Algebra 1B
Poudre School District
Pacing Overview

Chapter 3: Graphing Linear Functions
3 Days HS.A.CED.A.2, HS.F.IF.A.1, HS.F.IF.A.2, HS.F.IF.C.7a, HS.F.IF.C.9

Chapter 6: Exponential Functions and Sequences
9-10 Days HS.N.RN.A.1, HS.N.RN.A.2, HS.A.SSE.B.3c, HS.A.CED.A.1, HS.A.CED.A.2, HS.A.REI.A.1, HS.A.REI.D.11, HS.F.IF.B.4, HS.F.IF.C.7e, HS.F.IF.C.8b, HS.F.IF.C.9, HS.F.BF.A.1a, HS.F.BF.B.3, HS.F.LE.A.1a, HS.F.LE.A.1c, HS.F.LE.A.2

Chapter 7: Polynomial Equations and Factoring
9-10 Days HS.A.SSE.A.2, HS.A.SSE.B.3a, HS.A.APR.A.1, HS.A.APR.B.3, HS.A.REI.B.4b

Chapter 8: Graphing Quadratic Functions
8-9 Days HS.A.SSE.B.3a, HS.A.APR.B.3, HS.A.CED.A.2, HS.F.IF.B.4, HS.F.IF.B.6, HS.F.IF.C.7a, HS.F.IF.C.8a, HS.F.IF.C.9, HS.F.BF.A.1a, HS.F.BF.B.3, HS.F.LE.A.3

Chapter 9: Solving Quadratic Equations
7-8 Days HS.A.SSE.B.3b, HS.A.CED.A.1, HS.A.CED.A.4, HS.A.REI.B.4a, HS.A.REI.B.4b, HS.A.REI.C.7, HS.A.REI.D.11, HS.F.IF.C.7a, HS.F.IF.C.8a

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Chapter 10: Radical Functions and Equations
Time Permitting HS.A.CED.A.1, HS.A.CED.A.2, HS.F.IF.B.4, HS.F.IF.B.6, HS.F.IF.C.7b, HS.F.IF.C.9, HS.F.BF.4a

Chapter 11: Data Analysis and Displays
Time Permitting HS.S.ID.A.1, HS.S.ID.A.2, HS.S.ID.A.3, HS.S.ID.B.5

Review & Common Summative Assessment

Major Work of the Grade.
Supporting Work of the Grade.
Additional Work of the Grade.

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Chapter 3: Graphing Linear Functions
3 Days HS.A.CED.A.2, HS.F.IF.A.1, HS.F.IF.A.2, HS.F.IF.C.7a, HS.F.IF.C.9

Chapter Summary				
Section	**Title**	**Level of Learning**	**Standard(s)**	**Pacing**
3.1	Functions	Learning	HS.F.IF.A.1	0.5 day
3.3	Function Notation	Learning	HS.A.CED.A.2, HS.F.IF.A.1, HS.F.IF.A.2, HS.F.IF.C.7a, HS.F.IF.C.9	1 day

Total: 1.5 days

Note: Additional days reserved for review and assessment.

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Additional Activities/Resources	
Name	**Location**

Vocabulary		
dependent variable	domain	function
function notation	independent variable	range
relation		

Standards	
HS.A.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
HS.F.IF.A.1	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 $y = f(x)$.
HS.F.IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
HS.F.IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
HS.F.IF.C.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.*

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Chapter 6: Exponential Functions and Sequences
9-10 Days HS.N.RN.A.1, HS.N.RN.A.2, HS.A.SSE.B.3c, HS.A.CED.A.1, HS.A.CED.A.2, HS.A.REI.A.1, HS.A.REI.D.11, HS.F.IF.B.4, HS.F.IF.C.7e, HS.F.IF.C.8b, HS.F.IF.C.9, HS.F.BF.A.1a, HS.F.BF.B.3, HS.F.LE.A.1a, HS.F.LE.A.1c, HS.F.LE.A.2

