Oklahoma Mathematics

Grades 9, 10, 11, 12

Adopted 2022

Algebra 1

Numbers & Operations

1. Extend the understanding of exponents to include square roots and cube roots. A1.N.1
    1. Write square roots and cube roots of constants and monomial algebraic expressions in simplest radical form. A1.N.1.1
    2. Add, subtract, multiply, divide, and simplify square roots of constants, rationalizing the denominator when necessary. A1.N.1.2

Algebraic Reasoning & Algebra

1. Represent and solve mathematical and real-world problems using linear equations, absolute value equations, and systems of equations; interpret solutions in the original context. A1.A.1
    1. Use knowledge of solving equations with rational values to represent, use and apply mathematical models (e.g., angle measures, geometric formulas, dimensional analysis, Pythagorean theorem, science, statistics) and interpret the solutions in the original context. A1.A.1.1
    2. Solve absolute value equations and interpret the solutions in the original context. A1.A.1.2
    3. Analyze, use and apply mathematical models to solve problems involving systems of linear equations with a maximum of two variables by graphing, substitution, and elimination. Graphing calculators or other appropriate technology may be utilized. Interpret the solutions in the original context. A1.A.1.3
2. Represent and solve real-world and mathematical problems using linear inequalities and compound inequalities; interpret solutions in the original context. A1.A.2
    1. Represent relationships using mathematical models with linear inequalities; solve the resulting inequalities, graph on a coordinate plane, and interpret the solutions. A1.A.2.1
    2. Represent relationships using mathematical models with compound and absolute value inequalities and solve the resulting inequalities by graphing and interpreting the solutions on a number line. A1.A.2.2

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3. Create and evaluate equivalent algebraic expressions and equations using algebraic properties. A1.A.3
    1. Solve equations involving several variables for one variable in terms of the others. A1.A.3.1
    2. Simplify polynomial expressions by adding, subtracting, or multiplying. A1.A.3.2
    3. Factor common monomial factors from polynomial expressions and factor quadratic expressions with a leading coefficient of 1. A1.A.3.3
    4. Evaluate linear, absolute value, rational, and radical expressions. Include applying a nonstandard operation such as $x \odot y = 2x + y$ A1.A.3.4
4. Analyze real-world and mathematical problems involving linear equations. A1.A.4
    1. Analyze, use and apply mathematical models and other data sets (e.g., graphs, equations, two points, a set of data points) to calculate and interpret slope and the x- and y-intercepts of a line. A1.A.4.1
    2. Analyze and interpret mathematical models involving lines that are parallel, perpendicular, horizontal, and vertical. A1.A.4.2
    3. Write the equation of the line given its slope and y-intercept, slope and one point, two points, x- and y-intercepts, or a set of data points. A1.A.4.3
    4. Express linear equations in slope-intercept, point-slope, and standard forms. Convert between these forms. A1.A.4.4
    5. Analyze and interpret associations between graphical representations and written scenarios. A1.A.4.5

Functions

1. Understand functions as descriptions of covariation (how related quantities vary together) in real-world and mathematical problems. A1.F.1
    1. Distinguish between relations and functions. A1.F.1.1
    2. Identify the dependent variable, independent variable, domain and range given a function, equation, or graph. Identify restrictions on the domain and range in mathematical models. A1.F.1.2
    3. Write linear functions, using function notation, to represent mathematical models. A1.F.1.3
    4. Read and interpret the linear piecewise function, given a graph modeling a situation. A1.F.1.4
    5. Interpret graphs as being discrete or continuous. A1.F.1.5

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2. Recognize and understand that families of functions are defined by their characteristics. A1.F.2
    1. Distinguish between linear and nonlinear (including exponential) functions. Understand that linear functions grow by equal intervals (arithmetic) and that exponential functions grow by equal factors over equal intervals (geometric). A1.F.2.1
    2. Recognize the parent functions f(x) = x and f(x) = |x|. Predict the effects of vertical and horizontal transformations f(x + c) and f(x) + c, algebraically and graphically. A1.F.2.2
3. Represent functions in multiple ways and use the representation to interpret real-world and mathematical problems. A1.F.3
    1. Identify and generate equivalent representations of linear functions, graphs, tables, and real-world situations. A1.F.3.1
    2. Use function notation; evaluate a function, including nonlinear, at a given point in its domain algebraically and graphically. Interpret the results in terms of the original context. A1.F.3.2
    3. Add, subtract, and multiply functions using function notation. A1.F.3.3

