|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number and Quantity** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Extend and use properties of rational exponents.**  |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.NQ.A.1** Explain how the meaning of rational exponents extends from the properties of integer exponents. |  |  |  |  |  |  |  |  |  |  | X | X |
| **A1.NQ.A.2** Rewrite expressions involving radicals and rational exponents using the properties of exponents. Limit to rational exponents with a numerator of 1. |  |  |  |  |  |  |  |  |  |  | X | X |
| **Use units to solve problems.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.NQ.B.3** Use units of measure as a way to understand and solve problems involving quantities. ★a. Identify, label and use appropriate units of measure within a problem.b. Convert units and rates.c. Use units within problems.d. Choose and interpret the scale and the origin in graphs and data displays. | X | X | X | X |  | X | X |  | X | X |  |  |
| **A1.NQ.B.4** Define and use appropriate quantities for representing a given context or problem. | X |  | X |  |  | X |  |  |  |  |  |  |
| **A1.NQ.B.5** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. | X |  |  |  |  |  |  |  |  |  |  |  |
| **Seeing Structure in Expressions** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Interpret and use structure.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.SSE.A.1** Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions. **MPS**  | X | X | X |  |  |  |  |  |  |  |  |  |
| **A1.SSE.A.2** Analyze the structure of polynomials to create equivalent expressions or equations.**MPS** |  |  |  |  |  |  |  | X | X | X |  |  |
| **A1.SSE.A.3** Choose and produce equivalent forms of a quadratic expression or equations to reveal and explain properties. ★**Ⓢ**a. Find the zeros of a quadratic function by rewriting it in factored form.b. Find the maximum or minimum value of a quadratic function by completing the square. |  |  |  |  |  |  |  | X | X | X |  |  |
| **Creating Equations** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Create equations that describe linear, quadratic and exponential relationships.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.CED.A.1** Create equations and inequalities in one variable and use them to model and/or solve problems. ★ **MPS** |  | X |  |  | X |  |  |  |  |  |  |  |
| **A1.CED.A.2** Create and graph linear, quadratic and exponential equations in two variables. ★**Ⓢ** |  |  | X | X |  |  | X |  | X | X |  | X |
| **A1.CED.A.3** Represent constraints by equations or inequalities and by systems of equations or inequalities, and interpret the data points as a solution or non-solution in a modeling context. |  |  | X | X |  | X |  |  |  |  |  |  |
| **A1.CED.A.4** Solve literal equations and formulas for a specified variable that highlights a quantity of interest. |  | X | X | X |  |  |  |  |  |  |  |  |
| **Reasoning with Equations and Inequalities** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Understand solving equations as a process, and solve equations and inequalities in one variable.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.REI.A.1** Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.★**Ⓢ** |  |  | X | X | X | X |  |  |  |  |  |  |
| **A1.REI.A.2** Solve problems involving quadratic equations.a. Use the method of completing the square to create an equivalent quadratic equation.b. Derive the quadratic formula.c. Analyze different methods of solving quadratic equations. **MPS** |  |  |  |  |  |  |  | X | X |  |  |  |
| **Solve systems of equations.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.REI.B.3** Solve a system of linear equations algebraically and/or graphically. ★ |  |  |  |  |  | X |  |  |  |  |  |  |
| **A1.REI.B.4** Solve a system consisting of a linear equation and a quadratic equation algebraically and/or graphically. |  |  |  |  |  |  |  |  |  | X |  |  |
| **A1.REI.B.5** Justify that the technique of linear combination produces an equivalent system of equations. |  |  |  |  |  | X |  |  |  |  |  |  |
| **Represent and solve linear and exponential equations and inequalities graphically.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.REI.C.6** Explain that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane. **MPS** |  |  | X | X |  | X |  |  |  |  |  |  |
| **A1.REI.C.7** Graph the solution to a linear inequality in two variables. |  |  |  |  | X | X |  |  |  |  |  |  |
| **A1.REI.C.8** Solve problems involving a system of linear inequalities. **MPS** |  |  |  |  |  | X |  |  |  |  |  |  |
| **Arithmetic with Polynomials and Rational Expressions** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Perform operations on polynomials.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.APR.A.1** Add, subtract and multiply polynomials, and understand that polynomials follow the same general rules of arithmetic and are closed under these operations. ★ |  |  |  |  |  |  |  | X |  |  |  |  |
| **A1.APR.A.2** Divide polynomials by monomials. |  |  |  |  |  |  |  |  |  |  |  | X |
| **Interpreting Functions** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Understand the concept of a function and use function notation.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.IF.A.1** Understand that a function from one set (domain) to another set (range) assigns to each element of the domain exactly one element of the range. ★a. Represent a function using function notation.b. Understand that the graph of a function labeled 𝑓 is the set of all ordered pairs (𝑥, y) that satisfy the equation 𝑦=f (𝑥). |  |  | X |  |  |  |  |  |  |  |  | X |
| **A1.IF.A.2** Use function notation to evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. |  |  | X | X |  |  |  |  |  |  |  |  |
