HARFORD COUNTY PUBLIC SCHOOLS
ALGEBRA II CURRICULUM

CLICK HERE for the Maryland College and Career Ready Standards for Algebra II.

Topic 1: Linear Functions and Systems

Primary Resource: *enVisionmath Algebra 2,* Pearson Savvas, 2024.

Enduring Understandings

- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns each member of one set to a unique member of the other set.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.
- Relationships can be described and generalizations made for mathematical situations that have numbers or objects that repeat in predictable ways.

Essential Question

- What are the ways in which functions can be used to represent and solve problems involving quantities?

Lesson Title	Lesson Overview	Standards * Modeling standard + Standard beyond Alg II
Key Features of Functions	Students will • identify key features of a graph of a function, including the intercepts, positive and negative intervals, and areas where the function is increasing or decreasing. calculate and interpret the average rate of change of a function over a specified interval. • write the domain and range of functions using set-builder and interval notations	F.IF.B.4 * F.IF.B.5 * F.IF.B.6 * F.IF.C.7 * SMP.3 SMP.4 * SMP.6

Transformations of Functions	Students will • graph a transformed function by identifying the effect on the graph of replacing $f(x)$ by $f(x)+k$, $kf(x)$, $f(kx)$, and $f(x+k)$. • write an equation of a transformed function. • relate the domain of a function to its graph and the real-world situation function it describes.	F.BF.B.3 F.IF.B.5 * SMP.4 * SMP.5 SMP.7
Piecewise-defined Functions	Students will • create and graph piecewise-defined functions, including absolute value functions and step functions. • create and use a piecewise-defined function from real-world data. • write a piecewise-defined rule from a graph.	F.IF.B.5 * F.IF.C.7b * F.LE.A.2 SMP.3 SMP.6 SMP.7
Arithmetic Sequences and Series	Consider assessing student knowledge with a short quiz. Students will • identify the common difference in an arithmetic sequence. • write arithmetic sequences, both recursively and with an explicit formula. • construct arithmetic sequences, given a graph, a description of a relationship, or two input-output pairs.	F.IF.A.3 F.BF.A.1 * F.BF.A.1a * F.BF.B.2 * F.LE.A.2 SMP.3 SMP.4 * SMP.7
Solving Equations and Inequalities by Graphing	Students will • use graphs, tables, and graphing technology to find or approximate solutions to equations and inequalities. • find approximate solutions to equations and inequalities by setting each expression equal to y and graphing.	A.CED.A.1 * A.REI.D.11 * SMP.3 SMP.5 SMP.7

Linear Systems	Students will • solve linear systems graphically and algebraically. • identify regions that satisfy systems of inequalities.	A.CED.A.3 * A.REI.C.6 SMP.1 SMP.2 SMP.7
Mathematical Modeling in 3 Acts: **Current Events**	Students will • use mathematical modeling to represent a problem situation and to propose a solution. • test and verify the appropriateness of their math models. • explain why the results from their mathematical models might not align exactly with the problem situation.	A.CED.A.2 * A.CED.A.3 * A.REI.C.6 SMP.4 *

Topic 2: Quadratic Functions and Equations

Primary Resource: *enVisionmath Algebra 2,* Pearson Savvas, 2024.

Enduring Understandings

- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns each member of one set to a unique member of the other set.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.
- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.

Essential Question

- How do you use quadratic functions to model situations and solve problems?

Lesson Title	Lesson Overview	Standards * Modeling standard + Standard beyond Alg II
Vertex Form of a Quadratic Function	Students will: • create quadratic functions in vertex form to represent relationships between variables as shown in their graphs. • graph functions on coordinate axes using their key features. • interpret key features of the graph of a quadratic function.	A.CED.A.2 * F.IF.B.4 * F.BF.B.3 SMP.1 SMP.7
Standard Form of a Quadratic Function	Students will: • create quadratic functions written in standard form. • identify key features of quadratic functions and graph a quadratic function written in standard form.	A.CED.A.2 * F.IF.B.4 * S.ID.B.6a SMP.4 * SMP.7

