

Window Rock Unified School District #8
Curriculum Guide
2021-2022

SUBJECT: Algebra 2

GRADE: 11

TIMELINE: Quarter 3

Theme/Big Ideas for this Unit: ROOTS & RADICAL EXPRESSIONS (Equivalence, Solve Equations & Inequalities, Function)

Essential Questions for these Units

1. To simplify the nth root of an expression, what must be true about the expression?.
2. When you square each side of an equation is the resulting equation equivalent to the original?
3. How are functions and its inverse functions relate?

Standards	Content	Objectives	Assessment	Resources	Vocabulary
A2.A-SSE.A.2. Use structure to identify ways to rewrite polynomial and rational expressions. Focus on polynomial operations and factoring patterns.	Lessons 6.1 Roots and radical expressions	I will find roots and apply substitutions to solve quadratic equations. I will simplify square roots using properties of exponents to write the entire radicand as a perfect square.	Lesson Check/Lesson Quiz: page 364 page 370 page 378 page 385 Problem solving Homework Summative Test	Charles, R. et. Al. (2015). Algebra 2 Common Core. Pearson Education and Associates. P. 357-427; <u>Savvas Realize</u> ; Math xL	Nth root Principal root Radicand Index
	Lesson 6.2 Multiply and divide radical expressions.	I will multiply and divide radical expressions.			Simplest form of a radical
	Lesson 6.3, Lesson 6-4 Binomial Radical Expressions	I will add and subtract radical expressions.			Rationalize the denominator
A2.A-CED.A.1 Create equations	Lesson 6-5 Solving Square	I will solve square root and other	Lesson Check/Lesson Quiz:		Radical equation Square root

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and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on equations and inequalities arising from linear, quadratic, rational, and exponential functions. A2.A-REI.A.2. Solve rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	Root and Other Radical Equations.	radical equation.	page 395 Problem solving Homework Summative Test		equation
A2.F-BF.A.1 Write a function that describes a relationship between two quantities. Functions include linear, quadratic, exponential,	Lesson 6-6 Function Operations	I will add, subtract, multiply and divide functions. I will find the composite of 2 functions.	Lesson Check/Lesson Quiz: page 401. Problem solving Homework Summative Test		Composite function

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Standards	Content	Objectives	Assessment	Resources	Vocabulary
polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions. b. Combine function types using arithmetic operations and function composition.					

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A2.F-BF.B.4. Find inverse functions. a. Understand that an inverse function can be obtained by expressing the dependent variable of one function as the independent variable of another, recognizing that functions f and g are inverse functions if and only if $f(x) = y$ and $g(y) = x$ for all values of x in the domain of f and all values of y in the domain of g . b. Understand that if a function contains a point (a,b) , then the graph of the inverse relation of the function contains the point (b,a) . c. Interpret the meaning of and relationship between a function and its inverse	Lesson 6-7 Inverse Function	I will find the inverse of a relation or function.	Lesson Check/Lesson Quiz: page 409. Problem solving Homework Summative Test		Inverse relation Inverse function One-to-one function
	Lesson 6-8 Graphing Radical Functions	I will graph square root and other radical functions.			Radical function Square root function

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Standards	Content	Objectives	Assessment	Resources	Vocabulary
utilizing real-world context.					

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SUBJECT: Algebra

2

GRADE:

11

TIMELINE: Quarter 3

Theme/Big Ideas for this Unit: EXPONENTIAL & LOGARITHMIC FUNCTIONS (Modeling, Equivalence, and Function)

Essential Questions for this Unit:

1. How do you model a quantity that changes regularly over time by the same percentage?
2. How are exponents and logarithms related?
3. How are exponential functions and logarithmic functions related?

Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
A2.A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on equations and inequalities arising from linear, quadratic, rational, and exponential functions.	Lessons7-1 Exploring Exponential Models	I will model exponential growth and decay.	Lesson Check/Lesson Quiz: page 439. Problem solving Homework Summative Test	Charles, R. et. Al. (2015). Algebra 2 Common Core. Pearson Education and Associates. P. 434-490. <u>Savvas Realize;</u> Math xL	Exponential function Exponential growth Exponential decay Asymptote Growth factor Decay factor