| **Interpret linear, quadratic and exponential functions in terms of the context.** |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.IF.B.3** Using tables, graphs and verbal descriptions, interpret key characteristics of a function that models the relationship between two quantities. **MPS** |  |  | X | X |  |  | X |  | X | X |  | X |
| **A1.IF.B.4** Relate the domain and range of a function to its graph and, where applicable, to the quantitative relationship it describes.  |  |  | X | X |  |  | X |  |  |  |  | X |
| **A1.IF.B.5** Determine the average rate of change of a function over a specified interval and interpret the meaning. |  |  | X |  |  |  |  |  |  |  |  | X |
| **A1.IF.B.6** Interpret the parameters of a linear or exponential function in terms of the context. |  |  | X |  |  |  | X |  |  |  |  | X |
| **Analyze linear, quadratic and exponential functions using different representations.**  |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.IF.C.7** Graph functions expressed symbolically and identify and interpret key features of the graph. **MPS** |  |  | X |  |  |  |  |  | X | X |  |  |
| **A1.IF.C.8** Translate between different but equivalent forms of a function to reveal and explain properties of the function and interpret these in terms of a context. |  | X | X | X |  | X |  |  | X | X |  |  |
| **A1.IF.C.9** Compare the properties of two functions given different representations. |  |  | X | X |  |  | X |  | X | X |  |  |
| **Building Functions** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Build new functions from existing functions (limited to linear, quadratic and exponential).**  |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.BF.A.1** Analyze the effect of translations and scale changes on functions.★ **MPS** |  |  | X |  |  |  | X |  | X | X |  |  |
| **Linear, Quadratic and Exponential Models** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Construct and compare linear, quadratic and exponential models and sole problems.**  |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.LQE.A.1** Distinguish between situations that can be modeled with linear or exponential functions. ★a. Determine that linear functions change by equal differences over equal intervals.b. Recognize exponential situations in which a quantity grows or decays by a constant percent rate per unit interval. |  |  | X |  |  |  | X |  |  |  |  |  |
| **A1.LQE.A.2** Describe, using graphs and tables,that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically. |  |  |  |  |  |  | X |  | X | X |  |  |
| **A1.LQE.A.3** Construct linear, quadratic and exponential equations given graphs, verbal descriptions or tables. **MPS** |  |  | X |  |  |  | X |  | X | X |  |  |
| **Use arithmetic and geometric sequences.**  |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.LQE.B.4** Write arithmetic and geometric sequences in recursive and explicit forms, and use them to model situations and translate between the two forms. **MPS** |  |  |  |  |  |  |  |  |  |  |  | X |
| **A1.LQE.B.5** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the set of integers. |  |  |  |  |  |  |  |  |  |  |  | X |
| **A1.LQE.B.6** Find the terms of sequences given an explicit or recursive formula. |  |  |  |  |  |  |  |  |  |  |  | X |
| **Data and Statistical Analysis** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Summarize, represent and interpret data.**  |  |  |  |  |  |  |  |  |  |  |  |  |
| **A1.DS.A.1** Analyze and interpret graphical displays of data. ★ **MPS** |  |  | X |  |  | X | X |  | X | X |  | X |
| **A1.DS.A.2** Use statistics appropriate to the shape of the data distribution to compare center and spread of two or more different data sets. |  |  |  |  |  |  |  |  |  |  |  | X |
| **A1.DS.A.3** Interpret differences in shape, center and spreads in the context of the data sets, accounting for possible effects of outliers. |  |  |  |  |  |  |  |  |  |  |  | X |
| **A1.DS.A.4** Summarize data in two-way frequency tables.a. Interpret relative frequencies in the context of the data.b. Recognize possible associations and trends in the data. |  |  |  |  |  |  |  |  |  |  |  | X |
| **A1.DS.A.5** Construct a scatter plot of bivariate quantitative data describing how the variables are related; determine and use a function that models the relationship.a. Construct a linear function to model bivariate data represented on a scatter plot that minimizes residuals.b. Construct an exponential function to model bivariate data represented on a scatter plot that minimizes residuals. |  |  |  | X |  |  |  |  |  |  |  | X |
| **A1.DS.A.6** Interpret the slope (rate of change) and the y-intercept (constant term) of a linear model in the context of the data. |  |  |  |  |  |  |  |  |  |  |  | X |
| **A1.DS.A.7** Determine and interpret the correlation coefficient for a linear association. |  |  |  |  |  |  |  |  |  |  |  | X |
| **A1.DS.A.8** Distinguish between correlation and causation. |  |  |  |  |  |  |  |  |  |  |  | X |
| **Standards for Mathematical Practice** |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Make sense of problems and persevere in solving them.
 | X | X | X | X | X | X | X | X | X | X | X | X |
| 1. Reason abstractly and quantitatively.
 | X | X | X | X | X | X | X | X | X | X | X | X |
| 1. Construct viable arguments and critique the reasoning of others.
 | X | X | X | X | X | X | X | X | X | X | X | X |
| 1. Model with mathematics.
 | X | X | X | X | X | X | X | X | X | X | X | X |
| 1. Use appropriate tools strategically.
 | X | X | X | X | X | X | X | X | X | X | X | X |
| 1. Attend to precision.
 | X | X | X | X | X | X | X | X | X | X | X | X |
| 1. Look for and make use of structure.
 | X | X | X | X | X | X | X | X | X | X | X | X |
| 1. Look for and express regularity in repeated reasoning.
 | X | X | X | X | X | X | X | X | X | X | X | X |