Chapter Summary				
Section	**Title**	**Level of Learning**	**Standard(s)**	**Pacing**
6.1	Properties of Exponents	Learning	HS.N.RN.A.2	1.5 days
6.2	Radicals and Rational Exponents	Learning	HS.N.RN.A.1, HS.N.RN.A.2	1.5 days
6.3	Exponential Functions	Learning	HS.A.CED.A.2, HS.F.IF.B.4, HS.F.IF.C.7e, HS.F.IF.C.9, HS.F.BF.A.1a, HS.F.BF.B.3, HS.F.LE.A.1a, HS.F.LE.A.2	1.5 days
6.4	Exponential Growth and Decay	Learning	HS.A.SSE.B.3c, HS.A.CED.A.2, HS.F.IF.C.7e, HS.F.IF.C.8b, HS.F.BF.A.1a, HS.F.LE.A.1c, HS.F.LE.A.2	1 day
6.5	Solving Exponential Equations	Learning	HS.A.CED.A.1, HS.A.REI.A.1, HS.A.REI.D.11	1.5 days

Total: 7 days

Note: Additional days reserved for review and assessment.

Additional Activities/Resources	
Name	**Location**

Vocabulary		
common ratio	compound interest	explicit rule
exponential decay	exponential decay function	exponential equation
exponential function	exponential growth	exponential growth function
geometric sequence	index of a radical	n^{th} root of a
radical	recursive rule	

Standards	
HS.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. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*
HS.N.RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
HS.A.SSE.B.3c	Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
HS.A.CED.A.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.*
HS.A.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
HS.A.REI.A.1	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.
HS.A.REI.D.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.

Standards (continued)	
HS.F.IF.B.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*.
HS.F.IF.C.7e	Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
HS.F.IF.C.8b	Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)12^t$, $y = (1.2)^t/10$, and classify them as representing exponential growth or decay.
HS.F.IF.C.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*.
HS.F.BF.A.1a	Determine an explicit expression, a recursive process, or steps for calculation from a context.
HS.F.BF.B.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.
HS.F.LE.A.1a	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
HS.F.LE.A.1c	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
HS.F.LE.A.2	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).

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Chapter 7: Polynomial Equations and Factoring
9-10 Days HS.A.SSE.A.2, HS.A.SSE.B.3a, HS.A.APR.A.1, HS.A.APR.B.3, HS.A.REI.B.4b *Fall Special Day: Conferences October 20* *Spring Special Day: Teacher Work Day February 19, Spring Break March 12 - 16*

Chapter Summary

Section	Title	Level of Learning	Standard(s)	Pacing
7.1	Adding and Subtracting Polynomials	Learning	HS.A.APR.A.1	0.5 day
7.2	Multiplying Polynomials	Learning	HS.A.APR.A.1	1.5 days
7.4	Solving Polynomial Equations in Factored Form	Learning	HS.A.APR.B.3, HS.A.REI.B.4b	1 day
7.5	Factoring $x^2 + bx + c$	Learning	HS.A.SSE.A.2, HS.A.SSE.B.3a	1 day
7.6	Factoring $ax^2 + bx + c$	Learning	HS.A.SSE.A.2, HS.A.SSE.B.3a	1 day
7.3	Special Products of Polynomials	Learning	HS.A.APR.A.1	1 day
7.7	Factoring Special Products	Learning	HS.A.SSE.A.2, HS.A.SSE.B.3a	
7.8	Factoring Polynomials Completely	Learning	HS.A.SSE.A.2, HS.A.SSE.B.3a	1 day

Total: 7 days

Note: Additional days reserved for review and assessment.

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Additional Activities/Resources	
Name	**Location**
Algebra Tiles	Big Ideas Math: Dynamic Classroom: Tools

Vocabulary		
binomial	closed	degree of a monomial
degree of a polynomial	factored completely	factored form
factoring by grouping	FOIL method	leading coefficient
monomial	polynomial	repeated roots
roots	standard form of a polynomial	trinomial
Zero-Product Property		

Standards	
HS.A.SSE.A.2	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*
HS.A.SSE.B.3a	Factor a quadratic expression to reveal the zeros of the function it defines.
HS.A.APR.A.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.
HS.A.APR.B.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.
HS.A.REI.B.4b	Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.

