Course Guide to Essential Outcomes

High School: College Mathematics

Adopted Course Primary Resource	Supplementary Resources
• Thinking Mathematically (7th Edition, Blitzer) Pearson	• ALEKS (MCGraw-Hill)

Domain	Cluster	Standard **RED indicates power/identified essential standards for student success.**	
		Number & Quantity	
The Real Number System	Extend the properties of exponents to rational exponents.	CC.N.RN.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) x 3] to hold, so [5^(1/3)]^3 must equal 5.
		CC.N.RN.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
	Use properties of rational and irrational numbers.	CC.N.RN.3	Explain why the sum or product of 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.
Quantities	Reason quantitatively and use units to solve problems.	CC.N.Q.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
		CC.N.Q.2	Define appropriate quantities for the purpose of descriptive modeling.
		CC.N.Q.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
The Complex Number System	Perform arithmetic operations with complex numbers.	CC.N.CN.1	Know there is a complex number i such that i^2 = -1, and every complex number has the form a + bi with a and b real.
		CC.N.CN.2	Use the relation i^2 = -1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
		CC.N.CN.3	Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.
	Represent complex numbers and their operations on the complex plane.	CC.N.CN.4	Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.
		CC.N.CN.5	Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. For example, (-1 ± ?3i)^3 = 8 because (-1 ±?3i) has modulus 2 and argument 120°.
		CC.N.CN.6	Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.
	Use complex numbers in polynomial identities and equations.	CC.N.CN.7	Solve quadratic equations with real coefficients that have complex solutions.
		CC.N.CN.8	Extend polynomial identities to the complex numbers. For example, rewrite x^2 + 4 as (x + 2i)(x - 2i).
		CC.N.CN.9	Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
~~Vector & Matrix Quantities~~	Perform operations on matrices & use matrices in applications.	CC.N.VM.6	Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
		CC.N.VM.7	Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.
		CC.N.VM.8	Add, subtract, and multiply matrices of appropriate dimensions.
		CC.N.VM.9	Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.
		CC.N.VM.10	Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.
		CC.N.VM.11	Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.
		Algebra	
Seeing Structure in Expressions	Interpret the structure of expressions	CC.A.SSE.1	**Interpret expressions that represent a quantity in terms of its context.*** *a. Interpret parts of an expression, such as terms, factors, and coefficients.* *b. 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.*
		CC.A.SSE.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).

	Write expressions in equivalent forms to solve problems	CC.A.SSE.3	**Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.** *a. Factor a quadratic expression to reveal the zeros of the function it defines.* *b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.* *c. 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) ? 1.012^(12t) to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
		CC.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.
Arithmetic with Polynomials and Rational Functions	Perform arithmetic operations on polynomials	CC.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.
	Understand the relationship between zeros and factors of polynomials	CC.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).
		CC.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.
	Use polynomial identities to solve problems	CC.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.
		CC.A.APR.5	Know and apply that the Binomial Theorem gives 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. (The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument.)
	Rewrite rational expressions	CC.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.
		CC.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.
Creating Equations	Create equations that describe numbers or relationships	CC.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.*
		CC.A.CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*
		CC.A.CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*
		CC.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.*
Reasoning with Equations and Inequalities	Understand solving equations as a process of reasoning and explain the reasoning	CC.A.REI.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.
		CC.A.REI.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
	Solve equations and inequalities in one variable	CC.A.REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
		CC.A.REI.4	**Solve quadratic equations in one variable.** *a. Use the method of completing the square to transforms 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.* *b. 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 ± bi for real numbers a and b.*
	Solve systems of equations	CC.A.REI.5	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.
		CC.A.REI.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
		CC.A.REI.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.
		CC.A.REI.8	Represent a system of linear equations as a single matrix equation in a vector variable.
		CC.A.REI.9	Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater).

