Arizona's College and Career Ready Standards
Mathematics

Crosswalks: AZCCRS / 2008

High School

ARIZONA DEPARTMENT OF EDUCATION
High Academic Standards for Students
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Number and Quantity: The Real Number System – (N-RN)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Extend the properties of exponents to rational exponents.	HS.N-RN.1	A II M II	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.*	MCWR-S1C1-02 (Algebra 2)	Convert between radical and exponential forms of numerical expressions.
				MCWR-S3C3-02 (Algebra 2)	Apply the laws of exponents including rational and negative exponents to rewrite expressions in alternative forms.
	HS.N-RN.2	A II M II	Rewrite expressions involving radicals and rational exponents using the properties of exponents.	MCWR-S1C1-02 (Algebra 2)	Convert between radical and exponential forms of numerical expressions.
				MCWR-S3C3-02 (Algebra 2)	Apply the laws of exponents including rational and negative exponents to rewrite expressions in alternative forms.
				MCWR-S3C3-05 (Algebra 2)	Simplify radical expressions by performing operations on them.
Use properties of rational and irrational numbers.	HS.N-RN.3	A I M II	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	MHS-S1C1-01	Justify with examples the relation between the number system being used (natural numbers, whole numbers, integers, rational numbers and irrational numbers) and the question of whether or not an equation has a solution in that number system.
				MHS-S5C2-13	Identify and explain the roles played by definitions, postulates, propositions and theorems in the logical structure of mathematics, including Euclidean geometry.

Number and Quantity: Quantities★ (N-Q)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Reason quantitatively and use units to solve problems.	HS.N-Q.1	A I M I ★	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	M08-S5C1-01	Create an algorithm to solve problems involving indirect measurements, using proportional reasoning, dimensional analysis, and the concepts of density and rate.
				MHS-S2C1-02	Organize collected data into an appropriate graphical representation with or without technology.
				MHS-S4C4-01	Use dimensional analysis to keep track of units of measure when converting.
	HS.N-Q.2	A I A II M I M II M II ★	Define appropriate quantities for the purpose of descriptive modeling.	MCWR-S3C4-09 (4th Credit)	Develop a personal budget including debit, checking, and savings accounts by interpreting multiple personal budget examples.
	HS.N-Q.3	A I M I ★	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	MHS-S1C3-02	Use estimation to determine the reasonableness of a solution.
				MHS-S1C3-03	Determine when an estimate is more appropriate than an exact answer.
				MCWR-S1C3-01 (Algebra 2)	Recognize the limitations of estimations by assessing the amount of error resulting from estimation and determining whether the error is within acceptable tolerance limits.

Number and Quantity: The Complex Number System (N-CN)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Perform arithmetic operations with complex numbers.	HS.N-CN.1	A II M II	Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.	MCWR-S1C1-01 (Algebra 2)	Solve problems and equations that require the number system to be extended from real to complex numbers.
				MCWR-S1C2-01 (Algebra 2)	Explore different forms of complex numbers; determine if the properties of the real number system extend to complex numbers and matrices.
	HS.N-CN.2	A II M II	Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.	MCWR-S1C1-01 (Algebra 2)	Solve problems and equations that require the number system to be extended from real to complex numbers.
	HS.N-CN.3	+	Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.	MCWR-S1C2-02 (Algebra 2)	Perform computations with complex numbers.
Represent complex numbers and their operations on the complex plane.	HS.N-CN.4	+	Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.	MCWR-S1C2-03 (Algebra 2)	Describe the relationship between real and complex numbers including plotting complex numbers as points in a plane.
				MCWR-S1C2-04 (4^{th} Credit)	Define polar coordinates; relate polar coordinates to Cartesian coordinates.
				MCWR-S1C2-05 (4^{th} Credit)	Convert complex numbers to trigonometric form and then multiply the results.
				MCWR-S4C3-06 (4^{th} Credit)	Convert between rectangular and polar coordinates.

Number and Quantity: The Real Number System – (N-CN)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Represent complex numbers and their operations on the complex plane.	HS.N-CN.5	+	Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. *For example, $(-1 + \sqrt{3}\, i)^3 = 8$ because $(-1 + \sqrt{3}\, i)$ has modulus 2 and argument 120°.*	MCWR-S1C2-05 (4^{th} Credit)	Convert complex numbers to trigonometric form and then multiply the results.
	HS.N-CN.6	+	Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.	*	
Use complex numbers in polynomial identities and equations.	HS.N-CN.7	A II M II	Solve quadratic equations with real coefficients that have complex solutions.	MCWR-S3C3-07 (Algebra 2)	Find complex solutions for quadratic equations.
	HS.N-CN.8	+	Extend polynomial identities to the complex numbers. *For example, rewrite $x^2 + 4$ as $(x + 2i)(x – 2i)$.*	*	
	HS.N-CN.9	+	Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.	MCWR-S3C2-12 (4^{th} Credit)	Use theorems of polynomial behavior (including but not limited to the Fundamental Theorem of Algebra, Remainder Theorem, the Rational Root Theorem, Descartes Rule of Signs, the Conjugate Root Theorem) to find the zeros of a polynomial function.

Number and Quantity: Vector and Matrix Quantities (N-VM)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Represent and model with vector quantities.	HS.N-VM.1	+	Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, $\|v\|$, $\|\|v\|\|$, v).	*	
	HS.N-VM.2	+	Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.	*	
	HS.N-VM.3	+	Solve problems involving velocity and other quantities that can be represented by vectors.	*	
Perform operations on vectors.	HS.N-VM.4	+	Add and subtract vectors.		
		+	a. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.	MCWR-S3C3-11 (4^{th} Credit)	Add, subtract, and compute the dot product of two-dimensional vectors; multiply a two-dimensional vector by a scalar.
		+	b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.	MCWR-S3C3-11 (4^{th} Credit)	Add, subtract, and compute the dot product of two-dimensional vectors; multiply a two-dimensional vector by a scalar.
		+	c. Understand vector subtraction $v - w$ as $v + (-w)$, where $-w$ is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.	MCWR-S3C3-11 (4^{th} Credit)	Add, subtract, and compute the dot product of two-dimensional vectors; multiply a two-dimensional vector by a scalar.

Number and Quantity: Vector and Matrix Quantities (N-VM)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Perform operations on vectors.	HS.N-VM.5	+	Multiply a vector by a scalar.		
		+	a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$.	MCWR-S3C3-11 (4^{th} Credit)	Add, subtract, and compute the dot product of two-dimensional vectors; multiply a two-dimensional vector by a scalar.
		+	b. Compute the magnitude of a scalar multiple cv using $\|\|cv\|\| = \|c\|v$. Compute the direction of $c\mathbf{v}$ knowing that when $\|c\|v \neq 0$, the direction of cv is either along v (for $c > 0$) or against v (for $c < 0$).	MCWR-S3C3-11 (4^{th} Credit)	Add, subtract, and compute the dot product of two-dimensional vectors; multiply a two-dimensional vector by a scalar.
Perform operations on matrices and use matrices in applications.	HS.N-VM.6	+	Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.	MHS-S2C1-02	Organize collected data into an appropriate graphical representation with or without technology.
				MCWR-S2C1-09 (Algebra 2)	Use matrices to organize and represent data.
	HS.N-VM.7	+	Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.	MHS-S3C3-15	Solve problems using operations with matrices.
	HS.N-VM.8	+	Add, subtract, and multiply matrices of appropriate dimensions.	MHS-S3C3-15	Solve problems using operations with matrices.
	HS.N-VM.9	+	Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.	*	

Number and Quantity: Vector and Matrix Quantities (N-VM)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Perform operations on matrices and use matrices in applications.	HS.N-VM.10	+	Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.	*	
	HS.N-VM.11	+	Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.	MCWR-S3C3-10 (4^{th} Credit)	Represent vectors as matrices.
	HS.N-VM.12	+	Work with 2×2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.	*	

Algebra: Seeing Structure in Expressions (A-SSE)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Interpret the structure of expressions	HS.A-SSE.1	A I M I M II ★	Interpret expressions that represent a quantity in terms of its context.	*	
		A I M I ★	a. Interpret parts of an expression, such as terms, factors, and coefficients.	*	
		A I M I M II ★	*b.* Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret* $P(1+r)^n$ *as the product of P and a factor not depending on P.*	*	
	HS.A-SSE.2	A I A II M II M III	Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$*, thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$*.*	MHS-S3C3-08	Simplify and evaluate polynomials, rational expressions, expressions containing absolute value, and radicals.
				MHS-S3C3-14	Factor higher order polynomials.
Write expressions in equivalent forms to solve problems	HS.A-SSE.3	A I A II M I M II ★	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.	MHS-S3C3-01	Create and explain the need for equivalent forms of an equation or expression.
				MHS-S5C2-07	Find structural similarities within different algebraic expressions and geometric figures.
				MCWR-S3C3-01 (Algebra 2)	Rewrite and describe the need for equivalent forms of algebraic expressions.
	HS.A-SSE.3	A I M II ★	a. Factor a quadratic expression to reveal the zeros of the function it defines.	MHS-S3C3-12	Factor quadratic polynomials in the form of $ax^2 + bx + c$ where a, b, and c are integers.
				MHS-S3C3-13	Solve quadratic equations.

