# Algebra II Yearlong Mathematics Map

| **Resources:** Approved from Board of Education | | | | **Assessments:** PARCC Assessments, District Benchmark Assessments | | |
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**Common Core State Standards – Standards for Mathematical Practice:**

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| 1. Make sense of problems and persevere in solving them. | 2. Reason abstractly and quantitatively. |
| 3. Construct viable arguments and critique the reasoning of others. | 4. Model with mathematics. |
| 5. Use appropriate tools strategically. | 6. Attend to precision. |
| 7. Look for and make use of structure. | 8. Look for and express regularity in repeated reasoning. |

| Conceptual Category | Domain | Cluster | Common Core Standard | Content | Skills | Academic Vocabulary |
|---|---|---|---|---|---|---|
| N | CN | Perform arithmetic operations with complex numbers. | N-CN.1 Know there is a complex number i such that $i^2 = -1$, and every complex number has the form a + b$i$ with a and b real. | Complex Numbers in Standard Form | N-CN.1 Recognize there is a complex number $i$ | imaginary number |
| N | CN | Perform arithmetic operations with complex numbers. | N-CN.1 Know there is a complex number i such that $i^2 = -1$, and every complex number has the form a + b$i$ with a and b real. | Complex Numbers in Standard Form | N-CN.1 Write complex numbers in the form a+b$i$ | standard form of a complex number |
| N | CN | Perform arithmetic operations with complex numbers. | N-CN.2 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. | Arithmetic operations with Complex Numbers | N-CN.2 Apply the commutative, associative, and distributive properties to operations involving complex numbers | complex conjugate |
| N | CN | Use complex numbers in polynomial identities and equations. | N-CN.7 Solve quadratic equations with real coefficients that have complex solutions. | Complex Solutions in Polynomials | N-CN.7 Solve quadratic equations with real coefficients that have complex solutions | imaginary roots; irrational roots; rational roots; *discriminant* |
| N | CN | Use complex numbers in polynomial identities and equations. | N-CN.8 (+) Extend polynomial identities to the complex numbers. For example, rewrite x2 + 4 as (x + 2i)(x − 2i). | Complex Numbers in Polynomials | N-CN.8 Rewrite polynomials in factored form that involve complex numbers | Sum of squares |
| N | CN | Use complex numbers in polynomial identities and equations. | N-CN.9 (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials. | Complex Numbers in Polynomials | N-CN.9 Prove that the Fundamental Theorem of Algebra is true for quadratic polynomials | Fundamental Theorem of Algebra; multiple roots |

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|---|---|---|---|---|---|---|
| A | SSE | Interpret the structure of expressions. | A-SSE.1 Interpret expressions that represent a quantity in terms of its context.★ | Polynomial Expressions | A-SSE.1 Model expressions that represent a quantity in terms of its context | |
| A | SSE | Interpret the structure of expressions. | A-SSE.1a Interpret parts of an expression, such as terms, factors, and coefficients. | Polynomial Expressions | A-SSE.1a Interpret parts of an expression, such as terms, factors, and coefficients | *degree; leading coefficient, quadratic,* cubic, quartic |
| A | SSE | Interpret the structure of expressions. | A-SSE.1b 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. | Polynomial Expressions | A-SSE.1b Describe each entity of a complicated expression | decay factor; growth factor |
| A | SSE | Interpret the structure of expressions. | A-SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2). | Polynomial Expressions | A-SSE.2 Recognize equivalent forms of expressions | Sum of cubes, difference of cubes, *difference of two squares, completing the square* |
| A | SSE | Write expressions in equivalent forms to solve problems. | A-SSE.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. For example, calculate mortgage payments.★ | Polynomial Expressions | A-SSE.4 Derive the formula for the sum of a finite geometric series | *geometric series;* finite differences; *arithmetic series* |
| A | SSE | Write expressions in equivalent forms to solve problems. | A-SSE.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. For example, calculate mortgage payments.★ | Polynomial Expressions | A-SSE.4 Apply the formula for the sum of a finite geometric series to solve problems | |
| A | APR | Perform arithmetic operations on polynomials. | A-APR.1 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. | Arithmetic Operations on Polynomial Expressions | A-APR.1 Perform addition, subtraction and multiplication on polynomials. | |