Data & Probability

1. Display, describe, and compare data. For linear relationships, make predictions, and assess the reliability of those predictions. A1.D.1
    1. Display, describe, and compare data sets using summary statistics (central tendency and spread (range)). Utilize technology (e.g., spreadsheets, calculators) to display data and calculate summary statistics. A1.D.1.1
    2. Collect data and analyze scatter plots for patterns, linearity, and outliers. A1.D.1.2
    3. Make predictions based upon the linear regression, and use the correlation coefficient to assess the reliability of those predictions using graphing technology. A1.D.1.3
2. Calculate probabilities, and apply probability concepts. A1.D.2
    1. Apply simple counting procedures (factorials, permutations, combinations, and tree diagrams) to determine sample size, sample space, and calculate probabilities. A1.D.2.1
    2. Given a Venn diagram, determine the probability of the union of events, the intersection of events, and the complement of an event. Understand the relationships between these concepts and the words "AND," "OR," and "NOT." A1.D.2.2
    3. Use simulations and experiments to calculate experimental probabilities. A1.D.2.3
    4. Apply probability concepts to real-world situations to make informed decisions. A1.D.2.4

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Geometry

Reasoning & Logic

1. Use appropriate tools and logic, including algebraic methods, to evaluate mathematical arguments. G.RL.1
    1. Use undefined terms, definitions, postulates, and theorems in logical arguments/proofs. G.RL.1.1
    2. Analyze and draw conclusions based on a set of conditions using inductive and deductive reasoning. Recognize the logical relationships between a conditional statement and its inverse, converse, and contrapositive. G.RL.1.2
    3. Assess the validity of a logical argument and give counterexamples to disprove a statement. G.RL.1.3

Two-Dimensional Shapes

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1. Discover, evaluate, and analyze the relationships between lines, angles, and polygons to solve real-world and mathematical problems; express proofs in a form that clearly justifies the reasoning (e.g., two-column proofs, paragraph proofs, flowcharts). G.2D.1

    1. Use properties of parallel lines cut by a transversal to determine angle relationships and solve problems. G.2D.1.1
    2. Use the angle relationships formed by lines cut by a transversal to determine if the lines are parallel and verify, using algebraic and deductive proofs. G.2D.1.2
    3. Apply the properties of angles (corresponding, exterior, interior, vertical, complementary, supplementary) to solve problems using mathematical models, algebraic reasoning, and proofs. G.2D.1.3
    4. Apply theorems involving the interior and exterior angle sums of polygons to solve problems using mathematical models, algebraic reasoning, and proofs. G.2D.1.4
    5. Apply the properties of special quadrilaterals (square, rectangle, trapezoid, isosceles trapezoid, rhombus, kite, parallelogram) to solve problems involving angle measures and segment lengths using mathematical models, algebraic reasoning, and proofs. G.2D.1.5
    6. Use coordinate geometry and algebraic reasoning to represent and analyze line segments and polygons, including determining lengths, midpoints, and slopes of line segments. G.2D.1.6
    7. Apply the properties of polygons, and use them to represent and apply mathematical models involving perimeter and area (e.g., triangles, special quadrilaterals, regular polygons up to 12 sides, composite figures). G.2D.1.7
    8. Apply the properties of congruent or similar polygons to solve problems using mathematical models and algebraic and logical reasoning. G.2D.1.8
    9. Construct logical arguments to prove triangle congruence (SSS, SAS, ASA, AAS and HL). G.2D.1.9
    10. Construct logical arguments to prove triangle similarity (AA, SSS, SAS). G.2D.1.10
    11. Use numeric, graphic, and algebraic representations of transformations in two dimensions (e.g., reflections, translations, dilations, rotations about the origin by multiples of 90°) to solve problems involving figures on a coordinate plane and identify types of symmetry. G.2D.1.11