Factored Form of a Quadratic Function	Students will: • write a quadratic equation in factored form and use it to identify the zeros of the function it defines. • determine the intervals over which a quadratic function is positive or negative.	A.APR.B.3 * A.SSE.A.2 A.SSE.B.3a * SMP.1 SMP.7
Complex Numbers and Operations	Students will: • add, subtract, and multiply complex numbers using the properties of operations and the relation of $i^2 = -1$. • use complex numbers to represent numbers that are not on the real number line.	N.CN.A.1 N.CN.A.2 N.CN.A.3 (+) SMP.4 * SMP.8
Mathematical Modeling in 3 Acts: **Swift Kick**	Students will: • use mathematical modeling to represent a problem situation and to propose a solution. • test and verify the appropriateness of their math models. • explain why the results from other mathematical models might not align exactly with the problem situation.	F.BF.A.1a * F.IF.B.4 * A.CED.A.2 * SMP.4 *
Completing the Square	Students will: • transform a quadratic equation into the form $(x - p)^2 = q$ by completing the square. • complete the square to reveal the minimum or maximum value of a quadratic expression.	A.REI.B.4a SMP.3 SMP.6
The Quadratic Formula	Students will: • use the Quadratic Formula to solve quadratic equations that have complex solutions.	N.CN.C.7 A.REI.B.4a A.REI.B.4b SMP.3 SMP.5

Linear-Quadratic Systems	Students will: • use algebra to solve a linear-quadratic system. • solve a linear-quadratic system using graphing and explain why the points of intersection are the solutions.	A.REI.C.7 A.REI.D.11 * SMP.3 SMP.7

Topic 3: Polynomial Functions

Primary Resource: *enVisionmath Algebra 2,* Pearson Savvas, 2024.

Enduring Understandings

- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns each member of one set to a unique member of the other set.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.
- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.

Essential Questions

- What can an equation for a polynomial function tell about its graph?
- What can a graph of a polynomial function tell about the solutions of a polynomial equation?

Lesson Title	Lesson Overview	Standards * Modeling standard + Standard beyond Alg II
Graphing Polynomial Functions	Students will: • graph polynomial functions and show the key features of the graphs. • predict the end behavior of polynomial functions by interpreting the leading coefficients and degrees. • sketch graphs showing key features, given a verbal description.	F.IF.B.4 * F.IF.C.7c F.IF.B.6 * SMP.5 SMP.7
Adding, Subtracting, and Multiplying Polynomials	Students will: • add, subtract, and multiply polynomials and understand that polynomials are closed under these operations. • compare a polynomial function represented algebraically with one represented graphically.	A.APR.A.1 F.IF.C.9 F.BF.A.1b SMP.2 SMP.3

Polynomial Identities	Students will: • prove polynomial identities and use them to multiply and factor polynomials. • expand binomials using the Binomial Theorem and coefficients determined by Pascal's Triangle.	A.APR.C.4 A.APR.C.5 (+) A.SSE.A.1a * A.SSE.A.1b * A.SSE.A.2 SMP.2 SMP.7
Dividing Polynomials	Students will: • divide polynomial expressions using long division. • use synthetic division to rewrite rational expressions.	A.APR.B.2 A.APR.D.6 A.SSE.A.2 SMP.2 SMP.6
Zeros of Polynomial Functions	Students will: • identify the zeros of a function by factoring or using synthetic division. • use the zeros of a polynomial function to sketch its graph.	A.APR.B.3 F.IF.C.7c * A.SSE.A.2 SMP.7 SMP.8
Mathematical Modeling in 3 Acts: **What Are the Rules?**	Students will: • use mathematical modeling to represent a problem situation and to propose a solution. • test and verify the appropriateness of their math models • explain why the results from their mathematical models might not align exactly with the problem situation.	A.SSE.A.2 A.APR.B.3 SMP.4 *

Theorems About Roots of Polynomial Equations	Students will: • extend polynomial theorems and identities to find the real and complex solutions of a polynomial equation. • write polynomial functions using conjugates.	N.CN.C.8 (+) N.CN.C.9 (+) A.APR.B.2 A.APR.B.3 SMP.2 SMP.7
Transformations of Polynomial Functions	Students will: • recognize even and odd functions from their graphs and algebraic equations. • identify the effect on the graphs of cubic and quartic functions of replacing $f(x)$ with $f(x)+k$, $kf(x)$, $f(kx)$, and $f(x+k)$.	F.BF.B.3 SMP.3 SMP.7

Topic 4: Rational Functions

Primary Resource: *enVisionmath Algebra 2,* Pearson Savvas, 2024.