Algebra: Seeing Structure in Expressions (A-SSE)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Write expressions in equivalent forms to solve problems	HS.A-SSE.3	A I M II ★	b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	MHS-S3C3-13	Solve quadratic equations.
		A I A II M I ★	c. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15t can be rewritten as (1.151/12)12t ≈ 1.012^{12t} *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*	MCWR-S3C3-02 (Algebra 2)	Apply the laws of exponents including rational and negative exponents to rewrite expressions in alternative forms.
	HS.A-SSE.4	A II M III ★	Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.*	MCWR-S3C1-01 (Algebra 2)	Analyze sequences and series and use them in modeling, including • explicit formulas for nth terms, • sums of finite arithmetic series, and • sums of finite geometric series.
				MCWR-S3C1-05 (Algebra 2)	Use and interpret sigma notation to represent summation.
				MCWR-S3C4-07 (4^{th} Credit)	Determine the total cost of purchasing consumer durables over time given different down payments, financing options, and fees.
				MCWR-S3C4-10 (4^{th} Credit)	Determine an effective retirement savings plan to meet personal financial goals including IRAs, ROTH accounts, and annuities.

Algebra: Arithmetic with Polynomials and Rational Expressions (A –APR)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Perform arithmetic operations on polynomials.	HS.A-APR.1	A I M II	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	MHS-S3C3-10	Add, subtract, and multiply polynomial and rational expressions.
Understand the relationship between zeros and factors of polynomials	HS.A-APR.2	A II M III	Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x – a$ is $p(a)$, so $p(a) = 0$ if and only if $(x – a)$ is a factor of $p(x)$.	MCWR-S3C2-12 (4th Credit)	Use theorems of polynomial behavior (including but not limited to the Fundamental Theorem of Algebra, Remainder Theorem, the Rational Root Theorem, Descartes Rule of Signs, the Conjugate Root Theorem) to find the zeros of a polynomial function.
	HS.A-APR.3	A I A II M III	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	MCWR-S3C3-08 (Algebra 2)	Describe the relationships among the solutions of an equation, the zeros of a function, the x-intercepts of a graph, and the factors of a polynomial expression with and without technology.
Use polynomial identities to solve problems	HS.A-APR.4	A II M III	Prove polynomial identities and use them to describe numerical relationships. *For example, the polynomial identity* $(x^2+y^2)^2 = (x^2–y^2)^2 + (2xy)^2$ *can be used to generate Pythagorean triples.*	*	
	HS.A-APR.5	+	Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle. (The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument.)	MCWR-S2C3-01 (Algebra 2)	Use the binomial theorem and Pascal's Triangle to solve problems.
				MCWR-S2C3-02 (Algebra 2)	Demonstrate the connections between the binomial coefficients, entries of Pascal's triangle, and combinations.

Algebra: Arithmetic with Polynomials and Rational Expressions (A –APR)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Rewrite rational expressions	HS.A-APR.6	A II M III	Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.	MHS-S3C3-09	Multiply and divide monomial expressions with integer exponents.
				MCWR-S3C3-06 (Algebra 2)	Divide a polynomial by a lower degree polynomial.
				MCWR-S5C2-07 (Algebra 2)	Analyze and explain the general properties and behavior of functions or relations using algebraic and graphing techniques.
	HS.A-APR.7	+	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.	MHS-S3C3-10	Add, subtract, and multiply polynomial and rational expressions.

Algebra: Creating Equations★ (A-CED)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Create equations that describe numbers or relationships	HS.A-CED.1	A I A II M I M II M III ★	Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	MHS-S1C2-01	Solve word problems involving absolute value, powers, roots, and scientific notation.
				MHS-S3C2-06	Recognize and solve problems that can be modeled using a quadratic function.
				MHS-S3C3-05	Solve linear equations and equations involving absolute value, with one variable.
				MCWR-S3C4-09 (4th Credit)	Develop a personal budget including debit, checking, and savings accounts by interpreting multiple personal budget examples.
	HS.A-CED.2	A I M I M II M III ★	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	MHS-S3C2-04	Use equations, graphs, tables, descriptions, or sets of ordered pairs to express a relationship between two variables.
				MHS-S3C2-06	Recognize and solve problems that can be modeled using a quadratic function.
	HS.A-CED.3	A I M I ★	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*	MHS-S3C2-05	Recognize and solve problems that can be modeled using a system of two equations in two variables.
				MCWR-S4C3-02 (Algebra 2)	Determine an equation of a circle given its center and radius; given an equation of a circle, find its center and radius.
Create equations that describe numbers or relationships	HS.A-CED.4	A I M I M II ★	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*	MHS-S3C3-02	Solve formulas for specified variables.

Algebra: Reasoning with Equations and Inequalities (A -REI)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Understand solving equations as a process of reasoning and explain the reasoning	HS.A-REI.1	A I A II M II M III	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	MHS-S1C2-02	Summarize the properties of and connections between real number operations; justify manipulations of expressions using the properties of real number operations.
				MHS-S3C3-01	Create and explain the need for equivalent forms of an equation or expression.
				MHS-S5C2-09	State the inverse, converse, and contrapositive of a given statement and state the relationship between the truth value of these statements and the original statement.
				MHS-S5C2-10	List related *if… then* statements in logical order.
				MHS-S5C2-12	Construct a simple formal deductive proof.
	HS.A-REI.2	A II M III	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	MHS-S3C3-11	Solve square root equations involving only one radical.
Solve equations and inequalities in one variable	HS.A-REI.3	A I M I	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	MHS-S3C3-05	Solve linear equations and equations involving absolute value, with one variable.
				MHS-S3C3-06	Solve linear inequalities in one variable.
	HS.A-REI.4	A I A II M II	Solve quadratic equations in one variable.		
		A I M II	a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.	MHS-S3C3-13	Solve quadratic equations.

Algebra: Creating Equations★ (A-CED)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Solve equations and inequalities in one variable	HS.A-REI.4	A I A II M II	b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	MHS-S3C3-13	Solve quadratic equations.
				MCWR-S3C3-07 (Algebra 2)	Find complex solutions for quadratic equations.
Solve systems of equations	HS.A-REI.5	A I M I	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.	*	
	HS.A-REI.6	A I A II M I	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	MHS-S3C2-05	Recognize and solve problems that can be modeled using a system of two equations in two variables.
				MHS-S3C3-07	Solve systems of two linear equations in two variables.
				MCWR-S3C3-03 (Algebra 2)	Solve systems of three linear equations in three variables with or without technology.
				MCWR-S5C2-07 (Algebra 2)	Analyze and explain the general properties and behavior of functions or relations using algebraic and graphing techniques.
	HS.A-REI.7	A II M II	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.*	*	

Algebra: Reasoning with Equations and Inequalities (A -REI)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Solve systems of equations	HS.A-REI.8	+	Represent a system of linear equations as a single matrix equation in a vector variable.	MCWR-S3C3-03 (Algebra 2)	Solve systems of three linear equations in three variables with or without technology.
				MCWR-S3C3-04 (Algebra 2)	Use matrices to represent everyday problems that involve systems of linear equations.
	HS.A-REI.9	+	Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3×3 or greater).	MCWR-S3C3-03 (Algebra 2)	Solve systems of three linear equations in three variables with or without technology.
				MCWR-S3C3-09 (Algebra 2)	Use matrix operations and the inverse of a matrix to solve problems.
Represent and solve equations and inequalities graphically	HS.A-REI.10	A I M I	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).	*	
	HS.A-REI.11	A I A II M I M III ★	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.	MCWR-S3C2-11 (4rh Credit)	Find approximate solutions for polynomial equations with or without graphing technology.
				MCWR-S5C2-07 (Algebra 2)	Analyze and explain the general properties and behavior of functions or relations using algebraic and graphing techniques.