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|---|---|---|---|---|---|---|
| A | APR | Perform arithmetic operations on polynomials. | A-APR.1 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. | Arithmetic Operations on Polynomial Expressions | A-APR.1 Compare operations on polynomials to operations on other systems such as integers | |
| A | APR | Understand the relationship between zeros and factors of polynomials. | A-APR.2 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). | Factors of Polynomial Expressions | A-APR.2 State and apply the Remainder theorem | Remainder Theorem |
| A | APR | Understand the relationship between zeros and factors of polynomials. | A-APR.2 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). | Factors of Polynomial Expressions | A-APR.2 Recognize the relationship between zeros and factors of a polynomial | roots |
| A | APR | Understand the relationship between zeros and factors of polynomials. | A-APR.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. | Zeros of Polynomial Equations | A-APR.3 Identify zeros of polynomials given the factorization | multiple roots/double roots; *intercepts;* |
| A | APR | Understand the relationship between zeros and factors of polynomials. | A-APR.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. | Zeros of Polynomial Equations | A-APR.3 Utilize the zeros of a polynomial to construct a rough graph of the function | |
| A | APR | Use polynomial identities to solve problems. | A-APR.4 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. | Identities of Polynomial Expressions | A-APR.4 Prove polynomial identities | sum of cubes, sum of squares, difference of cubes/squares/ quadratic formula |
| A | APR | Use polynomial identities to solve problems. | A-APR.4 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. | Identities of Polynomial Expressions | A-APR.4 Write equivalent forms of polynomial expressions using identities | |

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| A | APR | Use polynomial identities to solve problems. | 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.1 | Polynomial Expressions | A-APR.5 Recognize Pascal's Triangle as the coefficients in binomial expansions | Pascal's Triangle; Binomial Theorem |
| A | APR | Use polynomial identities to solve problems. | 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.2 | Polynomial Expressions | A-APR.5 Expand polynomial expressions using Pascal's triangle | |
| A | APR | Rewrite rational expressions. | A-APR.6 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. | Rational Expressions | A-APR.6 Write equivalent forms of rational expressions | rational expression; long division; *degree* |
| A | APR | Rewrite rational expressions. | 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. | Arithmetic Operations on Rational Expressions | A-APR.7 Apply operations to rational expressions | |
| A | CED | Create equations that describe numbers or relationships. | A-CED.1 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. | Equations and Inequalties in one variable | A-CED.1 Create and use equations in one variable | |
| A | CED | Create equations that describe numbers or relationships. | A-CED.1 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. | Equations and Inequalties in one variable | A-CED.1 Create and use inequalities in one variable | |

| Conceptual Category | Domain | Cluster | Common Core Standard | Content | Skills | Academic Vocabulary |
|---|---|---|---|---|---|---|
| A | CED | Create equations that describe numbers or relationships. | A-CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. | Equations and Inequalties in two variables | A-CED.2 Create equations in two or more variables to represent relationships between quantities | compound inequality; *power regression; exponential regression; best fitting quadratic model; quadratic regression* |
| A | CED | Create equations that describe numbers or relationships. | A-CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. | Equations and Inequalties in two variables | A-CED.2 Graph equations on coordinate axes with labels and scales | |
| A | CED | Create equations that describe numbers or relationships. | A-CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. | Constraints within Equations and Inequalties | A-CED.3 Represent constraints using one or more equations | *dependent; inconsistent system of equations; independent; restriction on the domain* |
| A | CED | Create equations that describe numbers or relationships. | A-CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. | Constraints within Equations and Inequalties | A-CED.3 Represent constraints using one or more inequalities | |
| A | CED | Create equations that describe numbers or relationships. | A-CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. | Constraints within Equations and Inequalties | A-CED.3 Interpret solutions to systems of equations | |
| A | CED | Create equations that describe numbers or relationships. | A-CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. | Constraints within Equations and Inequalties | A-CED.3 Interpret solutions to systems of inequalities | |

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|---|---|---|---|---|---|---|
| A | CED | Create equations that describe numbers or relationships. | A-CED.4 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. | Literal Equations | A-CED.4 Write equivalent forms of equations | |
| A | REI | Understand solving equations as a process of reasoning and explain the reasoning. | A-REI.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. | Rational and Radical Equations | A-REI.2 Solve rational and radical equations in one variable | *like radicals, radical equations, radicand; radical function* |
| A | REI | Understand solving equations as a process of reasoning and explain the reasoning. | A-REI.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. | Rational and Radical Equations | A-REI.2 Recognize equations where extraneous solutions exist | extraneous solution |
| A | REI | Represent and solve equations and inequalities graphically. | A-REI.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 cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.★ | Solutions of Equations and Inequalties | A-REI.11 Explain why a point(s) of intersection represent a solution(s) to a system | logarithmic function |
| A | REI | Represent and solve equations and inequalities graphically. | A-REI.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 cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.★ | Solutions of Equations and Inequalties | A-REI.11 Approximate the solution(s) to a system using technology | |