Enduring Understandings

- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns each member of one set to a unique member of the other set.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.
- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.

Essential Question

- What are rational functions, and what are the key features of their graphs?

Lesson Title	Lesson Overview	Standards * Modeling standard + Standard beyond Alg II
Inverse Variation and the Reciprocal Function	Students will: • use inverse variation to write and graph the reciprocal function. • identify the effect of transformations on the graph of the reciprocal function and define the effects of h and k on the function $f(x) = \frac{1}{x-h} + k$.	F.BF.B.3 A.CED.A.2 * F.IF.C.7d (+) * SMP.1
Graphing Rational Functions	Students will: • graph rational functions by identifying asymptotes and end behavior. • rewrite simple rational expressions in different forms using long division.	F.IF.C.7d (+) * A.APR.D.6 A.SSE.A.1a * A.SSE.A.1b * SMP.2 SMP.7

Multiplying and Dividing Rational Expressions	Students will: • use the structure of rational expressions to rewrite simple rational expressions in different forms. • understand that rational expressions form a system analogous to the system of rational numbers and use that understanding to multiply and divide rational expressions.	A.APR.D.6 A.APR.D.7 (+) A.SSE.A.2 SMP.6 SMP.7
Adding and Subtracting Rational Expressions	Students will: • understand that rational expressions form a system analogous to the system of rational numbers and use that understanding to add and subtract rational expressions.	A.SSE.A.2 A.APR.D.7 (+) SMP.5 SMP.7
Solving Rational Equations	Students will: • solve rational equations in one variable. • identify extraneous solutions to rational equations and give examples of how they arise.	A.REI.A.1 A.REI.A.2 A.CED.A.1 * SMP.1 SMP.7
Mathematical Modeling in 3 Acts: **Real Cool Waters**	Students will: • use mathematical modeling to represent a problem situation and to propose a solution. • test and verify the appropriateness of their math models. • explain why the results from their mathematical models might not align exactly with the problem situation.	A.CED.A.1 * A.REI.A.1 A.REI.B.3 SMP.4 *

Topic 5: Rational Exponents and Radical Functions

Primary Resource: *enVisionmath Algebra 2,* Pearson Savvas, 2024.

Enduring Understandings

- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns each member of one set to a unique member of the other set.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.
- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.

Essential Question

- How are rational exponents and radical equations used to solve real-world problems?

Lesson Title	Lesson Overview	Standards * Modeling standard + Standard beyond Alg II
n^{th} Roots, Radicals, and Rational Exponents	Students will: • use properties of exponents to rewrite expressions involving radicals in terms of rational exponents. • find all real n^{th} roots of a number. • evaluate expressions with rational exponents. • use n^{th} roots to solve equations by rewriting expressions using the properties of exponents.	N.RN.A.1 N.RN.A.2 A.REI.A.1 SMP.1 SMP.5
Properties of Exponents and Radicals	Students will: • use the properties of exponents and radicals to identify ways to rewrite radical expressions. • interpret radical expressional that represent a quantity in terms of its context.	N.RN.A.2 A.SSE.A.2 SMP.2 SMP.7

Graphing Radical Functions	Students will: • graph radical functions, including square root and cube root functions. • identify the effect of transformations on the key features of the graphs of radical functions.	F.IF.C.7b F.BF.B.3 F.IF.B.4 F.IF.C.6 SMP.2 SMP.7
Solving Radical Equations	Students will: • solve radical equations in one variable. • explain how extraneous solutions may arise when solving radical equations. • solve radical inequalities and apply the solution within a real-world context.	A.REIA.1 A.REI.A.2 A.CED.A.4 * SMP.3 SMP.7
Mathematical Modeling in 3 Acts: **The Snack Shack**	Students will: • use mathematical modeling to represent a problem situation and to propose a solution. • test and verify the appropriateness of their math models. • explain why the results from their mathematical models might not align exactly with the problem situation.	A.REI.A.2 A.CED.A.1 * A.CED.A.4 * SMP.4 *
Function Operations	Students will: • combine functions by addition, subtraction, multiplication, or division and identify the domain of the result.	F.BF.A.1b * F.BF.A.1c (+) SMP.6 SMP.7