Algebra: Reasoning with Equations and Inequalities (A -REI)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Represent and solve equations and inequalities graphically	HS.A-REI.12	A I M I	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	MHS-S4C3-05	Graph a linear equation or linear inequality in two variables.
				MCWR-S4C3-01 (Algebra 2)	Graph the solution set of a system of two or three linear inequalities and given an ordered pair determine whether it is a solution to the system.
				MCWR-S5C2-07 (Algebra 2)	Analyze and explain the general properties and behavior of functions or relations using algebraic and graphing techniques.

Functions: Interpreting Functions (F-IF)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Understand the concept of a function and use function notation	HS.F-IF.1	A I M I	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f*(*x*) denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y* = *f*(*x*).	MHS-S3C2-02	Determine if a relationship represented by an equation, graph, table, description, or set of ordered pairs is a function.
				MHS-S3C2-07	Determine domain and range of a function from an equation, graph, table, description, or set of ordered pairs.
	HS.F-IF.2	A I M I	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	MHS-S3C2-03	Use function notation; evaluate a function at a specified value in its domain.
				MHS-S3C2-07	Determine domain and range of a function from an equation, graph, table, description, or set of ordered pairs.
				MCWR-S3C2-02 (Algebra 2)	Use function notation flexibly and evaluate a function at a value represented by an algebraic expression.
	HS.F-IF.3	A I A II M I	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.*	*	

Functions: Interpreting Functions (F-IF)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Interpret functions that arise in applications in terms of the context	HS.F-IF.4	A I A II M I M II M III ★	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*	MHS-S3C2-01	Sketch and interpret a graph that models a given context, make connections between the graph and the context, and solve maximum and minimum problems using the graph.
				MCWR-S3C2-05 (Algebra 2)	Sketch the graphs and determine the key characteristics of power functions in the form f(x) = ax^n , a≠ 0, for positive integral values of n.
				MCWR-S3C2-06 (Algebra 2)	Graph polynomial functions identifying their key characteristics
				MCWR-S3C2-07 (Algebra 2)	Find domain, range, intercepts, zeros, asymptotes, and points of discontinuity of functions.
				MCWR-S3C4-02 (Algebra 2)	Identify patterns in a function's rate of change, including intervals of increase, decrease, and constancy; if possible, relate them to the function's verbal description or its graph.
				MCWR-S5C2-07 (Algebra 2)	Analyze and explain the general properties and behavior of functions or relations using algebraic and graphing techniques.
Interpret functions that arise in applications in terms of the context	HS.F-IF.5	A I M I M II ★	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*	MHS-S3C2-07	Determine domain and range of a function from an equation, graph, table, description, or set of ordered pairs.

Functions: Interpreting Functions (F-IF)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
	HS.F-IF.6	A I A II M I M II M III ★	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	MHS-S3C4-01	Determine the slope and intercepts of the graph of a linear function, interpreting slope as a constant rate of change.
				MHS-S3C4-02	Solve problems involving rate of change.
Analyze functions using different representations	HS.F-IF.7	A I A II M I M II M III + ★	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	MCWR-S5C2-07 (Algebra 2)	Analyze and explain the general properties and behavior of functions or relations using algebraic and graphing techniques.
		A I M I M II ★	a. Graph linear and quadratic functions and show intercepts, maxima, and minima.	MHS-S4C3-05	Graph a linear equation or linear inequality in two variables.
				MHS-S4C3-08	Graph a quadratic function and interpret x-intercepts as zeros.
		A I M II ★	b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	MCWR-S3C2-03 (Algebra 2)	Graph absolute value, and step and other piecewise-defined functions identifying their key characteristics
				MCWR-S3C4-08 (4^{th} Credit)	Apply a variety of strategies to use tax tables and determine, calculate, and complete yearly federal income tax.

Functions: Interpreting Functions (F-IF)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Analyze functions using different representations	HS.F-IF.7	A II M III ★	c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	MCWR-S3C2-05 (Algebra 2)	Sketch the graphs and determine the key characteristics of power functions in the form f(x) = ax^n , a≠ 0, for positive integral values of n.
				MCWR-S3C2-06 (Algebra 2)	Graph polynomial functions identifying their key characteristics
		+ ★	d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.	MCWR-S3C2-07 (Algebra 2)	Find domain, range, intercepts, zeros, asymptotes, and points of discontinuity of functions.
		A II M II M III ★	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	MCWR-S3C2-04 (Algebra 2)	Graph exponential functions identifying their key characteristics.
				MCWR-S3C2-09 (4^{th} Credit)	Find domain, range, intercepts, period, amplitude, and asymptotes of trigonometric functions.
				MCWR-S4C3-04 (4^{th} Credit)	Graph all six trigonometric functions identifying their key characteristics.
	HS.F-IF.8	A I A II M II	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.		
		A I M II	a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	MCWR-S3C3-08 (Algebra 2)	Describe the relationships among the solutions of an equation, the zeros of a function, the x-intercepts of a graph, and the factors of a polynomial expression with and without technology.

Functions: Interpreting Functions (F-IF)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Analyze functions using different representations	HS.F-IF.8	A II M II	*b.* Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*	MHS-S3C3-01	Create and explain the need for equivalent forms of an equation or expression.
				MCWR-S3C3-01 (Algebra 2)	Rewrite and describe the need for equivalent forms of algebraic expressions.
	HS.F-IF.9	A I A II M I M II M III	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*	*	

Functions: Building Functions (F-BF)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Build a function that models a relationship between two quantities	HS.F-BF.1	A I A II M I M II + ★	Write a function that describes a relationship between two quantities.		
		A I A II M I M II ★	a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	MHS-S3C1-01	Recognize, describe, and analyze sequences using tables, graphs, words, or symbols; use sequences in modeling.
				MCWR-S3C1-02 (4th Credit)	Apply recursive formulas for arithmetic and geometric sequences to solve problems.
				MCWR-S3C1-04 (Algebra 2)	Solve problems involving recursion.
		A II M II ★	b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*	MCWR-S3C2-01 (Algebra 2)	Express and solve problems that can be modeled using linear, quadratic, logarithmic, exponential, cubic, reciprocal, absolute value, and step and other piecewise-defined functions; interpret their solutions in terms of the context.
		+ ★	c. Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*	MCWR-S3C2-14 (Algebra 2)	Combine functions by composition, as well as by addition, subtraction, multiplication, and division including any necessary restrictions on the domain.

Functions: Building Functions (F-BF)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Build a function that models a relationship between two quantities	HS.F-BF.2	A II M I ★	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	MHS-S3C1-01	Recognize, describe, and analyze sequences using tables, graphs, words, or symbols; use sequences in modeling.
				MHS-S3C1-02	Determine a specific term of a sequence.
				MHS-S3C1-03	Create sequences using explicit and recursive formulas involving both subscripts and function notation.
				MCWR-S3C1-02 (4th Credit)	Apply recursive formulas for arithmetic and geometric sequences to solve problems.
				MCWR-S3C1-03 (Algebra 2)	Distinguish between explicit and recursive formulas and convert between them, making good choices.
Build new functions from existing functions	HS.F-BF.3	A I A II M II M III	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*	MHS-S4C3-06	Describe how changing the parameters of a linear function affect the shape and position of its graph.
				MCWR-S3C2-15 (Algebra 2)	Determine if functions are even, odd, or neither both algebraically and graphically.
				MCWR-S4C2-01 (Algebra 2)	Describe how changing the parameters of a quadratic function affects the shape and position of its graph ($f(x) = a(x-h)^2+k$).