Three-Dimensional Shapes

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1. Solve real-world and mathematical problems involving three-dimensional figures. G.3D.1

    1. Represent, use, and apply mathematical models and other tools (e.g., nets, measuring devices, formulas) to solve problems involving surface area and volume of three-dimensional figures (prisms, cylinders, pyramids, cones, spheres, composites of these figures). G.3D.1.1

    2. Use ratios derived from similar three-dimensional figures to make conjectures, generalize, and to solve for unknown values such as angles, side lengths, perimeter, and circumference of a face, area of a face, and volume. G.3D.1.2

Circles

1. Solve real-world and mathematical problems using the properties of circles. G.C.1

    1. Apply the properties of circles to solve problems involving circumference and area, using approximate values and in terms of pi, using algebraic and logical reasoning. G.C.1.1

    2. Use the distance and midpoint formula, where appropriate, to recognize and write the radius r, center (h,k), and standard form of the equation of a circle $(x - h)^2 + (y - k)^2 = r^2$ with and without graphs. G.C.1.2

    3. Apply the properties of circles and relationships among angles; arcs; and distances in a circle among radii, chords, secants, and tangents to solve problems using algebraic and logical reasoning. G.C.1.3

Right Triangle Trigonometry

1. Apply mathematical relationships of right triangles and trigonometric ratios to solve real-world and mathematical problems. G.RT.1

    1. Apply the distance formula, the Pythagorean theorem, and the Pythagorean theorem converse (approximate and exact values, including Pythagorean triples) to solve problems, using algebraic and logical reasoning and mathematical models. G.RT.1.1

    2. Verify and apply properties of right triangles, including properties of 45-45-90 and 30-60-90 triangles, to solve problems using algebraic and logical reasoning. G.RT.1.2

    3. Use the definition of the trigonometric functions to determine the sine, cosine, and tangent ratio of an acute angle in a right triangle. Apply the inverse trigonometric functions to find the measure of an acute angle in right triangles. G.RT.1.3

    4. Apply the trigonometric functions as ratios (sine, cosine, tangent) to find side lengths in right triangles in mathematical models, including the coordinate plane. G.RT.1.4

Algebra 2 **Numbers & Operations**

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1. Extend the understanding of numbers and operations to include complex numbers, radical expressions, and expressions written with rational exponents. A2.N.1
    1. Find the value of i^n for any whole number n. A2.N.1.1
    2. Simplify, add, subtract, multiply, and divide complex numbers. A2.N.1.2
    3. Understand and apply the relationship between rational exponents to integer exponents and radicals to solve problems. A2.N.1.3
2. Extend the understanding of numbers and operations to matrices. A2.N.2
    1. Use matrices to organize and represent data. Identify the order (dimension) of a matrix. A2.N.2.1
    2. Use addition, subtraction, and scalar multiplication of matrices to solve problems. A2.N.2.2

Algebraic Reasoning & Algebra

1. Represent and solve mathematical and real-world problems using nonlinear equations, systems of linear equations, and systems of linear inequalities; interpret the solutions in the original context. A2.A.1
    1. Use mathematical models to represent quadratic relationships and solve using factoring, completing the square, the quadratic formula, and various methods (including graphing calculator or other appropriate technology). Find non-real roots when they exist. A2.A.1.1
    2. Use mathematical models to represent exponential relationships, such as compound interest, depreciation, and population growth. Solve these equations algebraically or graphically (including graphing calculator or other appropriate technology). A2.A.1.2
    3. Solve one-variable rational equations and check for extraneous solutions. A2.A.1.3
    4. Solve polynomial equations with real roots using various methods (e.g., polynomial division, synthetic division, using graphing calculators or other appropriate technology). A2.A.1.4
    5. Solve square and cube root equations with one variable, and check for extraneous solutions. A2.A.1.5
    6. Solve common and natural logarithmic equations using the properties of logarithms. A2.A.1.6
    7. Represent and evaluate mathematical models using systems of linear equations with a maximum of three variables. Graphing calculators or other appropriate technology may be used. A2.A.1.7
    8. Use tools to solve systems of equations containing one linear equation and one quadratic equation. Graphing calculators or other appropriate technology may be used. A2.A.1.8
    9. Solve systems of linear inequalities in two variables, with a maximum of three inequalities; graph and interpret the solutions on a coordinate plane. Graphing calculators or other appropriate technology may be used. A2.A.1.9