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Chapter 8: Graphing Quadratic Functions
8-9 Days HS.A.SSE.B.3a, HS.A.APR.B.3, HS.A.CED.A.2, HS.F.IF.B.4, HS.F.IF.B.6, HS.F.IF.C.7a, HS.F.IF.C.8a, HS.F.IF.C.9, HS.F.BF.A.1a, HS.F.BF.B.3, HS.F.LE.A.3

Chapter Summary				
Section	**Title**	**Level of Learning**	**Standard(s)**	**Pacing**
8.1	Graphing $f(x) = ax^2$	Learning	HS.A.CED.A.2, HS.F.IF.C.7a, HS.F.BF.B.3	0.5 day
8.2	Graphing $f(x) = ax^2 + c$	Learning	HS.A.CED.A.2, HS.F.IF.C.7a, HS.F.BF.B.3	0.5 day
8.3	Graphing $f(x) = ax^2 + bx + c$	Learning	HS.A.CED.A.2, HS.F.IF.C.7a, HS.F.IF.C.9	1.5 days
8.4	Graphing $f(x) = a(x - h)^2 + k$	Learning	HS.A.CED.A.2, HS.F.IF.B.4, HS.F.BF.A.1a, HS.F.BF.B.3	1 day
8.5	Using Intercept Form	Learning	HS.A.SSE.B.3a, HS.A.APR.B.3, HS.A.CED.A.2, HS.F.IF.B.4, HS.F.IF.C.8a, HS.F.BF.A.1a	1 day
8.6	Comparing Linear, Exponential, and Quadratic Functions	Learning	HS.F.IF.B.6, HS.F.BF.A.1a, HS.F.LE.A.3	1 day

Total: 5.5 days

Note: Additional days reserved for review and assessment.

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Additional Activities/Resources	
Name	**Location**

Vocabulary		
average rate of change	axis of symmetry	even function
intercept form	maximum value	minimum value
odd function	parabola	vertex form of a quadratic function
vertex of a parabola	zero of a function	

Standards	
HS.A.SSE.B.3a	Factor a quadratic expression to reveal the zeros of the function it defines.
HS.A.APR.B.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.
HS.A.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
HS.F.IF.B.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*.
HS.F.IF.B.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.
HS.F.IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
HS.F.IF.C.8a	Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
HS.F.IF.C.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.*
HS.F.BF.A.1a	Determine an explicit expression, a recursive process, or steps for calculation from a context.

Standards (continued)	
HS.F.BF.B.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.
HS.F.LE.A.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

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Chapter 9: Solving Quadratic Equations
7-8 Days HS.A.SSE.B.3b, HS.A.CED.A.1, HS.A.CED.A.4, HS.A.REI.B.4a, HS.A.REI.B.4b, HS.A.REI.C.7, HS.A.REI.D.11, HS.F.IF.C.7a, HS.F.IF.C.8a *Fall Special Days: Thanksgiving Break November 22-24* *Spring Special Days: Conferences April 13*

Chapter Summary				
Section	**Title**	**Level of Learning**	**Standard(s)**	**Pacing**
9.2	Solving Quadratic Equations by Graphing	Learning	HS.A.REI.D.11, HS.F.IF.C.7a	1 day
9.3	Solving Quadratic Equations Using Square Roots	Learning	HS.A.CED.A.1, HS.A.CED.A.4, HS.A.REI.B.4b	0.5 day
9.4	Solving Quadratic Equations by Completing the Square	Learning	HS.A.SSE.B.3b, HS.A.CED.A.1, HS.A.REI.B.4a, HS.A.REI.B.4b, HS.F.IF.C.8a	1.5 days
9.5	Solving Quadratic Equations Using the Quadratic Formula	Learning	HS.A.CED.A.1, HS.A.REI.B.4a, HS.A.REI.B.4b	1 day
9.6	Solving Nonlinear Systems of Equations	Learning	HS.A.REI.C.7, HS.A.REI.D.11	1 day

Total: 5 days

Note: Additional days reserved for review and assessment.

