Chapter 1 - Solving Equations/Inequalities

- Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
- Create equations and inequalities in one variable and use them to solve problems. (including compound and absolute value inequalities)
- 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.
- Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
- Explain each step in solving a simple 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.
- Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Chapter 2 - Writing/Graphing Linear Equations

- Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
- Construct linear functions given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
- Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
- Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line passing through a given point.)
- Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

Chapter 3 - Functions

- Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.
- Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
- Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
- Write a function that describes a relationship between two quantities.
- 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)
- Construct linear functions, including arithmetic sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

- Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
- Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
- Compute (using technology) and interpret the correlation coefficient of a linear fit.
- Distinguish between correlation and causation.

Chapter 4 - Systems of Linear Equations and Inequalities

- 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.
- Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
- Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
- 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.
- Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Chapter 5 - Piecewise Functions

- Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

Chapter 6 - Exponents and Exponential Functions

- 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.
- Rewrite expressions involving radicals and rational exponents using the properties of exponents.
- Create equations in one variable and use them to solve problems.
- Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
- Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
- 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)
- Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

Chapter 7 - Polynomials

- Interpret expressions that represent a quantity in terms of its context.
- Add, subtract, and multiply polynomials.

- Use the structure of an expression to identify ways to rewrite it.
- Identify zeros of polynomials when suitable factorizations are available

Chapter 8 - Quadratic Functions

- Interpret expressions that represent a quantity in terms of its context.
- Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
- Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
- Distinguish between situations that can be modeled with linear functions and with exponential functions.
- Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
- Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

Chapter 9 - Solving Quadratic Equations

- Solve quadratic equations in one variable.
- Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.

Chapter 11 - Statistics

- Represent data with plots on the real number line (dot plots, histograms, and box plots).
- Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
- Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
- Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.