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2. Generate and evaluate equivalent algebraic expressions and equations using various strategies. A2.A.2
    1. Factor polynomial expressions including, but not limited to, trinomials, differences of squares, sum and difference of cubes, and factoring by grouping, using a variety of tools and strategies. A2.A.2.1
    2. Add, subtract, multiply, divide, and simplify polynomial expressions. A2.A.2.2
    3. Add, subtract, multiply, divide, and simplify rational expressions. A2.A.2.3
    4. Recognize that a quadratic function has different equivalent representations [$f(x) = ax^2 + bx + c$, $f(x) = a(x - h)^2 + k$, and $f(x) = a(x - p)(x - q)$]. Identify and use the mathematical model that is most appropriate to solve problems. A2.A.2.4
    5. Rewrite algebraic expressions involving radicals and rational exponents using the properties of exponents. A2.A.2.5
3. Represent and solve mathematical and real-world problems involving arithmetic and geometric sequences and series. A2.A.3
    1. Recognize that arithmetic sequences are linear using equations, tables, graphs, and verbal descriptions. Using the pattern, find the next term. A2.A.3.1
    2. Recognize that geometric sequences are exponential using equations, tables, graphs, and verbal descriptions. Given the formula f(x) = a(r)^x, find the next term and define the meaning of a and r within the context of the problem. A2.A.3.2
    3. Solve problems that can be modeled using arithmetic sequences or series given the nth terms and sum formulas. Graphing calculators or other appropriate technology may be used. A2.A.3.3
    4. Solve problems that can be modeled using finite geometric sequences and series given the nth terms and sum formulas. Graphing calculators or other appropriate technology may be used. A2.A.3.4

Functions

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1. Understand functions as descriptions of covariation (how related quantities vary together). A2.F.1

    1. Use algebraic, interval, and set notations to specify the domain and range of various types of functions, and evaluate a function at a given point in its domain. A2.F.1.1
    2. Identify the parent forms of exponential, radical (square root and cube root only), quadratic, and logarithmic functions. Predict the effects of transformations [f(x + c), f(x) + c, f(cx), and cf(x)] algebraically and graphically. A2.F.1.2
    3. Graph a quadratic function. Identify the domain, range, x- and y-intercepts, maximum or minimum value, axis of symmetry, and vertex using various methods and tools that may include a graphing calculator or appropriate technology. A2.F.1.3
    4. Graph exponential and logarithmic functions. Identify the domain, range, asymptotes, and x- and y-intercepts using various methods and tools that may include calculators or other appropriate technology. Recognize exponential decay and growth graphically and algebraically. A2.F.1.4
    5. Analyze the graph of a polynomial function by identifying the domain, range, intercepts, zeros, relative maxima, relative minima, and intervals of increase and decrease. A2.F.1.5
    6. Graph a rational function and identify the domain (including holes), range, x- and y-intercepts, vertical and horizontal asymptotes, using various methods and tools that may include a graphing calculator or other appropriate technology (excluding slant or oblique asymptotes). A2.F.1.6
    7. Graph a radical function (square root and cube root only). Identify the domain, range, and x- and y-intercepts using various methods and tools that may include a graphing calculator or other appropriate technology. A2.F.1.7
    8. Graph piecewise functions with no more than three branches (linear, quadratic, or exponential). Analyze the function by identifying the domain, range, intercepts, and intervals for which it is increasing, decreasing, and constant using various methods and tools (e.g., graphing calculator, other appropriate technology). A2.F.1.8
    9. Recognize whether a discrete or continuous graphical representation is appropriate to create a graph based upon a mathematical model. A2.F.1.9

