Algebra II
Mathematics Curriculum

DOMAIN DESCRIPTION	CLUSTER DESCRIPTION	MLS CODE	MLS DESCRIPTION	DOK	Instructional Activities	Assessments
Number and Quantity	Extend and use the relationship between rational exponents and radicals.	A2.NQ.A.1	Extend the system of powers and roots to include rational exponents.	2	Explain all properties of exponents including both integer and rational exponents (with numerators of 1 and larger)	Example: $(x^{1/2})(x^{2/5}) = x^{9/10}$
	Extend and use the relationship between rational exponents and radicals.	A2.NQ.A.2	Create and recognize equivalent expressions involving radical and exponential forms of expressions.	2	Given an exponential expression, convert it to radical n^{th} root form. Given a radical expression, convert it to exponential form.	Example: $\sqrt[3]{x^2} = x^{2/3}$
	Extend and use the relationship between rational exponents and radicals.	A2.NQ.A.3	Add, subtract, multiply and divide radical expressions.	2	Introduce all 4 mathematical operations individually to radical expressions, & extend concepts to problems that involve 2 or more different operations within the same problem.	Students will perform all 4 operations to radical expressions and express answers in simplified form (including rationalizing the denominator using conjugates and FOIL if necessary).
		A2.NQ.A.4	Solve equations involving rational exponents &/or radicals & identify situations where other solutions may result.	3	Given a variety of radical equations, isolate the radical, clear the radical and check.	Solve and check $\sqrt{2x-1} +7=-2$
	Use complex numbers.	A2.NQ.B.5	Represent complex numbers.	3	Introduce the complex number system and imaginary numbers stressing $\sqrt{-1}= i$	Example: $i^3 = -i$
	Use complex numbers.	A2.NQ.B.6	Add, subtract, multiply and divide complex numbers.	3	Applying $i^2 = -1$, commutative, associative & distributive properties, students will add, subtract, multiply, & divide complex numbers	Example: Simplify (2+3i)(2-4i)
	Use complex numbers.	A2.NQ.B.7	Know and apply the Fundamental Theorem of Algebra.	3	Apply the Fundamental Theorem of Algebra to quadratic polynomials.	Explain why the Fundamental Theorem of Algebra holds for $3x^2$ - 18x -

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Seeing Structure in Expressions	Define and use logarithms	A2.SSE.A.1	Develop the definition of logarithms based on properties of exponents.	3	Define a logarithm based on $\log_b(x)=y$ if and only if $b^y=x$	Students should understand that $\log_3 27=3$ because $3^3=27$
	Define and use logarithms	A2.SSE.A.2	Use the inverse relationship between exponents and logarithms to solve exponential and logarithmic equations.	2	Use the inverse relationship between exponential and logarithms to solve simple equations.	Example: Rewrite $\log_3 x=4$ in exponential form as $x=3^4$
	Define and use logarithms	A2.SSE.A.3	Use properties of logarithms to solve equations or find equivalent expressions.	2	Use properties of logarithms to do the following: a. Convert an exponent into a multiplier (factor). b. Convert between a logarithm of factors and the sum of the logarithms of the individual factors. c. Convert between a logarithm of a quotient and the difference of the logarithms of the dividend and divisor.	Simplify $\log_4 x+\log_4 2=\log_4 8$
	Define and use logarithms	A2.SSE.A.4	Understand why logarithmic scales are used, and use them to solve problems.	2	The expectation of the student is to understand why logarithmic scales are used, and use them to solve problems.	Use logarithmic scales to compare quantities and solve problems involving logarithms. (e.g., pH scale, earthquake intensity, light

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Reasoning with Equations and Inequalities	Solve equations and inequalities.	A2.REI.A.1	Create and solve equations and inequalities, including those that involve absolute value.	2	The expectation of the student is to create and solve equations and inequalities, including those that involve absolute value. These equations and inequalities would include, but wound not be limited to: linear, quadratic, cubic, exponential, step functions and absolute value. The student may use graphical and/or algebraic methods to solve these problems.	Solve $\lvert x+5\rvert \leq 10$
	Solve equations and inequalities.	A2.REI.A.2	Solve rational equations where numerators and denominators are polynomials and where extraneous solutions may result.	3	Students should undetstand the concept of least common denominators and rules for adding or subtracting fractions. They should also understand that a denominator can not be equal to 0.	Solve (2n)/(n-5) + (4n-30)/(n-5) = 5. State any extraneous solutions.
	Solve general systems of equations and inequalities.	A2.REI.B.3	Create and solve systems of equations that may include non-linear equations and inequalities.	3	Create and solve systems of equations that may include non-linear equations and inequalities. Extend solving systems of equations to finding solutions of systems with two unknowns that include non-linear equations or inequalities.	A library ordered 48 fiction and non fiction books. A fiction book cost $15 and a non fiction book cost $20. The total cost of the order was $900. How many non fiction books were ordered?