Inverse Relations and Functions	Students will: • use tables, graphs, and equations to represent the inverse of a relation. • write an equation for the inverse of a function by restricting the domain. • verify that one function is the inverse of another, using composition.	F.BF.B.4 F.BF.B.4a F.BF.B.4b F.BF.B.4c F.BF.B.4d SMP.2 SMP.7

Topic 6: Exponential and Logarithmic Functions

Primary Resource: *enVisionmath Algebra 2,* Pearson Savvas, 2024.

Enduring Understandings

- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns each member of one set to a unique member of the other set.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.
- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.

Essential Question

- How do you use exponential and logarithmic functions to model situations and solve problems?

Lesson Title	Lesson Overview	Standards * Modeling standard + Standard beyond Alg II
Key Features of Exponential Functions	Students will: • interpret key features of exponential functions represented by graphs, tables, and equations. • graph transformations of exponential functions showing intercepts and end behavior. • model quantities that increase or decrease by a fixed percent each time period using exponential functions.	F.IF.B.4 * F.IF.C.7e * F.BF.B.3 F.LE.A.2 * F.LE.B.5 * SMP.4 * SMP.7

Exponential Models	Students will: • rewrite exponential functions to identify rates. • interpret the parameters of an exponential function within the context of compound interest problems. • construct exponential models given two points or by using regression.	A.SSE.B.3c * F.IF.C.8 F.IF.C.8b F.LE.A.2 * F.LE.B.5 * S.ID.B.6.A SMP.1 SMP.4 *
Mathematical Modeling in 3 Acts: **The Crazy Conditioning**	Students will: • use mathematical modeling to represent a problem situation and to propose a solution. • test and verify the appropriateness of their math models. • explain why the results from their mathematical models might not align exactly with the problem situation.	F.LE.B.5 * S.ID.B.6a SMP.4 *
Logarithms	Students will: • understand the inverse relationship between exponents and logarithms. • use logarithms to solve exponential models. • evaluate logarithms using technology.	F.BF.B.4a F.BF.B.5 (+) F.LE.A.4 * SMP.2 SMP.7
Logarithmic Function	Students will: • graph logarithmic functions and interpret their key features. • write and interpret the inverses of exponential and logarithmic functions.	F.BF.B.3 F.IF.C.7e * F.BF.B.4 F.BF.B.4a F.BF.B.4c (+) SMP.4 * SMP.7

Properties of Logarithms	Students will: • use Properties of Logarithms to rewrite logarithmic expressions. • use the Change of Base Formula to evaluate logarithmic expressions and solve equations.	A.SSE.A.2 A.REI.A.1 F.LE.A.4 * SMP.2 SMP.7
Exponential and Logarithmic Equations	Students will: • use logarithms to express the solutions to exponential models. • solve exponential and logarithmic equations.	A.SSE.A.2 A.CED.A.1 * A.REI.A.1 F.LE.A.4 * SMP.2 SMP.7
Geometric Sequences and Series	Students will: • construct a geometric sequence given a graph, table, or description of a relationship. • translate between geometric sequences written in recursive and explicit forms. • use the formula for the sum of a finite geometric series to solve problems.	F.LE.A.2 * A.SSE.B.4 * F.IF.A.3 F.BF.A.1 * F.BF.A.1a * F.BF.A.2 * SMP.2

Topic 7: Trigonometric Functions

Primary Resource: *enVisionmath Algebra 2,* Pearson Savvas, 2024.

Enduring Understandings

- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns each member of one set to a unique member of the other set.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.
- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.

Essential Question

- How are trigonometric functions used to solve real-world problems?