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2. Analyze functions through algebraic combinations, compositions, and inverses if they exist. A2.F.2
    1. Add, subtract, multiply, and divide functions using function notation and recognize domain restrictions. A2.F.2.1
    2. Combine functions by com position and recognize that g(x) = f^-1(x), the inverse function of f(x), if and only if f(g(x)) = g(f(x)) = x. A2.F.2.2
    3. Find and graph the inverse of a function, if it exists, in mathematical models. Know that the domain of a function f is the range of the inverse function f^-1 and the range of the function f is the domain of the inverse function f^-1 A2.F.2.3
    4. Apply the inverse relationship between exponential and logarithmic functions to convert from one form to another. A2.F.2.4

Data & Probability

1. Display, describe, and compare data. For linear and nonlinear relationships, make predictions and assess the reliability of those predictions. A2.D.1
    1. Use the mean and standard deviation of a data set to create a normal distribution (bell-shaped curve). A2.D.1.1
    2. Collect data and use scatter plots to analyze patterns and describe linear, exponential, or quadratic relationships between two variables. A2.D.1.2
    3. Make predictions based upon the regression equation (linear, exponential, or quadratic), and use the correlation coefficient to assess the reliability of those predictions using graphing technology. A2.D.1.3
2. Analyze statistical thinking to draw inferences, make predictions, and justify conclusions. A2.D.2
    1. Evaluate reports by making inferences, justifying conclusions, and determining appropriateness of data collection methods. Show how graphs and data can be distorted to support different points of view. A2.D.2.1
    2. Identify and explain misleading conclusions and graphical representations of data sets. A2.D.2.2
    3. Differentiate between correlation and causation when describing the relationship between two variables. A2.D.2.3

Precalculus

Functions

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1. Analyze functions and relations. PC.F.1
    1. Interpret characteristics of a function defined by an expression in the context of the situation. PC.F.1.1
    2. Sketch the graph of a function that models a relationship between two quantities, identifying key features. PC.F.1.2
    3. Interpret characteristics of graphs and tables for a function that models a relationship between two quantities in terms of the quantities. PC.F.1.3
    4. Describe end behavior, asymptotic behavior, and points of discontinuity. PC.F.1.4
    5. Determine if a function has an inverse. Algebraically and graphically find the inverse or define any restrictions on the domain that meet the requirement for invertibility, and find the inverse on the restricted domain. PC.F.1.5
2. Build functions to model and validate relationships among functions. PC.F.2
    1. Model relationships through composition, and attend to the restrictions of the domain. PC.F.2.1
    2. Rewrite a function as a composition of functions. PC.F.2.2
    3. Interpret the meanings of quantities involving functions and their inverses. PC.F.2.3
    4. Verify by analytical methods that one function is the inverse of another. PC.F.2.4
3. Predict and verify solutions involving functions. PC.F.3
    1. Predict solutions involving functions that are quadratic, polynomial of higher order, rational, exponential, and logarithmic. PC.F.3.1
    2. Graphically verify solutions involving functions that are quadratic, polynomial of higher order, rational, exponential, and logarithmic. PC.F.3.2
    3. Algebraically verify solutions involving functions that are quadratic, polynomial of higher order, rational, exponential, and logarithmic. PC.F.3.3

Conic Sections

1. Investigate conic sections. PC.CS.1
    1. Model real-world situations which involve conic sections. PC.CS.1.1
    2. Identify key features of conic sections (foci, directrix, radii, axes, asymptotes, center) graphically and algebraically. PC.CS.1.2
    3. Sketch a graph of a conic section using its key features. PC.CS.1.3
    4. Write the equation of a conic section given its key features. PC.CS.1.4
    5. Given the equation $ax^2 + by^2 + cx + dy + e = 0$, determine if the equation represents a circle, ellipse, parabola, or hyperbola. PC.CS.1.5