Functions: Building Functions (F-BF)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Build new functions from existing functions	HS.F-BF.3 *continued*		Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*	MCWR-S4C2-02 (Algebra 2)	Describe how changing the parameters of an exponential function affects the shape and position of its graph ($f(x) = ab^x$).
				MCWR-S4C2-03 (4^{th} Credit)	Describe how changing the parameters of a trigonometric function affects the shape and position of its graph ($f(x) = A \sin B(x-C)+D$ or the other trigonometric functions).
	HS.F-BF.4	A II M III +	Find inverse functions.		
		A II M III	a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. *For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.*	MCWR-S3C2-10 (Algebra 2)	Given a function • find the inverse of the function, • determine whether the inverse is a function, • explain why the graph of a function and its inverse are reflections of each other over the line y = x.
		+	b. Verify by composition that one function is the inverse of another.	MCWR-S3C2-14 (Algebra 2)	Combine functions by composition, as well as by addition, subtraction, multiplication, and division including any necessary restrictions on the domain.

Functions: Building Functions (F-BF)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Build new functions from existing functions	HS.F-BF.4 *continued*	+	c. Read values of an inverse function from a graph or a table, given that the function has an inverse.	MCWR-S3C2-10 (Algebra 2)	Given a function • find the inverse of the function, • determine whether the inverse is a function, • explain why the graph of a function and its inverse are reflections of each other over the line y = x.
		+	d. Produce an invertible function from a non-invertible function by restricting the domain.	MCWR-S3C2-14 (Algebra 2)	Combine functions by composition, as well as by addition, subtraction, multiplication, and division including any necessary restrictions on the domain.
	HS.F-BF.5	+	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	MCWR-S3C2-13 (4^{th} Credit)	Relate logarithms and exponential functions as inverses, prove basic properties of a logarithm using properties of its inverse, and apply those properties to solve problems.

Functions: Linear, Quadratic, and Exponential Models★ (F-LE)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Construct and compare linear and exponential models and solve problems	HS.F-LE.1	A I M I ★	Distinguish between situations that can be modeled with linear functions and with exponential functions.		
		A I M I ★	a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.	MCWR-S3C4-01 (Algebra 2)	Analyze and describe how a change in an independent variable leads to a change in a dependent variable.
				MCWR-S3C4-03 (Algebra 2)	Analyze change in various contexts by modeling and solving word problems using functions and equations.
				MCWR-S3C4-05 (4th Credit)	Solve problems involving compound interest.
				MCWR-S3C4-06 (4th Credit)	Demonstrate the relationship between • simple interest and linear growth • compound interest and exponential growth.
		A I M I ★	b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	MCWR-S3C4-01 (Algebra 2)	Analyze and describe how a change in an independent variable leads to a change in a dependent variable.
				MCWR-S3C4-03 (Algebra 2)	Analyze change in various contexts by modeling and solving word problems using functions and equations.
				MCWR-S3C4-06 (4th Credit)	Demonstrate the relationship between simple interest and linear growth compound interest and exponential growth.
Construct and compare linear and exponential models and solve problems	HS.F-LE.1	A I M I ★	c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	MCWR-S3C4-01 (Algebra 2)	Analyze and describe how a change in an independent variable leads to a change in a dependent variable.

Functions: Linear, Quadratic, and Exponential Models★ (F-LE)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Construct and compare linear and exponential models and solve problems	HS.F-LE.1 *continued*	A I M I ★		MCWR-S3C4-03 (Algebra 2)	Analyze change in various contexts by modeling and solving word problems using functions and equations.
				MCWR-S3C4-06 (4th Credit)	Demonstrate the relationship between • simple interest and linear growth • compound interest and exponential growth.
	HS.F-LE.2	A I A II M I ★	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	MHS-S3C1-03	Create sequences using explicit and recursive formulas involving both subscripts and function notation.
				MHS-S3C3-03	Write an equation given a table of values, two points on the line, the slope and a point on the line, or the graph of the line.
				MCWR-S2C1-01 (4th Credit)	Solve problems by estimating and computing with one-variable and two-variable data.
				MCWR-S3C2-01 (Algebra 2)	Express and solve problems that can be modeled using linear, quadratic, logarithmic, exponential, cubic, reciprocal, absolute value, and step and other piecewise-defined functions; interpret their solutions in terms of the context.
				MCWR-S3C4-05 (4th Credit)	Solve problems involving compound interest.

Functions: Linear, Quadratic, and Exponential Models★ (F-LE)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Construct and compare linear and exponential models and solve problems	HS.F-LE.3	A I M I ★	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	MCWR-S3C4-04 (Algebra 2)	Compare relative magnitudes of functions and their rates of change.
	HS.F-LE.4	A II M III ★	For exponential models, express as a logarithm the solution to a bct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	*	
Interpret expressions for functions in terms of the situation they model	HS.F-LE.5	A I A II M I ★	Interpret the parameters in a linear, quadratic, or exponential function in terms of a context.	MHS-S3C4-03	Solve interest problems.
				MCWR-S3C4-05 (4th Credit)	Solve problems involving compound interest.
				MCWR-S3C4-06 (4th Credit)	Demonstrate the relationship between • simple interest and linear growth • compound interest and exponential growth.

Functions: Trigonometric Functions (F-TF)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Extend the domain of trigonometric functions using the unit circle	HS.F-TF.1	A II M III	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.	MCWR-S4C4-01 (4th Credit)	Explain, use, and convert between degree and radian measures for angles.
	HS.F-TF.2	A II M III	Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	*	
	HS.F-TF.3	+	Use special triangles to determine geometrically the values of sine, cosine, tangent for π /3, π/4 and π/6, and use the unit circle to express the values of sine, cosine, and tangent for π-*x*, π+*x*, and 2π-*x* in terms of their values for *x*, where *x* is any real number.	MHS-S4C1-10	Solve problems using right triangles, including special triangles.
				MCWR-S4C3-05 (4th Credit)	Evaluate all six trigonometric functions at angles between (0 degrees and 360 degrees, 0 and 2π radians) using the unit circle in the coordinate plane.
	HS.F-TF.4	+	Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.	*	
Model periodic phenomena with trigonometric functions	HS.F-TF.5	A II M III ★	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.	*	

Functions: Trigonometric Functions (F-TF)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Model periodic phenomena with trigonometric functions	HS.F-TF.6	+	Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.	*	
	HS.F-TF.7	+ ★	Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.	*	
Prove and apply trigonometric identities	HS.F-TF.8	A II M III	Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant.	MCWR-S4C1-04 (4^{th} Credit)	Use basic trigonometric identities including Pythagorean, reciprocal, half-angle and double-angle, and sum and difference formulas to solve equations and problems.
	HS.F-TF.9	+	Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.	*	

Geometry: Congruence (G-CO)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Experiment with transformations in the plane	HS.G-CO.1	G M I	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	*	
	HS.G-CO.2	G M I	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	MHS-S4C2-01	Determine whether a transformation of a 2-dimensional figure on a coordinate plane represents a translation, reflection, rotation, or dilation and whether congruence is preserved.
				MHS-S4C2-02	Determine the new coordinates of a point when a single transformation is performed on a 2-dimensional figure.
				MHS-S5C2-07	Find structural similarities within different algebraic expressions and geometric figures.
	HS.G-CO.3	G M I	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	*	
	HS.G-CO.4	G M I	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	*	
Experiment with transformations in the plane	HS.G-CO.5	G M I	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	*	
Understand congruence in terms of rigid motions	HS.G-CO.6	G M I	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	*	

Geometry: Congruence (G-CO)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Understand congruence in terms of rigid motions	HS.G-CO.7	G M I	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	*	
	HS.G-CO.8	G M I	Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	*	
Prove geometric theorems	HS.G-CO.9	G M I	Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*	MHS-S4C1-03	Create and analyze inductive and deductive arguments concerning geometric ideas and relationships.

