	Functions	•	Embedded Assessment 2- The Green Monster	imaginary number
				<ul> <li>Graphing quadratic equations</li> </ul>	root (zero)
	How do graphic, symbolic,			<ul> <li>Interpreting characteristics of graphs in terms of</li> </ul>	
	and numeric methods of			problem situation	
	solving quadratic equations				
	compare to one another?				



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Unit 4	How do polynomial	EA#1: Polynomial Operations	•	Embedded Assessment 1 – This Test is Square	combination
Polynomials	functions help to model			<ul> <li>Polynomial functions</li> </ul>	end behavior
	real-world behavior?	EA#2: Factoring and Graphing	•	Embedded Assessment 2 – Sketch Artist	extrema
		Polynomials		<ul> <li>Factoring polynomials</li> </ul>	factorial
	How is probability used in			<ul> <li>Graphing polynomials</li> </ul>	permutation
	real-world settings?	EA#3: Combinations,	•	Embedded Assessment 3 – Wedding	polynomial function
		Permutations,		<ul> <li>Permutations</li> </ul>	probability distribution
		and Probability		<ul> <li>Combinations</li> </ul>	
				<ul> <li>Probability</li> </ul>	
				<ul> <li>Binomial expansion</li> </ul>	
				<ul> <li>Binomial Probability</li> </ul>	
Unit 5	Why is it important to	EA#1: Square Root	•	Embedded Assessment 1 – A Mightier Wind	complex fraction
Radical and	consider the domain and	Expressions,		<ul> <li>Inverse functions</li> </ul>	horizontal asymptote
Rational	range of a function?	Equations and Functions		<ul> <li>Composition of functions</li> </ul>	inverse variation
Functions	How are inverse functions	EA#2: Rational Equations and		o Transformations of $f(x) = \sqrt{x}$	one-to-one function power function
	useful in everyday life?	Functions		<ul> <li>Square root equations</li> </ul>	rational exponent
				<ul> <li>Rational exponents</li> </ul>	rational function
			•	Embedded Assessment 2 – Planning a Prom	vertical asymptote
				<ul> <li>Analyzing and graphing rational functions</li> </ul>	
				<ul> <li>Solving rational equations</li> </ul>	
				<ul> <li>Rational models and applications</li> </ul>	
Unit 6	How are surveys,	EA#1: Surveys and Results	•	Embedded Assessment 1 - Ice Cream Shoppe	
Data Collection	experiments, and			o Survey	experiment
and Analysis	observational studies used	EA#2: Data Modeling and		<ul> <li>Question of interest</li> </ul>	explanatory variable
	to collect information	Normal Distribution		o Bias	normal distribution
	about populations and to			<ul> <li>Categorical and quantitative data</li> </ul>	treatment
	make predictions and draw			o Data displays	voluntary response
	conclusions?			o Mean	sample
				<ul> <li>Standard deviation</li> </ul>	
	Why is it important to			<ul> <li>Interpreting results</li> </ul>	
	understand the similarities		•	Embedded Assessment 2 - Splashing Around	
	and differences between			<ul> <li>Quadratic functions</li> </ul>	
	the binomial distribution			<ul> <li>Curve fitting</li> </ul>	
	and the normal distribution			<ul> <li>Translating functions</li> </ul>	
	when analyzing data from			<ul> <li>Intersecting curves</li> </ul>	
	probability experiments?			<ul> <li>Normal distribution</li> </ul>	
				<ul> <li>Empirical rule</li> </ul>	
		1		<ul> <li>Probability</li> </ul>	Í



Unit 7 Conic Sections	How are the algebraic representations of the conic sections similar and how are they different?	EA#1: Conic Sections	•	0 1	Assessment 1 – Working with Us Identifying equations as the equation of a particular conic Graphing conic sections Writing the equations of conic sections.	conic section ellipse hyperbola quadratic relation standard form
	How do the conic sections model real-world phenomena?					