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A2.A-SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Include problem-solving opportunities utilizing real-world context and focus on expressions with rational exponents.	Lesson 7-2 Properties of Exponential Functions	I will explore the properties of functions of the form $y = ab^x$ I will graph the exponential functions that have a base e.	Lesson Check/Lesson Quiz: page 447. Problem solving Homework Summative Test		Natural base exponential function Continuously compounded interest
c. Use the properties of exponents to transform expressions for exponential functions. A-REI.D.11 Explain why the x-coordinates of the points where the graphs	Lesson 7-3 Logarithmic functions as Inverses	I will write and evaluate logarithmic expressions. I will graph logarithmic functions. I will interpret the x-coordinates of the points in the graphs of functions.	Lesson Check/Lesson Quiz: page 456. Problem solving Homework Summative Test		Logarithm Logarithmic function Common logarithm
					Logarithmic scale Exponential equation Logarithmic equation

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	Lesson 7-4 Properties of Logarithms	I will use the properties of logarithms to solve logarithmic functions.	Problem solving Homework Summative Test Lesson Check/Lesson Quiz: page 466.		Change of base formula
	Lesson 7-5 Exponential & Logarithmic Equations	I will solve exponential and logarithmic equations. I will use equations and technology to represent solutions of functions in the real world context.	Lesson Check/Lesson Quiz: Page 473 Problem solving Homework Summative Test		Exponential equation Logarithmic equation

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	Lesson 7-6 Natural Logarithms	I will evaluate and simplify natural logarithmic expressions. I will solve equations using natural logarithm.	Lesson Check/Lesson Quiz: Page 481 Problem solving Homework Summative Test		Natural logarithmic function
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TIMELINE: Quarter 3

Theme/Big Ideas for this Unit: RATIONAL FUNCTIONS (Proportionality, Function, and Equivalence)

Essential Questions for this Unit:

1. Are two quantities inversely proportional if an increase in one corresponds to a decrease in the other?
2. What kinds of asymptotes are possible for a rational function?
3. Are a relational expression and its simplified form equivalent?

Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
A2.A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on equations and inequalities arising from linear, quadratic, rational, and exponential functions.	Lesson 8-1 Inverse Variation	I will recognize and use inverse variation. I will use joint and other variations in solving problems.	Lesson Check/Lesson Quiz: Page 503. Problem solving Homework Summative Test	Charles, R. et. Al. (2015). Algebra 2 Common Core. Pearson Education and Associates. P.498-557. <u>Savvas Realize;</u> Math xL	Inverse variation Combined variation Joint variation
	Lesson 8-2 The Reciprocal Function	I will graph reciprocal functions. I will graph translation of reciprocal functions.	Lesson Check/Lesson Quiz: page 512. Problem solving Homework Summative Test Lesson		Reciprocal function Branch Rational

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A2.A-APR.B.3. 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. Focus on quadratic, cubic, and quartic polynomials including polynomials for which factors are not provided A2.A-SSE.A.2 Use structure to identify ways to rewrite polynomial and rational expressions. Focus on polynomial operations and factoring patterns.	Lesson 8-3 Rational Functions & their Graphs	I will understand the properties of rational functions. I will graph rational functions.	Check/Lesson Quiz: Page 521. Problem solving Homework Summative Test		function Continuous graph Discontinuous graph Point of discontinuity Non-removable discontinuity
	Lesson 8-4 Rational Expressions	I will Interpret the structure of expressions. I will simplify rational expressions. I will multiply and divide rational expressions.	Lesson Check/Lesson Quiz: Page 530. Problem solving Homework Summative Test		Rational expression Simplest form
	Lesson 8-5 Adding and Subtracting Rational	I will add and subtract rational expressions.	Lesson Check/Lesson Quiz: Page 539.		Complex fraction

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A2.A-REI.A.2 Solve rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. A2.A-REI.D.11. 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 problems in real-world context. Extend from linear, quadratic, and	Expressions Lesson 8-6 Solving Rational Equations	I will solve rational equations . I will use rational equations to solve problems.	Problem solving Homework Summative Test Lesson Check/Lesson Quiz: Page. 557 Problem solving Homework Summative Test		Rational Equation
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exponential functions to cases where $f(x)$ and/or $g(x)$ are polynomial, rational, exponential, and logarithmic functions.					
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TIMELINE: Quarter 3

Theme/Big Ideas for this Unit: SEQUENCES & SERIES (Variable, Equivalence, Modeling)

Essential Questions for this Unit:

1. 1. How can you represent the terms of a sequence explicitly?
2. What are equivalent explicit and recursive definitions for an arithmetic sequence?
3. How can you model a geometric sequence?

Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
A2.A-SSE.B.4 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. <i>For example, calculate mortgage payments.</i>	Lesson 9-3 Geometric Sequences	I will define, identify, and apply geometric sequence.	Lesson Check/Lesson Quiz: Page 583. Problem solving Homework Summative Test	Charles, R. et. Al. (2015). Algebra 2 Common Core. Pearson Education and Associates. P.587-601.	Geometric sequence Common ratio Geometric mean
	Lesson 9-4 Arithmetic Series	I will define the arithmetic series and find their sum using the summation notation.	Lesson Check/Lesson Quiz: Page 591. Problem solving Homework Summative Test	<u>Savvas</u> <u>Realize</u> ; Math xL	Series Arithmetic series

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	Lesson 9-5. Geometric Series	I will define the sum of a finite geometric series and use the formula to find their sum.	Lesson Check/Lesson Quiz: Page 598. Problem solving Homework Summative Test		Geometric series Finite series Infinite series
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SUBJECT: Algebra 2

GRADE: 11

TIMELINE: Quarter 4

Theme/Big Ideas for this Unit: PROBABILITY & STATISTICS

Essential Questions for this Unit:

1. What is the difference between a permutation and a combination?
2. What is the difference between experimental and theoretical probability?
3. How are measures of central tendency different from standard deviation?

Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
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A2.S-IC.A.1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. A2.S-IC.B.3. Recognize the purposes of and differences between designed experiments, sample surveys and observational studies. A2.S-IC.B.4. Use data from a sample survey to estimate a population mean or proportion; recognize that estimates are unlikely to be correct and the estimates will be more precise with larger sample sizes.	Lesson 8 Samples & Surveys	I will identify sampling methods. I will recognize bias in samples and surveys.	Lesson Check/Lesson Quiz: Page 728. Problem solving Homework Summative Test	Charles, R. et. Al. (2015). Algebra 2 Common Core. Pearson Education and Associates. P.681-757. <u>Savvas</u> <u>Realize</u>; MathxL	Population Sample Convenience sample Self-selected sample Systematic sample Random sample Observational study Controlled experiment Survey
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A2.S-IC.A.2. Explain whether a specified model is consistent with results from a given data-generating process.	Lesson 2	I will find the probability of an event using theoretical, experimental, and simulation methods.	Lesson Check/Lesson Quiz: Page 685. Problem solving Homework Summative Test	Experimental probability Simulation Sample space Equally likely outcomes Theoretical probability
A2.S-CP.A.5. Recognize and explain the concepts of conditional probability and independence utilizing real-world context. A2.S-CP.B.7. 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.	Lesson 3 Probability of Multiple Events	I will find the probability of event A AND B I will find the probability of event A OR B	Lesson Check/Lesson Quiz: Page 691. Problem solving Homework Summative Test	Dependent events Independent events Mutually exclusive events

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A2.S-CP.B.6. Use Bayes Rule to 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. A2.S-CP.B.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. A2.S-CP.A.3. Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, 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.	Lesson 4 Conditional Probability	I will find conditional probabilities. I will use tables and tree diagrams to determine conditional probabilities.	Lesson Check/Lesson Quiz: Page 700. Problem solving Homework Summative Test		
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A2.S-CP.A.4. 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. A2.S-CP.A.5. Recognize and explain the concepts of conditional probability and independence utilizing real-world context.					
A2.S-ID.C.10. Interpret parameters of exponential models.	Lesson 5	I will use probabilities to make fair decisions and analyze decisions.	Lesson Check/Lesson Quiz: Page 707. Problem solving Homework Summative Test		Probability models

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A2.S-ID.B.6. Represent data of two quantitative variables on a scatter plot, and describe how the quantities are related. Extend to polynomial and exponential models. 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 chooses a function suggested by the context.	Lesson 6. Analyzing Data	I will calculate measures of central tendency. I will draw and interpret box and whisker plots.	Lesson Check/Lesson Quiz: Page 715. Problem solving Homework Summative Test		
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A2.S-ID.A.4. Use the mean and standard deviation of a data set to fit it to a normal curve, and use properties of the normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, or tables to estimate areas under the normal curve.	Lesson 7 Standard Deviation	I will find the standard deviation and variance of a set of values.	Lesson Check/Lesson Quiz: Page 722. Problem solving Homework Summative Test		Measure of variation Variance Standard deviation
	Lesson 10 Normal Distribution	I will use the mean and standard deviation of a data set to fit it to a normal curve. I will use the properties of the normal distribution and to estimate of data that fall under the normal curve: 68%-99%-99.7% (population percentages).			Discrete probability distribution Continuous probability distribution Normal distribution