Lesson Title	Lesson Overview	Standards * Modeling standard + Standard beyond Alg II
Angles and the Unit Circle	Students will: • find the measures of an angle in standard position. • use radian measure on the unit circle to find arc length. • convert between degrees and radians.	F.TF.A.1 F.TF.A.2 SMP.2 SMP.5
Evaluating Trigonometric Functions	Students will: • understand reference angles in the unit circle. • use reference angles to evaluate trigonometric functions and their reciprocal functions. • use the Pythagorean Identity to find the sine, cosine, and quadrant of an angle.	F.TF.A.2 F.TF.A.3 (+) F.TF.C.8 SMP.2 SMP.7

Graphing Sine and Cosine Functions	Students will: • graph and identify the key features of sine and cosine functions. • understand how a change in parameter affects the sine and cosine graphs. • compare key features of different periodic functions.	F.IF.B.4 * F.IF.C.7e * F.IF.C.9 F.BF.B.3 F.TF.A.4 (+) F.TF.B.5 * SMP.4 * SMP.7
Mathematical Modeling in 3 Acts: **What Note Was That?**	Students will: • use mathematical modeling to represent a problem situation and to propose a solution. • test and verify the appropriateness of the math models. • explain why the results from the mathematical models might not align exactly with the problem situation.	F.IF.B.4 * F.IF.C.7e * SMP.4 *
Translating Trigonometric Functions	Students will: • identify how changing the parameters of the sine or cosine function affects the graph of the function. • use trigonometric functions to model situations with specified amplitude, frequency, and midline.	F.IF.B.4 * F.BF.B.3 F.TF.B.5 * SMP.7 SMP.8
Graphing Other Trigonometric Functions	Students will: • describe and compare key features of the graphs of trigonometric functions.** • graph functions of the form $f(x) = a \cdot \tan(bx)$ and relate the graph of a function to the graph of the parent function.	F.IF.B.4 * F.BF.B.3 F.TF.B.5 * SMP.7 SMP.8

Topic 8: Trigonometric Equations

Primary Resource: *enVisionmath Algebra 2,* Pearson Savvas, 2024.

Enduring Understandings

- Basic facts and algorithms for operations with rational functions use notions of equivalence to transform calculations into simpler ones.
- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns each member of one set to a unique member of the other set.

Essential Question

- How can you use an inverse function to find all the solutions of a trigonometric equation?

Lesson Title	Lesson Overview	Standards * Modeling standard + Standard beyond Alg II
Solving Trigonometric Equations Using Inverses	Students will: • define and evaluate inverse trigonometric functions. • solve trigonometric equations using inverse functions and interpret the solutions within a modeling context.	F.BF.B.4d (+) F.TF.B.6 (+) F.TF.B.7 (+) * SMP.5 SMP.7
Mathematical Modeling in 3 Acts: **Ramp Up Your Design**	Students will: • use mathematical modeling to represent a problem situation and to propose a solution. • test and verify the appropriateness of their math models. • explain why the results from their mathematical models might not align exactly with the problem situation.	F.BF.B.4d (+) F.TF.B.6 (+) F.TF.B.7 (+) * SMP.4 *

Topic 9: Conic Sections

Primary Resource: *enVisionmath Algebra 2,* Pearson Savvas, 2024.

Enduring Understandings

- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns each member of one set to a unique member of the other set.
- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.
- Two-dimensional objects with or without curved surfaces can be described, classified, and analyzed by their attributes.

Essential Questions

- How do the geometric properties of conic sections relate to their algebraic representations?
- How can conic sections model real-world problems?

Lesson Title	Lesson Overview	Standards * Modeling standard + Standard beyond Alg II
Parabolas	Students will: • derive the equation of a parabola. • relate a parabola's focal length to its equation. • rewrite an expression by completing the square and then use it to find the focus and directrix of a parabola.	G.GPE.A.2 A.SSE.A.2 A.SSE.B.3 * SMP.7 SMP.8
Circles	Students will: • use the center, the radius, and the Pythagorean Theorem to derive the equation of a circle. • write and graph the equation of a circle and use it to model a real-world situation. • find the center and radius of a circle by completing the square. • solve a linear-quadratic system algebraically and verify by graphing.	G.GPE.A.1 A.REI.C.7 A.SSE.B.3 * SMP.4 * SMP.7