Geometry: Congruence (G-CO)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Prove geometric theorems	HS.G-CO.9 *(continued)*	G M I	Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*	MHS-S4C1-04	Apply properties, theorems, and constructions about parallel lines, perpendicular lines, and angles to prove theorems.
				MHS-S5C2-12	Construct a simple formal deductive proof.
				MHS-S5C2-13	Identify and explain the roles played by definitions, postulates, propositions and theorems in the logical structure of mathematics, including Euclidean geometry.
	HS.G-CO.10	G M I	Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.*	M07-S4C1-04	Describe the relationship between the number of sides in a regular polygon and the sum of its interior angles.
				MHS-S4C1-03	Create and analyze inductive and deductive arguments concerning geometric ideas and relationships.
	HS.G-CO.11	G M I	Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.*	MHS-S4C1-03	Create and analyze inductive and deductive arguments concerning geometric ideas and relationships.

Geometry: Congruence (G-CO)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Make geometric constructions	HS.G-CO.12	G M III	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*	MCWR-S4C1-01 (4th Credit)	Perform basic geometric constructions using a variety of methods, including • perpendicular bisector of a line segment, • bisector of an angle • perpendicular or parallel lines.
	HS.G-CO.13	G M III	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	*	

Geometry: Similarity, Right Triangles, and Trigonometry (G-SRT)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Understand similarity in terms of similarity transformations	HS.G-SRT.1	G M II	Verify experimentally the properties of dilations given by a center and a scale factor:	*	
		G M II	a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.	*	
		G M II	b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	*	
Understand similarity in terms of similarity transformations	HS.G-SRT.2	G M II	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	*	
	HS.G-SRT.3	G M II	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	*	
Prove theorems involving similarity	HS.G-SRT.4	G M II	Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.*	*	
	HS.G-SRT.5	G M II	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	MHS-S4C1-08	Prove similarity and congruence of triangles.
				MHS-S4C4-04	Solve problems involving similar figures using ratios and proportions.
				MHS-S5C2-11	Draw a simple valid conclusion from a given if…then statement and a minor premise.
				MHS-S5C2-12	Construct a simple formal deductive proof.

Geometry: Similarity, Right Triangles, and Trigonometry (G-SRT)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Prove theorems involving similarity	HS.G-SRT.5	G M II	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	MHS-S5C2-13	Identify and explain the roles played by definitions, postulates, propositions and theorems in the logical structure of mathematics, including Euclidean geometry.
Define trigonometric ratios and solve problems involving right triangles	HS.G-SRT.6	G M II	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	*	
	HS.G-SRT.7	G M II	Explain and use the relationship between the sine and cosine of complementary angles.	*	
	HS.G-SRT.8	G M II ★	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	MHS-S4C1-11	Solve problems using the sine, cosine, and tangent ratios of the acute angles of a right triangle.
Apply trigonometry to general triangles	HS.G-SRT.9	+	Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	*	
	HS.G-SRT.10	+	Prove the Laws of Sines and Cosines and use them to solve problems.	MCWR-S4C1-03 (4th Credit)	Apply the law of cosines and the law of sines to find missing sides and angles of triangles.
	HS.G-SRT.11	+	Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).	MCWR-S4C1-03 (4th Credit)	Apply the law of cosines and the law of sines to find missing sides and angles of triangles.

Geometry: Circles (G-C)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Understand and apply theorems about circles	HS.G-C.1	G M III	Prove that all circles are similar.	*	
	HS.G-C.2	G M III	Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*	M07-S4C1-01	Recognize the relationship between central angles and intercepted arcs; identify arcs and chords of a circle.
				M08-S4C1-01	Identify the attributes of circles: radius, diameter, chords, tangents, secants, inscribed angles, central angles, intercepted arcs, circumference, and area.
				MHS-S4C1-01	Use the basic properties of a circle (relationships between angles, radii, intercepted arcs, chords, tangents, and secants) to prove basic theorems and solve problems.
				MHS-S5C2-12	Construct a simple formal deductive proof.
				MHS-S5C2-13	Identify and explain the roles played by definitions, postulates, propositions and theorems in the logical structure of mathematics, including Euclidean geometry.
	HS.G-C.3	G M III	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	*	
	HS.G-C.4	+	Construct a tangent line from a point outside a given circle to the circle.	*	
Find arc lengths and areas of sectors of circles	HS.G-C.5	G M III	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	MHS-S4C4-02	Find the length of a circular arc; find the area of a sector of a circle.

Geometry: Expressing Geometric Properties with Equations (G-GPE)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Translate between the geometric description and the equation for a conic section	HS.G-GPE.1	G M III	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	MCWR-S4C3-02 (Algebra 2)	Determine an equation of a circle given its center and radius; given an equation of a circle, find its center and radius.
	HS.G-GPE.2	A II M III	Derive the equation of a parabola given a focus and directrix.	MCWR-S4C3-03 (4th Credit)	Graph equations of conic sections explaining the relationship between their algebraic form and key characteristics of the graph.
	HS.G-GPE.3	+	Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.	MCWR-S4C3-03 (4th Credit)	Graph equations of conic sections explaining the relationship between their algebraic form and key characteristics of the graph.
Use coordinates to prove simple geometric theorems algebraically	HS.G-GPE.4	G M III	Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).*	MHS-S4C3-04	Verify characteristics of a given geometric figure using coordinate formulas for distance, midpoint, and slope to confirm parallelism, perpendicularity, and congruence.
	HS.G-GPE.5	G M III	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	MHS-S3C3-04	Verify characteristics of a given geometric figure using coordinate formulas for distance, midpoint, and slope to confirm parallelism, perpendicularity, and congruence.
	HS.G-GPE.6	G M III	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	M08-S4C3-01	Make and test a conjecture about how to find the midpoint between any two points in the coordinate plane.
				MHS-S4C3-01	Determine how to find the midpoint between two points in the coordinate plane.
Use coordinates to prove simple geometric theorems algebraically	HS.G-GPE.7	G M III ★	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.	MHS-S4C3-03	Determine the distance between two points in the coordinate plane.

Geometry: Geometric Measurement and Dimension (G-GMD)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Explain volume formulas and use them to solve problems	HS.G-GMD.1	G M II	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.*	MCWR-S3C2-17 (4th Credit)	Develop an informal notion of limits.
	HS.G-GMD.2	+	Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.	*	
	HS.G-GMD.3	G M II ★	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.	MHS-S4C4-05	Calculate the surface area and volume of 3-dimensional figures and solve for missing measures.
Visualize relationships between two-dimensional and three dimensional objects	HS.G-GMD.4	G M III	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	*	

Geometry: Modeling with Geometry (G-MG)					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Apply geometric concepts in modeling situations	HS.G-MG.1	G M III ★	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).	*	
	HS.G-MG.2	G M III ★	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).	*	
	HS.G-MG.3	G M III ★	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).	*	

Statistics and Probability: Interpreting Categorical and Quantitative Data (S-ID) ★					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Summarize, represent, and interpret data on a single count or measurement variable	HS.S-ID.1	A I M I ★	Represent data with plots on the real number line (dot plots, histograms, and box plots).	MCWR-S2C1-01 (4th Credit)	Solve problems by estimating and computing with one-variable and two-variable data.
				MHS-S2C1-02	Organize collected data into an appropriate graphical representation with or without technology.
	HS.S-ID.2	A I M I ★	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	MHS-S2C1-04	Make inferences by comparing data sets using one or more summary statistics.
				MCWR-S2C1-02 (Algebra 2)	Compare data sets using graphs and summary statistics, including variance and standard deviation, with or without technology.
	HS.S-ID.3	A I M I ★	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	MHS-S2C1-01	Draw inferences about data sets from lists, tables, matrices, and plots.
	HS.S-ID.4	A II M III ★	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. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	MCWR-S2C1-03 (4th Credit)	Compute and explain summary statistics for distributions of data including measures of center and spread, including variance and standard deviation.
				MCWR-S2C2-02 (Algebra 2)	Use the principal characteristics of the normal distribution to estimate probabilities.