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SUBJECT: Algebra 2

GRADE: 11

TIMELINE: Quarter 4

Theme/Big Ideas for this Unit: PERIODIC FUNCTIONS & TRIGONOMETRY

Essential Questions for this Unit:

1. How can you model periodic behavior?
2. What function has as its graph a sine curve with amplitude 4 period π , and a minimum at the origin?
3. If you know the value of $\sin \theta$, how can you find $\cos \theta$, $\tan \theta$, $\csc \theta$, $\sec \theta$, and $\cot \theta$?

Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
A2.F-IF.B.4. 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. Include problem-solving opportunities utilizing a real-world context. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions.	Lesson 13-1	I will identify cycles and periods of periodic functions. I will find the amplitude of periodic functions.	Lesson Check/Lesson Quiz: Page 831. Problem solving Homework Summative Test	Charles, R. et. Al. (2015). Algebra 2 Common Core. Pearson Education and Associates. P.828-882. <u>Savvas</u> <u>Realize;</u> <u>MathxL</u>	Periodic function Cycle Period Amplitude

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A2.F-TF.A.2. Explain how the unit circle in the coordinate plane enables the extension of sine and cosine functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	Lesson 13-2 Angles and the Unit Circle	I will work with angles in standard position. I will find coordinates of points on the unit circle.	Lesson Check/Lesson Quiz: Page 840. Problem solving Homework Summative Test	Standard position Initial side Terminal side Coterminal angles Unit circle Cosine θ Sine θ
A2.F-TF.A.1. Understand radian measure of an angle as the length of the arc on any circle subtended by the angle, measured in units of the circle's radius.	Lesson 13-3 Radian Measure	I will use radian measure for angles. I will find the length of an arc of a circle	Lesson Check/Lesson Quiz: Page 847. Problem solving Homework Summative Test	Central angle Intercepted arc radian

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A2.F-TF.B.5. Create and interpret sine, cosine and tangent functions that model periodic phenomena with specified amplitude, frequency, and midline.	Lesson 13-4 The Sine Function	I will identify the properties of the sine function. I will graph the sine curves.	Lesson Check/Lesson Quiz: Page 855. Problem solving Homework Summative Test	Sine function Sine curve
	Lesson 13-5 The cosine Function	I will graph and write cosine functions. I will solve trigonometric equations.	Lesson Check/Lesson Quiz: Page 855. Problem solving Homework Summative Test	Cosine function
	Lesson 6 Tangent Function	I will graph the tangent function.	Lesson Check/Lesson Quiz: Page 871. Problem solving Homework Summative Test	Tangent of θ Tangent function
	Lesson 7 Translating Sine and Cosine Function	I will graph translations of trigonometric functions. I will write equations of translations.	Lesson Check/Lesson Quiz: Page 880. Problem solving.	Phase shift
A2.F-IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Functions include linear, quadratic, exponential, polynomial, logarithmic, rational, sine, cosine, tangent, square root, cube root and piecewise-defined functions.			Homework Summative Test	

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SUBJECT: Algebra 2

GRADE: 11

TIMELINE: Quarter 4

Theme/Big Ideas for this Unit: TRIGONOMETRIC IDENTITIES & EQUATIONS (EQUIVALENCE & FUNCTIONS)

Essential Questions for this Unit:

1. How do you verify that an equation involving the variable x is an identity?
2. A trigonometric function correspond one number to many, so how can its inverse be a function?
3. How do the trigonometric functions relate to the trigonometric ratios for a right triangle?

Standards	Content	Student Friendly Objectives	Assessment	Resources	Vocabulary
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A2.F-TF.C.8. Use the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and the quadrant of the angle θ to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$ or $\cos(\theta)$.	Lesson 14-1 Trigonometric Identities	I will verify trigonometric identities	Lesson Check/Lesson Quiz: Page 908. Problem solving Homework Summative Test	Charles, R. et. Al. (2015). Algebra 2 Common Core. Pearson Education and Associates. P.904-.	Trigonometric identity
	Lesson 14-6 Angle Identities	I will verify and use angle identities. I will verify and use sum and difference identities.	Lesson Check/Lesson Quiz: Page 948. Problem solving Homework Summative Test	<u>Savvas</u> <u>Realize;</u> <u>MathxL</u>	