Mathematical Modeling in 3 Acts: **Watering the Lawn**	Students will: • use mathematical modeling to represent a problem situation and to propose a solution. • test and verify the appropriateness of their math models. • explain why the results from their mathematical models might not align exactly with the problem situation.	G.GPE.A.1 SMP.4 *
Ellipses	Students will: • derive the equation of an ellipse. • write and graph the equation of an ellipse and use an ellipse to model a real-world situation. • graph a transformed ellipse by completing the square to rewrite the equation in an equivalent form.	G.GPE.A.3 (+) A.SSE.A.2 A.SSE.B.3 * SMP.4 * SMP.8
Hyperbolas	Students will: • use the foci and the Distance Formula to derive an equation of a hyperbola. • write and graph the equation of a hyperbola and use it to model a real-world situation. • determine which conic section is represented by a second-degree equation.	G.GPE.A.3 (+) A.SSE.A.2 A.SSE.B.3 * SMP.1 SMP.7

Topic 10: Matrices

Primary Resource: *enVisionmath Algebra 2,* Pearson Savvas, 2024.

Enduring Understandings

- For a given set of numbers there are relationships that are always true, and these are the rules that govern arithmetic and algebra.
- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.

Essential Question

- How can matrices be used to solve real-world problems?

Lesson Title	Lesson Overview	Standards * Modeling standard + Standard beyond Alg II
Operations with Matrices	Students will: • use a matrix to represent data. • apply scalar multiplication to produce a new matrix. • add and subtract matrices by adding and subtracting the corresponding elements. • translate and dilate figures using matrices.	N.VM.C.6 (+) N.VM.C.7 (+) N.VM.C.8 (+) N.VM.C.12 (+) SMP.4 * SMP.6
Matrix Multiplication	Students will: • multiply two matrices when the number of columns in the first matrix is equal to the number of rows in the second matrix. • understand the identify matrix and recognize that it is similar to the role of 1 in multiplication of real numbers.	N.VM.C.8 (+) N.VM.C.10 (+) N.VM.C.9 (+) SMP.3 SMP.7

Vectors	Students will: • use vectors to represent quantities with both magnitude and direction. • add and subtract vectors graphically, algebraically, and by the Parallelogram Rule. • apply scalar multiplication to produce a new vector. • transform a vector using matrix multiplication.	N.VM.A.1 (+) N.VM.B.4 (+) N.VM.B.5 (+) N.VM.C.11 (+) SMP.2 SMP.7
Inverses and Determinants	Students will: • determine if a matrix has an inverse, and if it does, find it. • use the absolute value of the determinant of a matrix to find the areas of triangles and parallelograms.	A.REI.C.9 (+) N.VM.C.12 (+) N.VM.C.10 (+) SMP.5 SMP.7
Inverse Matrices and Systems of Equations	Students will: • represent a system of equations, in two or three variables, as a single matrix equation. • find the inverse of a matrix and use it to solve a system of linear equations.	A.REI.C.8 (+) A.REI.C.9 (+) A.CED.A.3 * SMP.6 SMP.7
Mathematical Modeling in 3 Acts: **The Big Burger**	Students will: • use mathematical modeling to represent a problem situation and to propose a solution. • test and verify the appropriateness of their math models. • explain why the results from their mathematical models might not align exactly with the problem situation.	N.VM.C.6 (+) A.REI.C.8 (+) SMP.4 *

Topic 11: Data Analysis and Statistics

Primary Resource: *enVisionmath Algebra 2,* Pearson Savvas, 2024.

Enduring Understandings

- Some questions can be answered by collecting and analyzing data, and the question to be answered determines the data that needs to be collected and how best to collect it.
- Data can be represented visually using tables, charts, and graphs. The type of data determines the best choice of visual representation.
- There are special numerical measures that describe the center and spread of numerical data sets.

Essential Question

- What questions can you answer by using statistics and normal distributions?

Lesson Title	Lesson Overview	Standards * Modeling standard + Standard beyond Alg II
Statistical Questions and Variables	Students will: • define and recognize a statistical question. • define and identify the type of statistical variable that is represented by a question or the data represented on a graph. • distinguish between quantities such a population/sample and parameter/statistic for the purpose of descriptive modeling.	N.Q.A.2 (+) * S.IC.A.1 (+) SMP.6 SMP.8
Statistical Studies and Sampling Methods	Students will: • identify experiments, sample surveys, and observational studies. • recognize bias in sampling methods. • identify a sampling method that provides a random sample from a population.	S.IC.A.1 (+) S.IC.B.3 (+) S.IC.B.6 (+) * SMP.1 SMP.3