Trigonometry

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1. Make sense of the unit circle and its relationship to the graphs of trigonometric functions. PC.T.1
    1. Draw and recognize angles in standard position using radian measure, and determine the quadrant of the terminal side. PC.T.1.1
    2. Convert radian measure to degree measure and vice-versa. PC.T.1.2
    3. Find the length of an arc and the area of a sector on a circle. PC.T.1.3
    4. Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$, and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi - x$, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number. PC.T.1.4
    5. Use reference angles to determine the terminal point P(x, y) on the unit circle for a given angle. PC.T.1.5
    6. Estimate trigonometric values of any angle. PC.T.1.6
    7. Apply the properties of a unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. PC.T.1.7
    8. Graph of all six trigonometric functions, identifying key features. PC.T.1.8
    9. Describe and analyze the relationships of the properties of a unit circle. PC.T.1.9
2. Apply trigonometric concepts beyond the right triangle. PC.T.2
    1. Create models for situations involving trigonometry. PC.T.2.1
    2. Apply the Law of Sines and Law of Cosines to solve problems. PC.T.2.2
    3. Use trigonometry to find the area of triangles. PC.T.2.3
    4. Use inverse functions to solve trigonometric equations; evaluate the solution and interpret them in terms of context. PC.T.2.4
3. Verify trigonometric identities and solve equations. PC.T.3
    1. Algebraically manipulate the structure of a trigonometric expression to identify ways to rewrite it. PC.T.3.1
    2. Choose and produce an equivalent form of an expression to explain the properties of the quantity represented by the expression. PC.T.3.2
    3. Graphically and algebraically verify solutions to trigonometric equations. PC.T.3.3
4. Explore complex numbers. PC.T.4
    1. Use the relation $i^2 = -1$ and the mathematical properties to add, subtract, and multiply complex numbers. PC.T.4.1
    2. Find the conjugate of a complex number in rectangular forms and quotients of complex numbers. PC.T.4.2
    3. Solve quadratic equations in one variable that have complex solutions. PC.T.4.3

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1. Understand the distinction between mathematical models and statistical models. S.Q.1
    1. Distinguish among different sources of variability, including measurement, natural, induced, and sampling variability. S.Q.1.1
    2. Formulate meaningful statistical questions to clarify the problem at hand. S.Q.1.2
2. Distinguish between the distribution of a population, a distribution of sample data, and a sampling distribution. S.Q.2
    1. Distinguish between sample statistics and population parameters. S.Q.2.1
    2. Recognize a population distribution has fixed values of its parameters and that these parameter values are typically unknown. S.Q.2.2
    3. Recognize that a sample data distribution is taken from a population distribution, and the data distribution is what is seen in practice. S.Q.2.3
    4. Recognize a sampling distribution is the distribution of a sample statistic (e.g., sample mean, sample proportion) obtained from repeated samples. S.Q.2.4
3. Identify differences between categorical and quantitative data. S.Q.3
    1. Determine whether categorical or quantitative data is appropriate to answer a statistical question. S.Q.3.1
    2. Compare and contrast different potential graphical or visual representations given the same data set. S.Q.3.2

Data Collection

1. Distinguish among different types of study designs for collecting data, and know the scope of inference for each design type. S.DC.1
    1. Distinguish among sample surveys, experiments, and observational studies. S.DC.1.1
    2. Compare and contrast the benefits of different sampling techniques. S.DC.1.2
    3. Determine the appropriate scope of inference for generalizing results. S.DC.1.3
    4. Explain how sample size impacts the precision with which generalizations can be made. S.DC.1.4
    5. Determine when a cause-and-effect inference can be drawn from an association, based on how the data were collected. S.DC.1.5
2. Identify common sources of bias and the role of randomization in study design. S.DC.2
    1. Explain how randomization and sources of bias impact the results of a study. S.DC.2.1
    2. Understand the different roles of random selection and random assignment in study design. S.DC.2.2