Statistics and Probability: Interpreting Categorical and Quantitative Data (S-ID) ★					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Summarize, represent, and interpret data on two categorical and quantitative variables	HS.S-ID.5	A I M I ★	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	*	
	HS.S-ID.6	A I A II M I M II M III ★	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.		
		A I A II M I M II M III ★	a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.*	MCWR-S2C1-08 (Algebra 2)	Draw a line of best fit for a scatterplot with or without technology, describe how the correlation coefficient relates to fit, and explain when it is appropriate to use the regression equation to make predictions.
		A I M II M III ★	b. Informally assess the fit of a function by plotting and analyzing residuals.	MHS-S2C1-03	Display data, including paired data, as lists, tables, matrices, and plots with or without technology; make predictions and observations about patterns or departures from patterns.
				MCWR-S2C1-08 (Algebra 2)	Draw a line of best fit for a scatterplot with or without technology, describe how the correlation coefficient relates to fit, and explain when it is appropriate to use the regression equation to make predictions.
		A I M I ★	c. Fit a linear function for a scatter plot that suggests a linear association.	MCWR-S2C1-08 (Algebra 2)	Draw a line of best fit for a scatterplot with or without technology, describe how the correlation coefficient relates to fit, and explain when it is appropriate to use the regression equation to make predictions.

Statistics and Probability: Interpreting Categorical and Quantitative Data (S-ID) ★					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Interpret linear models	HS.S-ID.7	A I M I ★	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	MHS-S3C4-01	Determine the slope and intercepts of the graph of a linear function, interpreting slope as a constant rate of change.
	HS.S-ID.8	A I M I ★	Compute (using technology) and interpret the correlation coefficient of a linear fit.	MCWR-S2C1-08 (Algebra 2)	Draw a line of best fit for a scatterplot with or without technology, describe how the correlation coefficient relates to fit, and explain when it is appropriate to use the regression equation to make predictions.
	HS.S-ID.9	A I M I ★	Distinguish between correlation and causation.	MCWR-S2C1-07 (4^{th} Credit)	Determine when arguments based on data mistake correlation for causation.
				MCWR-S5C2-11 (Algebra 2)	Determine under what conditions a given statement (algebraic, geometric) is true.

Statistics and Probability: Making Inferences and Justifying Conclusions (S-IC) ★					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Understand and evaluate random processes underlying statistical experiments	HS.S-IC.1	A II M III ★	Understand statistics as a process for making inferences to be made about population parameters based on a random sample from that population.	MCWR-S2C1-06 (4th Credit)	Explain the differences between randomized experiments and observational studies and determine the appropriateness of using each in given situations.
	HS.S-IC.2	A II M III ★	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*	MHS-S2C2-02	Determine the theoretical probability of events, estimate probabilities using experiments, and compare the two.
				MHS-S2C2-04	Explain and use the law of large numbers (that experimental results tend to approach theoretical probabilities after a large number of trials).
Make inferences and justify conclusions from sample surveys, experiments, and observational studies	HS.S-IC.3	A II M III ★	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	MHS-S2C1-08	Design simple experiments or investigations and collect data to answer questions.
				MCWR-S2C1-06 (4th Credit)	Explain the differences between randomized experiments and observational studies and determine the appropriateness of using each in given situations.

Statistics and Probability: Making Inferences and Justifying Conclusions (S-IC) ★					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Make inferences and justify conclusions from sample surveys, experiments, and observational studies	HS.S-IC.4	A II M III ★	Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.	*	
	HS.S-IC.5	A II M III ★	Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.	MHS-S2C1-08	Design simple experiments or investigations and collect data to answer questions.
	HS.S-IC.6	A II M III ★	Evaluate reports based on data.	MHS-S2C1-06	Evaluate the reasonableness of conclusions drawn from data analysis.
				MHS-S2C1-07	Identify misrepresentations and distortions in displays of data and explain why they are misrepresentations or distortions.
				MCWR-S2C1-04 (4^{th} Credit)	Explain how sampling methods, bias, and the phrasing of questions asked during data collections impact the conclusions that can be drawn.
				MCWR-S2C1-05 (4^{th} Credit)	Identify misleading uses of data and explain why they are misleading.
				MCWR-S5C2-11 (Algebra 2)	Determine under what conditions a given statement (algebraic, geometric) is true.

Statistics and Probability: Conditional Probability and the Rules of Probability (S-CP) ★					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Understand independence and conditional probability and use them to interpret data	HS.S-CP.1	A II M II ★	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").	*	
	HS.S-CP.2	A II M II ★	Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.	MCWR-S2C2-04 (Algebra 2)	Determine the conditional probability of an event given that another event occurs, decide if two events are dependent or independent, and determine the probability of an event given the probability of the complementary event.
	HS.S-CP.3	A II M II ★	Understand the conditional probability of *A* given *B* as *P*(*A* and *B*)/*P*(*B*), and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*.	MCWR-S2C2-04 (Algebra 2)	Determine the conditional probability of an event given that another event occurs, decide if two events are dependent or independent, and determine the probability of an event given the probability of the complementary event.

Statistics and Probability: Conditional Probability and the Rules of Probability (S-CP) ★					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Understand independence and conditional probability and use them to interpret data	HS.S-CP.4	A II M II ★	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*	MCWR-S2C2-03 (Algebra 2)	Estimate probabilities and predict outcomes using one- and two-variable data.
	HS.S-CP.5	A II M II ★	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*	MCWR-S2C2-04 (Algebra 2)	Determine the conditional probability of an event given that another event occurs, decide if two events are dependent or independent, and determine the probability of an event given the probability of the complementary event.
Use the rules of probability to compute probabilities of compound events in a uniform probability model	HS.S-CP.6	A II M II ★	Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model.	MCWR-S2C2-04 (Algebra 2)	Determine the conditional probability of an event given that another event occurs, decide if two events are dependent or independent, and determine the probability of an event given the probability of the complementary event.

Statistics and Probability: Conditional Probability and the Rules of Probability (S-CP) ★					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Use the rules of probability to compute probabilities of compound events in a uniform probability model	HS.S-CP.7	A II M II ★	Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.	MCWR-S2C2-01 (Algebra 2)	Apply probability concepts to calculate the probability of events and to make informed decisions in practical situations.
	HS.S-CP.8	+ ★	Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B\|A) = P(B)P(A\|B)$, and interpret the answer in terms of the model.	MCWR-S2C2-04 (Algebra 2)	Determine the conditional probability of an event given that another event occurs, decide if two events are dependent or independent, and determine the probability of an event given the probability of the complementary event.
	HS.S-CP.9	+ ★	Use permutations and combinations to compute probabilities of compound events and solve problems.	MHS-S2C3-01	Apply the addition and multiplication principles of counting, representing these principles algebraically using factorial notation.
				MHS-S2C3-02	Apply appropriate means of computing the number of possible arrangements of items using permutations where order matters, and combinations where order does not matter.
				MHS-S2C3-03	Determine the number of possible outcomes of an event.
				MCWR-S2C2-01 (Algebra 2)	Apply probability concepts to calculate the probability of events and to make informed decisions in practical situations.

Statistics and Probability: Using Probability to Make Decisions (S-MD) ★					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Calculate expected values and use them to solve problems	HS.S-MD.1	+ ★	Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.	*	
	HS.S-MD.2	+ ★	Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.	*	
	HS.S-MD.3	+ ★	Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. *For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.*	MHS-S2C2-01	Make predictions and solve problems based on theoretical probability models.
	HS.S-MD.4	+ ★	Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?*	*	

Statistics and Probability: Using Probability to Make Decisions (S-MD) ★					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Use probability to evaluate outcomes of decisions	HS.S-MD.5	+ ★	Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.		
Use probability to evaluate outcomes of decisions		+ ★	a. Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.*	*	
		+ ★	b. Evaluate and compare strategies on the basis of expected values. *For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.*	MCWR-S3C4-11 (4th Credit)	Compare and contrast the role of insurance as a device to mitigate risk and calculate expenses of various options.
	HS.S-MD.6	+ ★	Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).	*	
	HS.S-MD.7	+ ★	Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	*	

