Algebra II TNReady State Standards and Objective

Number and Quantity

The Real Number System (N.RN)

A2.N.RN.A.1 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.

- I can evaluate and simplify an expression with a rational exponent.

A2.N.RN.A.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

- I can move flexibly between radical notation and rational exponents.

Quantities* (N.Q)

A2.N.Q.A.1 Identify, interpret, and justify appropriate quantities for the purpose of descriptive modeling.

The Complex Number System (N.CN)

A2.N.CN.A.1 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.

- I can identify that i is a complex number where $i^2 = -1$ and $i = \sqrt{-1}$
- I can identify that a complex number is written in the form $a + bi$ where a and b are real numbers.

A2.N.CN.A.2 Know and use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

- I can simplify the square root of a negative number
- I can add, subtract, and multiply complex numbers.
- I can find powers of i.

A2.N.CN.B.3 Solve quadratic equations with real coefficients that have complex solutions.

- I can solve real-world quadratic problems and identify which answer(s) are appropriate.
- I can solve quadratic equations with real coefficients.
- I can determine when a quadratic equation in standard form, $ax^2 + bx + c$ has complex roots by looking at ta graph or by inspecting the discriminant.

Algebra

Seeing Structure in Expressions (A.SSE)

A2.A.SSE.A.1 Use the structure of an expression to identify ways to rewrite it.

- I can recognize the patterns in the sum and differences of cubes
- I can factor sum and difference of cubic expressions

A2.A.SSE.B.2 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*

a. Use the properties of exponents to rewrite expressions for exponential functions.

- I can rewrite exponential functions using the properties of exponents.

A2.A.SSE.B.3 Recognize a finite geometric series (when the common ratio is not 1), and know and use the sum formula to solve problems ini context.

Arithmetic with Polynomials and Rational Expressions (A.APR)

A2.A.APR.A.1 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).*

- I can explain and apply the Remainder Theorem to check answers when dividing polynomials.
- I understand that *a* is a root of a polynomial function if and only if $x-a$ is a factor of the function.

A2.A.APR.A.2 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.

- I can find the zeros of a polynomial when the polynomial is factored.

A2.A.APR.B.3 Know and use polynomial identities to describe numerical relationships.

- I can multiply polynomials and use the patterns observed in identities such as the difference of squares to multiply polynomials.

A2.A.APR.C.4 Rewrite rational expressions in different forms.

Creating Equations* (A.CED)

A2.A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems.

- I can solve absolute value equations and inequalities.

- I can distinguish between exponential functions that model exponential growth and decay.
- I can compose an original problem situation and construct an exponential function to model it.

A2.A.CED.A.2 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

Reasoning with Equations and Inequalities (A.REI)

A2.A.REI.A.1 Explain each step in solving an 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.

- I can explain steps in solving equations and justify my reasoning

A2.A.REI.A.2 Solve rational and radical equations in one variable, and identify extraneous solutions when they exist.

- I can simplify rational expressions by adding, subtracting, multiplying or dividing.
- I can define extraneous solution.
- I can solve a rational equation in one variable.
- I can determine which numbers cannot be solutions of a rational equation and explain why they cannot be solutions.
- I can solve an equation containing radicals
- I can solve an equation containing rational exponents.
- I can determine which numbers cannot be solutions of a radical equation and explain why they cannot be solutions

A2.A.REI.B.3 Solve quadratic equations and inequalities in one variable.

- I can solve quadratic equations by taking square roots
- I can solve quadratic equations by factoring
- I can solve quadratic equations by completing the square
- I can solve quadratic equations using the quadratic formula
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A2.A.REI.C.4 Write and solve a system of linear equations in context.

- I can write systems of equations to solve real-world problems.

A2.A.REI.C.5 Solve a system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.

- I can solve a system containing a linear equation and a quadratic equation graphically
- I can solve a system containing a linear equation and a quadratic equation algebraically

A2.A.REI.D.6 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 approximate solutions using technology.

- I understand that the intersection of two equations is the solution to the system of equations
- I can find the intersection of any two functions using graphing technology.

Functions

Interpreting Functions (F.IF)

A2. F.IF.A.1 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.

- I can view graphs as relationships between quantities and identify the following when given a graph:
    - Vertex
    - Maximum of minimum
    - Axis of symmetry
    - Domain and range of quadratic functions
    - Intercepts
    - Increasing and decreasing intervals
    - Relative maximums and minimums
    - End behavior

A2.F.IF.A.2 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.

- I can calculate and estimate the rate of change from a graph.

A2.F.IF.B.3 Graph functions expressed symbolically and show key features of the graph, by hand and using technology.

a. Graph square root , cube root, and piecewise defined functions, including step functions and absolute value functions.
b. Graph polynomial functions, identifying zeros when suitable factorizations are available and showing end behavior.
c. Graph exponential and logarithmic functions, showing intercepts and end behavior.
    - I can name the vertex, max or min, and the x and y intercepts of a quadratic and a polynomial function.
    - I can graph a quadratic and a polynomial function by hand and using technology.

- I can name the vertex, max or min, and the x and y intercepts of an absolute value function. I can graph an absolute value function by hand and using technology.
- I can graph polynomial functions in both standard and vertex form and identify key features using inspection and technology.
- I can graph exponential and logarithmic functions and identify
    - Intercepts
    - End behavior

A2.F.IF.B.4 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

a. Know and use the properties of exponents to interpret expressions for exponential functions.