Data Distributions	Students will: • find measures of center and spread, such as median, mean, interquartile range, and standard deviation. • compare data sets using statistical measures that are appropriate for the distribution of the data.	S.ID.A.1 (+) S.ID.A.2 (+) S.IC.A.2 (+) * SMP.2 SMP.6
Normal Distributions	Students will: • fit a normal distribution to data. • compare and evaluate data values using *z*-scores. • use technology to calculate the area under the standard normal distribution curve.	S.ID.A.3 (+) S.IC.B.6 (+) * SMP.5 SMP.7
Margin of Error	Students will: • evaluate reports by estimating population parameters. • use multiple samples to make an inference about a population. • calculate the margin of error for quantitative or categorical data.	S.IC.A.1 (+) S.IC.A.2 (+) * S.IC.B.4 (+) S.IC.B.6 (+) * SMP.5 SMP.8
Introduction to Hypothesis Testing	Students will: • formulate two hypotheses for a statistical question and test using statistics to draw a conclusion. • use graphs and simulation to determine whether differences between parameters are significant. • use data from a randomized experiment to evaluate a report.	S.IC.A.1 (+) S.IC.B.5 (+) S.IC.B.6 (+) * SMP.5 SMP.6

Mathematical Modeling in 3 Acts: **Mark and Recapture**	Students will: • use mathematical modeling to represent a problem situation and to propose a solution. • test and verify the appropriateness of their math models. • explain why the results from the mathematical models might not align exactly with the problem situation.	S.IC.A.1 (+) S.IC.A.2 (+) * S.IC.B.4 (+) * SMP.4 *

Topic 12: Probability

Primary Resource: *enVisionmath Algebra 2,* Pearson Savvas, 2024.

Enduring Understandings

- The chance of an event occurring can be described numerically by a number between 0 and 1 inclusive and used to make predictions about other events.
- Some questions can be answered by collecting and analyzing data, and the question to be answered determines the data that needs to be collected and how best to collect it.

Essential Question

- How can you find the probability of events and combinations of events?

Lesson Title	Lesson Overview	Standards * Modeling standard + Standard beyond Alg II
Probability Events	Students will: • explain independence of events in everyday language and everyday situations. • determine the probability of the union of two events (A or B) and the intersection of two independent events (A and B)	S.CP.A.2 (+) S.CP.A.1 (+) S.CP.A.5 (+) S.CP.B.7 (+) SMP.2 SMP.3
Conditional Probability	Students will: • understand the conditional probability of A given B as the fraction of outcomes in B that also belong to A. • interpret independence of events using conditional probability. • use a two-way frequency table to decide if events are independent and to approximate conditional probabilities.	S.CP.A.2 (+) S.CP.A.4 (+) S.CP.A.5 (+) S.CP.B.6 (+) S.CP.B.8 (+) SMP.1 SMP.7

Mathematical Modeling in 3 Acts: **Place Your Guess**	Students will: • use mathematical modeling to represent a problem situation and to propose a solution. • test and verify the appropriateness of their math models. • explain why the results from their mathematical models might not align exactly with the problem situation.	S.CP.A.1 (+) S.CP.A.2 (+) SMP.4 *
Permutations and Combinations	Students will: • calculate the number of permutations and combinations in mathematical and real-world contexts. • use permutations and combinations to compute probabilities of compound events and solve problems.	S.CP.B.9 (+) SMP.3 SMP.7
Probability Distributions	Students will: • develop a probability distribution based on theoretical probabilities and empirical data. • graph probability distributions. • calculate probability in binomial experiments.	S.CP.B.9 (+) S.MD.A.1 (+) S.MD.A.3 (+) S.MD.A.4 (+) SMP.2 SMP.4 * SMP.6
Expected Value	Students will: • calculate the expected value in situations involving chance. • weigh the possible outcomes of a decision by comparing expected values and finding expected payoffs.	S.MD.A.2 (+) S.MD.B.5 (+) SMP.2 SMP.3
Probability and Decision Making	Students will: • analyze decisions and evaluate fairness using probability concepts.	S.CP.B.9 (+) S.MD.B.6 (+) S.MD.B.7 (+) SMP.1 SMP.2