Contemporary Mathematics: Discrete Mathematics (CM-DM)★					
CLUSTER	**AZCCRS**	**LABEL**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
Understand and apply vertex-edge graph topics	AZ.HS.CM-DM.1	+ ★	Study the following topics related to vertex-edge graphs: Euler circuits, Hamilton circuits, the Travelling Salesperson Problem (TSP), minimum weight spanning trees, shortest paths, vertex coloring, and adjacency matrices.	MCWR-S2C4-01 (4th Credit)	Study the following topics related to vertex-edge graphs: Euler circuits, Hamilton circuits, the Travelling Salesperson Problem (TSP), minimum weight spanning trees, shortest paths, vertex coloring, and adjacency matrices.
	AZ.HS.CM-DM.2	+ ★	Understand, analyze, and apply vertex-edge graphs to model and solve problems related to paths, circuits, networks, and relationships among a finite number of elements, in real-world and abstract settings.	MCWR-S2C4-02 (4th Credit)	Understand, analyze, and apply vertex-edge graphs to model and solve problems related to paths, circuits, networks, and relationships among a finite number of elements, in real-world and abstract settings.
	AZ.HS.CM-DM.3	+ ★	Devise, analyze, and apply algorithms for solving vertex-edge graph problems.	MCWR-S2C4-03 (4th Credit)	Devise, analyze, and apply algorithms for solving vertex-edge graph problems.
	AZ.HS.CM-DM.4	+ ★	Extend work with adjacency matrices for graphs, such as interpreting row sums and using the nth power of the adjacency matrix to count paths of length n in a graph.	MCWR-S2C4-04 (4th Credit)	Extend work with adjacency matrices for graphs, such as interpreting row sums and using the nth power of the adjacency matrix to count paths of length n in a graph.

Standards for Mathematical Practice – (MP)				
CLUSTER	**AZCCRS**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
	HS.MP.1	Make sense of problems and persevere in solving them.	MHS-S5C2-01	Analyze a problem situation, determine the question(s) to be answered, organize given information, determine how to represent the problem, and identify implicit and explicit assumptions that have been made.
			MHS-S5C2-02	Solve problems by formulating one or more strategies, applying the strategies, verifying the solution(s), and communicating the reasoning used to obtain the solution(s).
			MHS-S5C2-03	Evaluate a solution for reasonableness and interpret the meaning of the solution in the context of the original problem.
			MHS-S5C2-04	Generalize a solution strategy for a single problem to a class of related problems; explain the role of generalizations in inductive and deductive reasoning.
			MHS-S5C2-05	Summarize and communicate mathematical ideas using formal and informal reasoning.
			MHS-S5C2-06	Synthesize mathematical information from multiple sources to draw a conclusion, make inferences based on mathematical information, evaluate the conclusions of others, analyze a mathematical argument, and recognize flaws or gaps in reasoning.
			MHS-S5C2-08	Use inductive reasoning to make conjectures, use deductive reasoning to analyze and prove a valid conjecture, and develop a counterexample to refute an invalid conjecture.
			MCWR-S5C2-01 (Algebra 2)	Analyze a problem situation, determine the question(s) to be answered, organize given information, determine how to represent the problem, and identify implicit and explicit assumptions that have been made.

Standards for Mathematical Practice – (MP)				
CLUSTER	**AZCCRS**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
	HS.MP.1	Make sense of problems and persevere in solving them.	MCWR-S5C2-02 (Algebra 2)	Solve problems by using theorems, formulating one or more strategies, applying the strategies, verifying the solution(s), and communicating the reasoning used to obtain the solution(s).
			MCWR-S5C2-03 (Algebra 2)	Evaluate a solution for reasonableness and interpret the meaning of the solution in the context of the original problem.
			MCWR-S5C2-04 (Algebra 2)	Generalize a solution strategy for a single problem to a class of related problems and explain the role of generalizations in inductive and deductive reasoning.
			MCWR-S5C2-05 (Algebra 2)	Summarize and communicate mathematical ideas using formal and informal reasoning.
			MCWR-S5C2-06 (Algebra 2)	Synthesize mathematical information from multiple sources to draw a conclusion, make inferences based on mathematical information, evaluate the conclusions of others, analyze a mathematical argument, and recognize flaws or gaps in reasoning.
			MCWR-S5C2-08 (Algebra 2)	Use inductive and deductive reasoning to make, analyze, and validate or refute conjectures and/or proofs.
	HS.MP.2	Reason abstractly and quantitatively.	MHS-S5C2-06	Synthesize mathematical information from multiple sources to draw a conclusion, make inferences based on mathematical information, evaluate the conclusions of others, analyze a mathematical argument, and recognize flaws or gaps in reasoning.
			MCWR-S5C2-06 (Algebra 2)	Synthesize mathematical information from multiple sources to draw a conclusion, make inferences based on mathematical information, evaluate the conclusions of others, analyze a mathematical argument, and recognize flaws or gaps in reasoning.

Standards for Mathematical Practice – (MP)				
CLUSTER	**AZCCRS**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
	HS.MP.3	Construct viable arguments and critique the reasoning of others.	MHS-S5C2-03	Evaluate a solution for reasonableness and interpret the meaning of the solution in the context of the original problem.
			MHS-S5C2-06	Synthesize mathematical information from multiple sources to draw a conclusion, make inferences based on mathematical information, evaluate the conclusions of others, analyze a mathematical argument, and recognize flaws or gaps in reasoning.
			MHS-S5C2-08	Use inductive reasoning to make conjectures, use deductive reasoning to analyze and prove a valid conjecture, and develop a counterexample to refute an invalid conjecture.
			MCWR-S5C2-03 (Algebra 2)	Evaluate a solution for reasonableness and interpret the meaning of the solution in the context of the original problem.
			MCWR-S5C2-06 (Algebra 2)	Synthesize mathematical information from multiple sources to draw a conclusion, make inferences based on mathematical information, evaluate the conclusions of others, analyze a mathematical argument, and recognize flaws or gaps in reasoning.
			MCWR-S5C2-08 (Algebra 2)	Use inductive and deductive reasoning to make, analyze, and validate or refute conjectures and/or proofs.
	HS.MP.4	Model with mathematics.	MHS-S5C2-02	Solve problems by formulating one or more strategies, applying the strategies, verifying the solution(s), and communicating the reasoning used to obtain the solution(s).
			MHS-S5C2-03	Evaluate a solution for reasonableness and interpret the meaning of the solution in the context of the original problem.

Standards for Mathematical Practice – (MP)				
CLUSTER	**AZCCRS**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
	HS.MP.4	Model with mathematics.	MHS-S5C2-04	Generalize a solution strategy for a single problem to a class of related problems; explain the role of generalizations in inductive and deductive reasoning.
			MHS-S5C2-05	Summarize and communicate mathematical ideas using formal and informal reasoning.
			MHS-S5C2-06	Synthesize mathematical information from multiple sources to draw a conclusion, make inferences based on mathematical information, evaluate the conclusions of others, analyze a mathematical argument, and recognize flaws or gaps in reasoning.
			MCWR-S5C2-02 (Algebra 2)	Solve problems by using theorems, formulating one or more strategies, applying the strategies, verifying the solution(s), and communicating the reasoning used to obtain the solution(s).
			MCWR-S5C2-03 (Algebra 2)	Evaluate a solution for reasonableness and interpret the meaning of the solution in the context of the original problem.
			MCWR-S5C2-04 (Algebra 2)	Generalize a solution strategy for a single problem to a class of related problems and explain the role of generalizations in inductive and deductive reasoning.
			MCWR-S5C2-05 (Algebra 2)	Summarize and communicate mathematical ideas using formal and informal reasoning.
			MCWR-S5C2-06 (Algebra 2)	Synthesize mathematical information from multiple sources to draw a conclusion, make inferences based on mathematical information, evaluate the conclusions of others, analyze a mathematical argument, and recognize flaws or gaps in reasoning.
			MCWR-S5C2-09 (4^{th} Credit)	Use mathematical models to represent and analyze personal and professional situations.
			MCWR-S5C2-10 (4^{th} Credit)	Differentiate, interpret, apply, and develop concepts in the context of personal and professional situations.