- I can use the properties of logarithms to condense and expand expressions.
- I can solve exponential and logarithmic equations.
- I can use properties of exponents to rewrite an exponential function to emphasize one of its properties.
- I can define an exponential function, f(x) = abx .

A2.F.IF.B.5 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

- I can compare properties of two functions when represented in different ways (algebraically, graphically, numerically in tables or by verbal descriptions).

Building Functions (F.BF)

A2.F.BF.A.1 Write a function that describes a relationship between two quantities.

a. Determine an explicit expression, a recursive process, or steps for calculation from a context.

b. Combine standard function types using arithmetic operations.

- I can write an explicit and/or recursive expression of a function to describe a real-world problem.
- I can combine different parent functions to write a function that describes a real-world problem.

A2.F.BF.A.2 Know and write arithmetic and geometric sequences with an explicit formula and use them to model situations.

- I can write a recursive and explicit formula for an arithmetic or geometric sequence
- I can differentiate between arithmetic and geometric sequences.
- I can decide when a real world problem models an arithmetic or geometric sequence and write an equation to model the situation.

A2.F.BF.B.3 Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(k)x), 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.

- I can graph and analyze exponential growth and decay functions.
- I can graph and analyze functions with base e.
- I can identify the effect on a graph from a constant k. (i.e. $f(x) + k$, $f(kx)$, k f(x), and $f(x + k)$) whether k is positive or negative.
- I can identify and explain the difference between an even and odd function.
- I can graph a cubic function

A2.F.BF.B.4 Find inverse functions

a. Find the inverse of a function when the given function is one-to-one.
    - I can write the inverse of a function by solving f(x) = c for x.
    - I can write the inverse of a function by interchanging the values of the x and y values and solving for y
    - I can verify that one function is the inverse of another by using the composition of functions,
    - I can find the inverses of simple quadratic and cubic functions.

Linear, Quadratic, and Exponential Models (F.LE)

A2.F.LE.A.1 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a table, a description of a relationship, or two input-output pairs

- I can apply compound interest problems to exponential functions.

A2.F.LE.A.2 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.

- I can translate between exponential and logarithmic forms.

A2.F.LE.B.3 Interpret the parameters in a linear or exponential function in terms of a context.

- I can explain the meaning (using appropriate units) of the constants a,b,c and the y-intercept in the exponential function, f(x) =a*bx +c.

Trigonometric Functions (F.TF.)

A2.F.TF.A.1 Understand and use radian measure of an angle.

a. Understand radian measure of an angel as the length of the arc on the unit circle subtended by the angle.
b. Use the unit circle to find $sin\,\theta,\ cos\,\theta,\ and\ tan\,\theta$ when θ is a commonly recognized angle between 0 and 2Π.
    - I can define a unit circle, a central angle and an intercepted arc.
    - I can define the radian measure of an angle.

A2.F.TF.A.2 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.

- I can find the values of trigonometric functions on the unit circle.
- I can define coterminal angles.
- I can use reference angles to evaluate trigonometric ratios.
- I can draw positive or negative angles in standard position using radians or degrees.

A2.F.TF.B.3 Know and use trigonometric identities to find values of trig functions.

a. Given a point on a circle centered at the origin, recognize and use the right triangle ratio definitions of $sin\,\theta,\ cos\,\theta,$ and $tan\,\theta$ to evaluate the trigonometric functions.
b. Given the quadrant of the angle, use the identity $sin^2\,\theta + cos^2\,\theta = 1$ to find $sin\,\theta$ given $cos\,\theta$, or vice versa.
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Statistics and Probability

Interpreting Categorical and Quantitative Data (S.ID)

A2.S.ID.A.1 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages using the Empirical Rule.

- I can calculate the mean and standard deviation for a set of data.
- I can apply the 68-95-99.7 rule for the normal distribution.

A2.S.ID.B.2 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data.
    - I can write a prediction equation for a set of data
    - I can use prediction equation to make predictions.
    - I can find the correlation coefficient for a set of data.
    - I can determine how well a line-of-fit model's data.

Making Inferences and Justifying Conclusions (S.IC)

A2.S.IC.A.1 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

- I can identify situations as sample survey, experiment, or observational study and can discuss the importance of randomization in these processes.
- I can explain why randomization is used to draw a sample that represents a population well.

A2.S.IC.A.2 Use data from a sample survey to estimate a population mean or proportion; use a given margin of error to solve a problem in context.

- I can estimate the total population values including the margin of error using sample means.

Conditional Probability and the Rules of Probability (S.CP)

A2.S.CP.A.1 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").

- I can define a sample space and events within the sample space.
- I can identify subsets within a sample space.
- I can give examples of unions, intersections and complements of sets and events/

A2.S.CP.A.2 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.

- I can identify two events as independent or not.
- I can predict if two events are independent, explain my reasoning, and verify my statement by calculating probabilities.

A2.S.CP.A.3 Know and 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*.

- I can calculate conditional probability.
- I can calculate simple conditional probability based on the data.

A2.S.CP.A.4 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

- I can collect data about students in my school
- I can organize the data in a chart.
- I can calculate the probability of independent and dependent events.

- I can determine if the events are dependent or independent.
- I can interpret probability based on the context of the given problem.

A2.S.CP.B.5 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.

- I can calculate the probability of an event.

A2.S.CP.B.6 Know and apply the Addition Rule, *P(A or B) = P(A) + P(B) - P(A and B)*, and interpret the answer in terms of the model.

- I can apply the addition rule to two events and interpret the results in terms of the context.
- I can choose a probability model for a problem situation.