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DOMAIN DESCRIPTION	CLUSTER DESCRIPTION	MLS CODE	MLS DESCRIPTION	DOK	Instructional Activities	Assessments
Arithmetic with Polynomials and Rational Expressions	Perform operations on polynomials and rational expressions	A2.APR.A.1	Extend the knowledge of factoring to include factors with complex coefficients.	2	Extend students knowledge of factoring to completely factor general polynomial expressions.	Solve $x^2-2x+6=0$
	Perform operations on polynomials and rational expressions	A2.APR.A.2	Understand the Remainder Theorem and use it to solve problems.	3	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).	Divide $4x^2-5x-20$ by x-4 using synthetic division. What is the remainder, and is x-4 a factor?
	Perform operations on polynomials and rational expressions	A2.APR.A.3	Find the least common multiple of two or more polynomials.	2	Use the concept of LCM with integers to extend the knowledge to polynomials.	Find the LCM of the two polynomials: $x^2+7x+10$ and x^2-25
	Perform operations on polynomials and rational expressions	A2.APR.A.4	Add, subtract, multiply and divide rational expressions.	2	Perform operations on rational expressions.	Solve $3/(x+2) + 4x/(x-5)$
	Perform operations on polynomials and rational expressions	A2.APR.A.5	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to sketch the function defined by the polynomial.	3	Given a polynomial function, find the zeros and create a rough graph.	Let $f(x)=(x-1)^2(x+2)(x-4)$. Find the zeros and use sign graphs to sketch a rough graph of the function.

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DOMAIN DESCRIPTION	CLUSTER DESCRIPTION	MLS CODE	MLS DESCRIPTION	DOK	Instructional Activities	Assessments
Interpreting Functions	Use and interpret functions	A2.IF.A.1	Identify and interpret key characteristics of functions represented graphically, with tables and with algebraic symbolism to solve problems.	3	Identify domain and range of functions, and identify unique characteristics of functions represented graphically, with tables, with algebraic symbolism and translate between these representations. Function types include general polynomials, square roots, cube roots, absolute value of linear functions, simple piecewise-defined functions, step functions, exponential and logarithmic functions.	Idenity and label unique characteristics including the following: a. x- and y-intercepts, if any b. end behavior c. limited domains and ranges d. local maxima or minima values e. symmetries f. specific values of the function g. intervals of increasing and decreasing h. points of discontinuity
	Use and interpret functions	A2.IF.A.2	Translate between equivalent forms of functions.	2	Be able to identify equation forms of functions and be able to convert from one to another.	Match graphs and tables with functions.

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DOMAIN DESCRIPTION	CLUSTER DESCRIPTION	MLS CODE	MLS DESCRIPTION	DOK	Instructional Activities	Assessments
Building Functions	Create new functions from existing functions.	A2.BF.A.1	Create new functions by applying the four arithmetic operations and composition of functions (modifying the domain and range as necessary).	2	Create functions by performing operations on functions, including addition, subtraction, multiplication, division and composition of functions. Modify the domain and range if necessary. (e.g., to restrict a domain in order to avoid a zero denominator in a quotient of functions)	If f(x)= 2x+3 and g(x)= x-1, find (f+g)(x), (f-g)(x), (f*g)(x), (f/g)(x) and (f o g)(x)
	Create new functions from existing functions.	A2.BF.A.2	Derive inverses of functions, and compose the inverse with the original function to show that the functions are inverses.	2	Given a function, find its inverse and verify your answer by the composition method.	Find the inverse of f(x)= 2x-4 and verify by composition.
	Create new functions from existing functions.	A2.BF.A.3	Describe the effects of transformations algebraically and graphically, creating vertical and horizontal translations, vertical and horizontal reflections and dilations (expansions/compressions) for linear, quadratic, cubic, square and cube root, absolute value, exponential and logarithmic functions.	3	Introduce parent functions and the general forms that describe transformations of the parent functions.	Describe the transformation of $f(x)=x^2$ given $f(x)=-3(x-4)^2+7$. Then be able to graph both.