			Precalculus	
Unit	Essential Questions	Embedded Assessments	Unit Focus on Embedded Assessment Goals	Academic Vocabulary
Unit 1 Sequences and Bivariate Data	How are recursive relationships used to model and investigate long term behavior involving sequential change?  How are median fit and least squares regression fit lines used to develop models for bivariate data?	EA#1: Sequences  EA#2: Linear Regressions and Predictions	Embedded Assessment 1 - The Old Square Craft	infinite sequence converge interpolation sigma notation diverge extrapolation correlation coefficient regression line residual
Unit 2 Functions and Their Graphs	How are zeros and end behavior of polynomial functions and their graphs related to the degree and the factors of the polynomial?  How are logarithmic and exponential functions used to model real-world problems?	EA#1: Modeling with Polynomial Functions  EA#2: Modeling with Rational Functions  EA#3: Modeling with Exponential and Logarithmic Functions	Embedded Assessment 1 - Coffee Time	relative maximum multiple root relative minimum even function odd function oblique asymptote natural logarithm



Unit 3	What type of real-world	EA#1: Angles, Unit Circle, and	Embedded Assessment 1 - Orbiting Spacecraft amplitude
Trigonometric Functions	problems are modeled and solved using trigonometry?  How are graphic representations of trigonometric functions useful in understanding real-life phenomena?	Trigonometric Graphs  EA#2: Inverse Trig Functions and Equations	<ul> <li>Sinusoidal models</li> <li>Graphing trigonometric functions</li> <li>Coterminal angles</li> <li>Converting between degree and radian measure</li> <li>Finding trigonometric values for angles on the unit circle</li> <li>Solving for trigonometric values using the definition of the trigonometric functions in terms of a point on the terminal side of an angle in standard position</li> <li>Embedded Assessment 2 - Inverse Trig Functions and Equations</li> <li>Graphing inverse trigonometric functions</li> <li>Evaluating inverse trigonometric functions</li> </ul>
Unit 4 Analytic Trigonometry and Trigonometric Applications	How are algebraic and geometric concepts related to trigonometric identities and formulas?  How is trigonometry used to solve real-world problems involving measure?	EA#1: Trigonometric Identities and Equations EA#2: Right and Oblique Triangles, Area	<ul> <li>Solving simple trigonometric equations</li> <li>Embedded Assessment 1 – Identify This, Solve That         <ul> <li>Trigonometric expressions, identities, and equations</li> <li>Simplifying, evaluating, verifying and solving</li> </ul> </li> <li>Embedded Assessment 2 – Tilting Towers and Triangles         <ul> <li>Solving problems in context</li> <li>Solving right and oblique triangles</li> <li>Finding the area of a triangle</li> </ul> </li> <li>Law of Sines angle of elevation/depression ambiguous case (SSA)</li> <li>Law of Cosines</li> <li>Law of Cosines</li> </ul>



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Unit 5 Conic Sections, Polar Coordinates, and Complex Numbers	How are multiple representations of conic sections related and used to model real-world situations?  How are polar and rectangular graphing related?	EA#1: Equations of Conic Sections  EA#2: Polar and Rectangular Coordinates	<ul> <li>Embedded Assessment 1 – Design of Conic Sections         <ul> <li>Determining the equation of an ellipse and a hyperbola from given information and determining the foci</li> <li>Rewriting the equation of a parabola in standard form and identifying the vertex, directrix, focus, and axis of symmetry</li> <li>Writing the equation of a circle given the center and radius</li> </ul> </li> <li>Embedded Assessment 2 – Totally Polar Bees         <ul> <li>Determining the polar and rectangular form of the coordinates of a point</li> <li>Finding equivalent coordinates for a point in polar form</li> <li>Interpreting polar equations of curves</li> <li>Converting rectangular equations to polar form and vice versa</li> <li>Multiplying complex numbers in polar form</li> </ul> </li> </ul>
Unit 6 Vectors, Parametric Equations, and Motion	How are parametric equations and vectors used to solve real-world problems involving motion?  What are the advantages and disadvantages to using Cartesian and parametric coordinate systems for graphing and solving problems?	EA#1: Parametric Equations and Vectors	<ul> <li>Embedded Assessment 1- A Pirate's Life         <ul> <li>Using parametric equations to model situations and solve problems</li> <li>Using vectors to model situations and solve problems</li> <li>Representing geometric figures in a three-dimensional coordinate system</li> <li>Operations with vectors</li> </ul> </li> </ul>
Unit 7 Foundations for Calculus	How is the concept of limit applied in mathematics to function discontinuities?  Why are limits important in the study of end behavior?	EA#1: Limits and Continuity	Embedded Assessment 1 — Ready for Calculus     Finding limits of a function at a particular point or at infinity by using graphs, tables, or algebraic methods     Convergence and divergence of a sequence     Continuity of a function