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Additional Activities/Resources	
Name	**Location**
Form Matters	Big Ideas Math: Performance Tasks: Assessment Book Performance Task

Vocabulary		
completing the square	discriminant	quadratic equation
Quadratic Formula	quadratic function	system of nonlinear equations

Standards	
HS.A.SSE.B.3b	Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
HS.A.CED.A.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*.
HS.A.CED.A.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.*
HS.A.REI.B.4a	Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.
HS.A.REI.B.4b	Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
HS.A.REI.C.7	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 $x^2 + y^2 = 3$.
HS.A.REI.D.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.
HS.F.IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
HS.F.IF.C.8a	Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

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Chapter 10: Radical Functions and Equations
Time Permitting HS.A.CED.A.1, HS.A.CED.A.2, HS.F.IF.B.4, HS.F.IF.B.6, HS.F.IF.C.7b, HS.F.IF.C.9, HS.F.BF.4a

Chapter Summary				
Section	**Title**	**Level of Learning**	**Standard(s)**	**Pacing**
	Chapter Opener/Mathematical Practices			0.5 day
10.1	Graphing Square Root Functions	Learning	HS.A.CED.A.2, HS.F.IF.B.4, HS.F.IF.B.6, HS.F.IF.C.7b, HS.F.IF.C.9	1 day
10.2	Graphing Cube Root Functions	Learning	HS.A.CED.A.2, HS.F.IF.B.4, HS.F.IF.B.6, HS.F.IF.C.7b, HS.F.IF.C.9	0.5 day
10.3	Solving Radical Equations	Learning	HS.A.CED.A.1	1.5 days
10.4	Inverse of a Function	Learning	HS.F.BF.4a	1 day

Total: 4.5 days

Note: Additional days reserved for review and assessment.

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Additional Activities/Resources	
Name	**Location**

Vocabulary		
cube root function	inverse function	inverse relation
radical equation	radical function	square root function

Standards	
HS.A.CED.A.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*.
HS.A.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
HS.F.IF.B.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*.
HS.F.IF.B.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.
HS.F.IF.C.7b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
HS.F.IF.C.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*.
HS.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, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.*

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Chapter 11: Data Analysis and Displays
Time Permitting HS.S.ID.A.1, HS.S.ID.A.2, HS.S.ID.A.3, HS.S.ID.B.5

Chapter Summary				
Section	**Title**	**Level of Learning**	**Standard(s)**	**Pacing**
	Chapter Opener/Mathematical Practices			0.5 day
11.1	Measures of Center and Variation	Learning	HS.S.ID.A.3	1 day
11.2	Box-and-Whisker Plots	Learning	HS.S.ID.A.1, HS.S.ID.A.3	1 day
11.3	Shapes of Distributions	Learning	HS.S.ID.A.1, HS.S.ID.A.2, HS.S.ID.A.3	0.5 day
11.4	Two-Way Tables	Learning	HS.S.ID.B.5	1.5 days
11.5	Choosing a Data Display	Learning	HS.S.ID.A.1	1 day

Total: 5.5 days

Note: Additional days reserved for review and assessment.

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Additional Activities/Resources	
Name	**Location**

Vocabulary		
box-and-whisker plot	categorical data	conditional relative frequency
data transformation	five-number summary	interquartile range
joint frequency	joint relative frequency	marginal frequency
marginal relative frequency	mean	measure of center
measure of variation	median	misleading graph
mode	outlier	qualitative data
quantitative data	quartiles	range of a data set
standard deviation	two-way table	

Standards	
HS.S.ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
HS.S.ID.A.2	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.
HS.S.ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
HS.S.ID.B.5	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.