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DOMAIN DESCRIPTION	CLUSTER DESCRIPTION	MLS CODE	MLS DESCRIPTION	DOK	Instructional Activities	Assessments
Modeling	Use functions to model real-world problems	A2.FM.A.1	Create functions and use them to solve applications of quadratic and exponential function model problems.	3	Create functions and use them to solve simple applications of quadratic and exponential function models. The student may use graphical and/or algebraic methods. (e.g., price-demand-cost-revenue-profit situations, compound interest problems and exponential growth or decay problems)	If a student deposits $800 into the bank with an interest rate of 4.8%, compounded monthly, how much will they have in 10 years?

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DOMAIN DESCRIPTION	CLUSTER DESCRIPTION	MLS CODE	MLS DESCRIPTION	DOK	Instructional Activities	Assessments
Data and Statistical Analysis	Make inferences and justify conclusions.	A2.DS.A.1	Analyze how random sampling could be used to make inferences about population parameters.	2	Explain the concept of random sampling and how it is essential to obtaining statistics that are free of bias, and thus, good estimations of population parameters.	For a student to conduct a political poll, explain why it would not be correct to just poll students at their school.
	Make inferences and justify conclusions.	A2.DS.A.2	Determine whether a specified model is consistent with a given data set.	2	Compare and contrast the concepts of experimental and theoretical problability, and how sample size affects this relationship.	A model says a spinning coin falls heads up with probability 0.5. Would an experimental result of 5 tails in a row cause you to question the model?)
	Make inferences and justify conclusions.	A2.DS.A.3	Describe and explain the purposes, relationship to randomization and differences among sample surveys, experiments and observational studies.	2	Explain and understand the characteristics that make up surveys, experiments and observational studies.	Given a scenario, determine whether it represents a survey, experiment or observational study.
	Make inferences and justify conclusions.	A2.DS.A.4	Use data from a sample to estimate characteristics of the population and recognize the meaning of the margin of error in these estimates.	3	Explain how to calculate mean, median, mode, standard deviation, proportions, margin of error and variance of samples. Use those statistics to estimate population parameters.	Create confidence interval estimates of population parameters.

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DOMAIN DESCRIPTION	CLUSTER DESCRIPTION	MLS CODE	MLS DESCRIPTION	DOK	Instructional Activities	Assessments
Data and Statistical Analysis	Make inferences and justify conclusions.	A2.DS.A.5	Describe and explain how the relative sizes of a sample and the population affect the margin of error of predictions.	2	Describe and explain how the relative sizes of a sample and the population affect the margin of error of predictions and thus the validity of these predictions.	Students should understand the concept of how increasing sample sizes causes sample statistics to approach population parameters.
	Make inferences and justify conclusions.	A2.DS.A.6	Analyze decisions and strategies using probability concepts.	3	Explain how probability is a number from 0-1 inclusive and how to create/compare theoretical and observed probability distributions.	Create and interpret probability distributions.
	Make inferences and justify conclusions.	A2.DS.A.7	Evaluate reports based on data.	3	Explain which statistical methods should be used in various scenarios to correctly evaluate whether report results are valid or not.	Create reports based on statistics as well as analyze given reports.
	Fit a data set to a normal distribution.	A2.DS.B.8	Know and use the characteristics of normally distributed data sets; predict what percentage of the data will be above or below a given value that is a multiple of standard deviations above or below the mean.	3	Understand the concept of converting data to z-scores and relating this to areas under the normal distribution curve to make predictions.	Given the mean and standard deviation of heights of adult males, how many of a thousand randomly selected adults males would be expected to be taller than three standard deviations above the mean?
	Fit a data set to a normal distribution.	A2.DS.B.9	Fit a data set to a distribution using its mean and standard deviation to determine whether the data is approximately normally distributed.	3	Understand the concept of the normal distribution, standard normal distribution and graphical representations such as histograms, to assess normality of data sets.	Use histograms along with statistical calculations to make a determination whether or not a data set is normally distributed.