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ata Analysis

1. Use distributions of quantitative and categorical data to identify the key features of the data collected in context. S.DA.1
    1. Summarize and represent the distribution for univariate quantitative data by describing and analyzing the shape of the distribution, the measures of center for the distribution, the patterns in variability for the distribution, and any outliers, gaps, or other unusual features in the distribution. S.DA.1.1
    2. Select and create an appropriate display (e.g., dot plots, histograms, box plots) for univariate data. S.DA.1.2
    3. Use statistics appropriate to the shape of the data distribution to compare center and variability of two or more different data sets. S.DA.1.3
    4. Describe and analyze the distribution of univariate categorical data. S.DA.1.4
2. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. S.DA.2
    1. Use calculators, computers, or tables to estimate areas under the normal curve. Recognize that there are data sets for which such a procedure is not appropriate. S.DA.2.1
3. Compare two or more groups by analyzing distributions. S.DA.3
    1. Construct appropriate parallel graphical displays of distributions. S.DA.3.1
    2. Use numerical attributes of distributions to make comparisons between distributions. S.DA.3.2
4. Analyze associations between two variables. S.DA.4
    1. Create two-way tables for bivariate categorical data and analyze for possible associations between the two categories using marginal, joint, and conditional frequencies. S.DA.4.1
    2. Make predictions and draw conclusions from regression models (linear, exponential, quadratic) from two-variable quantitative data. S.DA.4.2
    3. Analyze scatter plots for patterns, linearity, outliers, and influential points. S.DA.4.3
    4. Using technology, compute and interpret the correlation coefficient. S.DA.4.4
    5. Understand the implications of extrapolating data to make predictions. S.DA.4.5

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5. Make statistical inferences and evaluate claims from studies. S.DA.5
    1. Construct and interpret confidence intervals for the mean of a normally distributed population and for a population proportion. S.DA.5.1
    2. Explain how a sample statistic and a confidence level are used in the construction of a confidence interval. S.DA.5.2
    3. Explain how changes in the sample size, confidence level, and standard error affect the margin of error of a confidence interval. S.DA.5.3
    4. Construct a confidence interval for the mean of a normally distributed population (with a known standard deviation) and for a population proportion. Use confidence intervals to evaluate claims. S.DA.5.4
    5. Use confidence intervals to evaluate claims for a single population parameter. S.DA.5.5

Interpretation of Results

1. Interpret and communicate the results of a statistical analysis in context. S.IR.1
    1. Recognize when the difference between two sample proportions or two sample means is due to random variation or if the difference is statistically significant. S.IR.1.1
    2. Understand the concept of a confidence interval, including the interpretation of confidence level, margin of error, and statistical significance. S.IR.1.2
    3. Develop inferences or predictions to construct resulting decisions or recommendations. S.IR.1.3
    4. Create and evaluate recommendations for areas of future research. S.IR.1.4
2. Evaluate practical implications of statistical significance or lack thereof. S.IR.2
    1. Develop and critique arguments for practical implications based on statistical significance. S.IR.2.1
    2. Identify potential lurking variables which may explain an association between two variables. S.IR.2.2
3. Evaluate real-world claims and conclusions. S.IR.3
    1. Evaluate strengths and weaknesses in the studies or methods used to generate data. S.IR.3.1
    2. Evaluate the statistical validity of claims made. S.IR.3.2

Probability

1. Connect basic probability concepts to statistical analysis. S.P.1
    1. Describe events as subsets of a sample space. S.P.1.1
    2. Describe the relationship between theoretical and empirical probabilities using the Law of Large Numbers. S.P.1.2
    3. Use counting techniques (e.g., permutations and combinations) to solve mathematical and real-world problems, including determining probabilities of compound events. S.P.1.3

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2. Determine probabilities, including joint probabilities, conditional probabilities, probabilities of independent events, and probabilities of dependent events. Interpret the results. S.P.2

    1. 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 two events are independent. S.P.2.1

    2. Understand and calculate the conditional probability of A given B as P(A and B)/P(B). S.P.2.2

    3. Interpret independence of A and B as saying that the conditional probability of A, given B, is the same as the probability of A. S.P.2.3

3. Use probability to make decisions. Analyze decisions and strategies using probability concepts and expected values. S.P.3

    2. Analyze decisions about statistical significance based on reported p-values. S.P.3.2