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|---|---|---|---|---|---|---|
| F | IF | Interpret functions that arise in applications in terms of the context. | F-IF.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. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.★ | Features of Functions | F-IF.4 Interpret key features of graphs and tables | local maximum; local minimum; cubic; quartic; *absolute maximum; absolute minimum; end behavior; root;* periodicity |
| F | IF | Interpret functions that arise in applications in terms of the context. | F-IF.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. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.★ | Features of Functions | F-IF.4 Sketch a graph given key features of a model | |
| F | IF | Interpret functions that arise in applications in terms of the context. | F-IF.5 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.★ | Domain of Functions | F-IF.5 Relate the domain of a function to its graph and context | *domain; range* |
| F | IF | Interpret functions that arise in applications in terms of the context. | F-IF.6 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.★ | Rate of Change | F-IF.6 Calculate and interpret average rate of change of a function in various forms | *rate of change* |

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|---|---|---|---|---|---|---|
| F | IF | Analyze functions using different representations. | F-IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ | Graphical Features of Functions | F-IF.7 Graph functions by hand | cubic, quartic, *linear, quadratic, exponential* |
| F | IF | Analyze functions using different representations. | F-IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ | Graphical Features of Functions | F-IF.7 Graph functions using technology | |
| F | IF | Analyze functions using different representations. | F-IF.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. | Graphing nth root and piecewise Functions | F-IF.7b Graph square root functions | *radical function; rational function; radical; index* |
| F | IF | Analyze functions using different representations. | F-IF.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. | Graphing nth root and piecewise Functions | F-IF.7b Graph cube root functions | |
| F | IF | Analyze functions using different representations. | F-IF.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. | Graphing nth root and piecewise Functions | F-IF.7b Graph piecewise-defined functions | *piecewise function* |
| F | IF | Analyze functions using different representations. | F-IF.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. | Graphing nth root and piecewise Functions | F-IF.7b Graph step functions | *step functions* |
| F | IF | Analyze functions using different representations. | F-IF.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. | Graphing nth root and piecewise Functions | F-IF.7b Graph absolute value functions | *absolute value function* |
| F | IF | Analyze functions using different representations. | F-IF.7c Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. | Graphical Features of Functions | F-IF.7c Graph polynomial functions using key features | |
| F | IF | Analyze functions using different representations. | F-IF.7e Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. | Graphing Exponential and Logarithmic Functions | F-IF.7e Graph exponential functions using key features | *exponential function* |

| Conceptual Category | Domain | Cluster | Common Core Standard | Content | Skills | Academic Vocabulary |
|---|---|---|---|---|---|---|
| F | IF | Analyze functions using different representations. | F-IF.7e Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. | Graphing Exponential and Logarithmic Functions | F-IF.7e Graph logarithmic functions using key features | logarithmic function |
| F | IF | Analyze functions using different representations. | F-IF.7e Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. | Graphing Exponential and Logarithmic Functions | F-IF.7e Graph trigonometric functions using key features | period, midline, amplitude |
| F | IF | Analyze functions using different representations. | F-IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. | Equivalent Forms of Functions | F-IF.8 Write equivalent forms of functions | *vertex form of a quadratic function* |
| F | IF | Analyze functions using different representations. | F-IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. | Equivalent Forms of Functions | F-IF.8 Explain how the form of an equation reveals properties of the function | |
| F | IF | Analyze functions using different representations. | F-IF.9 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. | Compare Functions | F-IF.9 Compare properties of two functions in varied representations | |
| F | BF | Build a function that models a relationship between two quantities. | F-BF.1 Write a function that describes a relationship between two quantities.★ | Writing Functions | F-BF.1 Model a real world situation with a function in two variables | |
| F | BF | Build a function that models a relationship between two quantities. | F-BF.1b 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. | Arithmetic operations on Functions | F-BF.1b Combine functions using arithmetic operations | composite functions |

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|---|---|---|---|---|---|---|
| F | BF | Build new functions from existing functions. | F-BF.3 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. | Transformations of Functions | F-BF.3 Compare a function to the parent function | |
| F | BF | Build new functions from existing functions. | F-BF.4 Find inverse functions. | Inverse Functions | F-BF.4 Write the inverse of a function | inverse function; *inverse relation* |
| F | BF | Build new functions from existing functions. | F-BF.4a 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 for x > 0 or f(x) = (x+1)/(x–1) for x ≠ 1. | Solving Equations | F-BF.4a 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 | |
| F | LE | Construct and compare linear, quadratic, and exponential models and solve problems. | F-LE.4 For exponential models, express as a logarithm the solution to ab^ct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. | Exponential Models and Logarithms | F-LE.4 Write exponential models as logarithms | logarithm; common logarithm; logarithmic equation; natural logarithm; compound interest; compounding period; continuous growth; exponential decay function; exponential growth function; half life; exponential equation |
| F | LE | Construct and compare linear, quadratic, and exponential models and solve problems. | F-LE.4 For exponential models, express as a logarithm the solution to ab^ct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. | Exponential Models and Logarithms | F-LE.4 Evaluate logarithms using technology | |