Standards for Mathematical Practice – (MP)				
CLUSTER	**AZCCRS**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
	HS.MP.5	Use appropriate tools strategically.	MHS-S5C2-02	Solve problems by formulating one or more strategies, applying the strategies, verifying the solution(s), and communicating the reasoning used to obtain the solution(s).
			MHS-S5C2-08	Use inductive reasoning to make conjectures, use deductive reasoning to analyze and prove a valid conjecture, and develop a counterexample to refute an invalid conjecture.
			MCWR-S5C2-02 (Algebra 2)	Solve problems by using theorems, formulating one or more strategies, applying the strategies, verifying the solution(s), and communicating the reasoning used to obtain the solution(s).
			MCWR-S5C2-08 (Algebra 2)	Use inductive and deductive reasoning to make, analyze, and validate or refute conjectures and/or proofs.
	HS.MP.6	Attend to precision.	MHS-S5C2-02	Solve problems by formulating one or more strategies, applying the strategies, verifying the solution(s), and communicating the reasoning used to obtain the solution(s).
			MHS-S5C2-05	Summarize and communicate mathematical ideas using formal and informal reasoning.
	HS.MP.6	Attend to precision.	MCWR-S5C2-02 (Algebra 2)	Solve problems by using theorems, formulating one or more strategies, applying the strategies, verifying the solution(s), and communicating the reasoning used to obtain the solution(s).
			MCWR-S5C2-05 (Algebra 2)	Summarize and communicate mathematical ideas using formal and informal reasoning.
			MCWR-S5C2-08 (Algebra 2)	Use inductive and deductive reasoning to make, analyze, and validate or refute conjectures and/or proofs.

Standards for Mathematical Practice – (MP)				
CLUSTER	**AZCCRS**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
	HS.MP.7	Look for and make use of structure.	MHS-S5C2-06	Synthesize mathematical information from multiple sources to draw a conclusion, make inferences based on mathematical information, evaluate the conclusions of others, analyze a mathematical argument, and recognize flaws or gaps in reasoning.
			MHS-S5C2-08	Use inductive reasoning to make conjectures, use deductive reasoning to analyze and prove a valid conjecture, and develop a counterexample to refute an invalid conjecture.
			MCWR-S5C2-06 (Algebra 2)	Synthesize mathematical information from multiple sources to draw a conclusion, make inferences based on mathematical information, evaluate the conclusions of others, analyze a mathematical argument, and recognize flaws or gaps in reasoning.
			MCWR-S5C2-08 (Algebra 2)	Use inductive and deductive reasoning to make, analyze, and validate or refute conjectures and/or proofs.
	HS.MP.8	Look for and express regularity in repeated reasoning.	MHS-S5C2-03	Evaluate a solution for reasonableness and interpret the meaning of the solution in the context of the original problem.
			MHS-S5C2-04	Generalize a solution strategy for a single problem to a class of related problems; explain the role of generalizations in inductive and deductive reasoning.
			MCWR-S5C2-03 (Algebra 2)	Evaluate a solution for reasonableness and interpret the meaning of the solution in the context of the original problem.
			MCWR-S5C2-04 (Algebra 2)	Generalize a solution strategy for a single problem to a class of related problems and explain the role of generalizations in inductive and deductive reasoning.

Removed or Moved 2008 Performance Objectives				
CLUSTER	**AZCCRS**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
		REMOVED	MHS-S1C1-02	Sort sets of numbers as finite or infinite, and justify the sort.
	7.NS.1b	MOVED TO GRADE 7	MHS-S1C1-03	Express that the distance between two numbers is the absolute value of their difference.
	8.EE.1	MOVED TO GRADE 8	MHS-S1C2-03	Calculate powers and roots of rational and irrational numbers.
	8.EE.4	MOVED TO GRADE 8	MHS-S1C2-04	Compute using scientific notation.
	8.NS.2	MOVED TO GRADE 8	MHS-S1C3-01	Determine rational approximations of irrational numbers.
	8.NS.2	MOVED TO GRADE 8	MHS-S1C3-04	Estimate the location of the rational or irrational numbers on a number line.
	7.SP.2	MOVED TO GRADE 7	MHS-S2C1-01	Draw inferences about data sets from lists, tables, matrices, and plots.
	7.SP.4	MOVED TO GRADE 7	MHS-S2C1-05	Determine which measure of center is most appropriate in a given situation and explain why.
		REMOVED	MHS-S2C2-03	Use simulations to model situations involving independent and dependent events.
	7.SP.7b	MOVED TO GRADE 7	MHS-S2C2-05	Use concepts and formulas of area to calculate geometric probabilities.
		REMOVED	MHS-S4C1-02	Visualize solids and surfaces in 3-dimensional space when given 2-dimensional representations and create 2-dimensional representations for the surfaces of 3-dimensional objects.
		REMOVED	MHS-S4C1-05	Explore Euclid's five postulates in the plane and their limitations.
	8.G.5	MOVED TO GRADE 8	MHS-S4C1-06	Solve problems using angle and side length relationships and attributes of polygons.
		REMOVED	MHS-S4C1-07	Use the hierarchy of quadrilaterals in deductive reasoning.
		REMOVED	MHS-S4C1-09	Solve problems using the triangle inequality property.
	8.G.3 8.G.4	MOVED TO GRADE 8	MHS-S4C2-03	Sketch and describe the properties of a 2-dimensional figure that is the result of two or more transformations.
	8.G.3 8.G.4	MOVED TO GRADE 8	MHS-S4C2-04	Determine the effects of a single transformation on linear or area measurements of a 2-dimensional

Removed or Moved 2008 Performance Objectives				
CLUSTER	**AZCCRS**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
				figure.
	8.G.8	MOVED TO GRADE 8	MHS-S4C3-02	Illustrate the connection between the distance formula and the Pythagorean Theorem.
	8.EE.8b	MOVED TO GRADE 8	MHS-S4C3-07	Determine the solution to a system of linear equations in two variables from the graphs of the equations.
		REMOVED	MHS-S4C4-03	Determine the effect that changing dimensions has on the perimeter, area, or volume of a figure.
		REMOVED	MHS-S5C1-01	Select an algorithm that explains a particular mathematical process; determine the purpose of a simple mathematical algorithm.
		REMOVED	MHS-S5C1-02	Analyze algorithms for validity and equivalence recognizing the purpose of the algorithm.
		REMOVED	MCWR-S1C2-06	Apply DeMoivre's Theorem to calculate products, powers, and roots of complex numbers.
		SUBSUMED WITHIN OTHER CONTEMPORARY MATHEMATICS STANDARDS	MHS-S2C4-01	Solve network problems using graphs and matrices.
		MOVED TO CONTEMPORARY MATHEMATICS	MCWR-S2C4-01	Study the following topics related to vertex-edge graphs: Euler circuits, Hamilton circuits, the Travelling Salesperson Problem (TSP), minimum weight spanning trees, shortest paths, vertex coloring, and adjacency matrices.
		MOVED TO CONTEMPORARY MATHEMATICS	MCWR-S2C4-02	Understand, analyze, and apply vertex-edge graphs to model and solve problems related to paths, circuits, networks, and relationships among a finite number of elements, in real-world and abstract settings.
		MOVED TO CONTEMPORARY MATHEMATICS	MCWR-S2C4-03	Devise, analyze, and apply algorithms for solving vertex-edge graph problems.
		MOVED TO CONTEMPORARY MATHEMATICS	MCWR-S2C4-04	Extend work with adjacency matrices for graphs, such as interpreting row sums and using the nth power of the adjacency matrix to count paths of length n in a graph.
		REMOVED	MCWR-S3C2-08	Find the major and minor axes, intercepts and asymptotes of conic sections.
		REMOVED	MCWR-S3C2-16	Identify the degree of a given polynomial function and write a polynomial function of a given degree.

Removed or Moved 2008 Performance Objectives				
CLUSTER	**AZCCRS**	**ITEM DESCRIPTION**	**2008 PO**	**ITEM DESCRIPTION**
		REMOVED	MCWR-S4C1-02	Explore geometries other than Euclidean geometry in which the parallel postulate is not true.
		REMOVED	MCWR-S4C3-07	Graph equations given in polar coordinates.
		REMOVED	MCWR-S5C1-01	Use a variety of approaches (inductive and deductive reasoning, estimations, generalizations, formal and informal methods of proof) to analyze algorithms.