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|---|---|---|---|---|---|---|
| F | TF | Extend the domain of trigonometric functions using the unit circle. | F-TF.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. | Radian Measure and Arc Length | F-TF.1 Recognize radian measure of an angle as the length of the arc on the unit circle subtended by the angle | *radian* ; unit circle |
| F | TF | Extend the domain of trigonometric functions using the unit circle. | F-TF.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. | Trigonometric Functions using the Unit Circle | F-TF.2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers | |
| F | TF | Extend the domain of trigonometric functions using the unit circle. | F-TF.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. | Trigonometric Functions using the Unit Circle | F-TF.2 Interpret radian measures of angles traversed counterclockwise around the unit circle | |
| F | TF | Model periodic phenomena with trigonometric functions. | F-TF.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.★ | Modeling with Trigonometric Functions | F-TF.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline | amplitude, period, frequency, midline, *trigonometric function; sine, cosine and tangent* |
| F | TF | Prove and apply trigonometric identities. | F-TF.8 Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle. | Trigonometric Identities | F-TF.8 Prove the Pythagorean identity | Pythagorean identity: $\sin^2(\theta) + \cos^2(\theta) = 1$ |
| F | TF | Prove and apply trigonometric identities. | F-TF.8 Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle. | Trigonometric Identities | F-TF.8 Apply the Pythagorean identity | |

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|---|---|---|---|---|---|---|
| S | ID | Summarize, represent, and interpret data on a single count or measurement variable | S-ID.4 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. | Interpreting Quantitative Data | S-ID.4 Create a normal distribution for a given data set | distribution; normal distribution; normal curve; *standard deviation, mean* |
| S | ID | Summarize, represent, and interpret data on a single count or measurement variable | S-ID.4 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. | Interpreting Quantitative Data | S-ID.4 Determine whether a normal distribution is appropriate for a data set | |
| S | ID | Summarize, represent, and interpret data on a single count or measurement variable | S-ID.4 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. | Interpreting Quantitative Data | S-ID.4 Estimate areas under the normal curve using calculators, spreadhseets, and tables | z-table; z-score |
| S | IC | Understand and evaluate random processes underlying statistical experiments | S-IC.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population. | Statistical Inferences | S-IC.1 Recognize statistics as a process for making inferences about population parameters based on a random sample from that population | random sample; *statistics; population* |
| S | IC | Understand and evaluate random processes underlying statistical experiments | S-IC.2 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? | Statistical Conclusions | S-IC.2 Justify whether a specified model is consistent with results from a given data-generating process | |

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|---|---|---|---|---|---|---|
| S | IC | Make inferences and justify conclusions from sample surveys, experiments, and observational studies | S-IC.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. | Sampling Methods | S-IC.3 Describe the purpose and difference between various sampling procedures | cluster sample; convenience sample; simple random sample; self-selected sample; stratified; systematic sample; experimental group; representative sample; unbiased; biased sample; *population; skewed distribution (left/right)* |
| S | IC | Make inferences and justify conclusions from sample surveys, experiments, and observational studies | S-IC.4 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. | Data Analysis | S-IC.4 Estimate a population mean or proportion from a sample survey. | random sample; sample size |
| S | IC | Make inferences and justify conclusions from sample surveys, experiments, and observational studies | S-IC.4 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. | Data Analysis | S-IC.4 Develop a margin of error through the use of simulation models for random sampling | margin of error |
| S | IC | Make inferences and justify conclusions from sample surveys, experiments, and observational studies | S-IC.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. | Data Analysis | S-IC.5 Compare results from two treatments of data | treatment |

| Conceptual Category | Domain | Cluster | Common Core Standard | Content | Skills | Academic Vocabulary |
|---|---|---|---|---|---|---|
| S | IC | Make inferences and justify conclusions from sample surveys, experiments, and observational studies | S-IC.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. | Data Analysis | S-IC.5 Decide whether differences between parameters are significant based on simulations | |
| S | IC | Make inferences and justify conclusions from sample surveys, experiments, and observational studies | S-IC.6 Evaluate reports based on data. | Data Analysis | S-IC.6 Draw conclusions from reports based on data | |
| S | MD | Use probability to evaluate outcomes of decisions | S-MD.6 (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). | Probability | S-MD.6 Justify a fair decision using probabilities | |
| S | MD | Use probability to evaluate outcomes of decisions | 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). | Probability | S-MD.7 Analyze decisions and strategies using probability concepts | |