		CC.A.REI.10	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).
		CC.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.*
	Represent and solve equations and inequalities graphically	CC.A.REI.12	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.
Functions			
		CC.F.IF.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).
		CC.F.IF.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
		CC.F.IF.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ? 1 (n is greater than or equal to 1).
		CC.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.*
		CC.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.*
	Understand the concept of a function and use function notation	CC.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.*
		CC.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.*** *a. Graph linear and quadratic functions and show intercepts, maxima, and minima.* *b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.* *c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.* *d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. (+)* *e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.*
		CC.F.IF.8	**Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.** *a. 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.* *b. 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)^(12t), y = (1.2)^(t/10), and classify them as representing exponential growth or decay.*
Interpreting Functions	Analyze functions using different representations	CC.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.
		CC.F.BF.1	**Write a function that describes a relationship between two quantities.*** *a. Determine an explicit expression, a recursive process, or steps for calculation from a context.* *b. 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.* *c. Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time. (+)*
	Build a function that models a relationship between two quantities	CC.F.BF.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*
		CC.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.
Building Functions	Build new functions from existing functions	CC.F.BF.4	**Find inverse functions.** *a. 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) =2(x^3) for x > 0 or f(x) = (x+1)/(x-1) for x =? 1 (x not equal to 1).* *b. Verify by composition that one function is the inverse of another. (+)* *c. Read values of an inverse function from a graph or a table, given that the function has an inverse. (+)* *d. Produce an invertible function from a non-invertible function by restricting the domain. (+)*

		CC.F.BF.5	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.
Linear, Quadratic, and Exponential Models	Construct and compare linear and exponential models and solve problems	CC.F.LE.1	**Distinguish between situations that can be modeled with linear functions and with exponential functions.*** *a. Prove that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.** *b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.** *c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.**
		CC.F.LE.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).*
		CC.F.LE.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.*
		CC.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.*
	Interpret expressions for functions in terms of the situation they model	CC.F.LE.5	Interpret the parameters in a linear, quadratic, or exponential function in terms of a context.*
Trigonometric Functions	Extend the domain of trigonometric functions using the unit circle	CC.F.TF.1	Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
		CC.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.
		CC.F.TF.3	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 x, [(pi) + x], and [2(pi) - x] in terms of their values for x, where x is any real number.
		CC.F.TF.4	Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
	Model periodic phenomena with trigonometric functions	CC.F.TF.5	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.*
		CC.F.TF.6	Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
		CC.F.TF.7	Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.*
	Prove and apply trigonometric identities	CC.F.TF.8	Prove the Pythagorean identity (sin A)^2 + (cos A)^2 = 1 and use it to calculate trigonometric ratios.
		CC.F.TF.9	Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.
Geometry			
Congruence	Experiment with transformations in the plane	CC.G.CO.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
	Prove theorems involving similarity	CC.G.SRT.4	Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.
		CC.G.SRT.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
	Define trigonometric ratios and solve problems involving right triangles	CC.G.SRT.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
Geometric Measurement and Dimension	Explain volume formulas and use them to solve problems	CC.G.GMD.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.
		CC.G.GMD.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*
Modeling with Geometry	Apply geometric concepts in modeling situations	CC.G.MG.1	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*
		CC.G.MG.2	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).*
		CC.G.MG.3	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).
Statistics & Probability			
Interpreting Categorical	Summarize, represent, and interpret data on a single	CC.S.ID.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).

and Quantitative Data	count or measurement variable	CC.S.ID.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.
		CC.S.ID.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
		CC.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.
		CC.S.ID.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.
		CC.S.ID.6	**Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.** *a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.* *b. Informally assess the fit of a function by plotting and analyzing residuals.* *c. Fit a linear function for a scatter plot that suggests a linear association.*
	Interpret linear models	CC.S.ID.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
		CC.S.ID.8	Compute (using technology) and interpret the correlation coefficient of a linear fit
		CC.S.ID.9	Distinguish between correlation and causation
	Use the rules of probability to compute probabilities of compound events in a uniform probability model	CC.S.CP.6	Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.
		CC.S.CP.7	Apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpret the answer in terms of the model.
		CC.S.CP.8	Apply the general Multiplication Rule in a uniform probability model, P(A and B) = [P(A)]*[P(B|A)] =[P(B)]*[P(A|B)], and interpret the answer in terms of the model.
		CC.S.CP.9	Use permutations and combinations to compute probabilities of compound events and solve problems.
Using Probability to Make Decisions	Use probability to evaluate outcomes of decisions	CC.S.MD.5	**Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.** *a. Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.* *b. Evaluate and compare strategies on the basis of expected values. For example, compare a high-deductible versus a low- deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.*
		CC.S.MD.6	Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
		CC.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).
Mathematical Practices			• Make sense of problems and persevere in solving them. • Reason abstractly and quantitatively. • Construct viable arguments and critique the reasoning of others. • Model with Mathematics • Use appropriate tools strategically. • Attend to precision. • Look for and make use of structure. • Look for and express regularity in repeated reasoning.

Units of Study	Standards	Unit Learning Targets	Common Assessments & Pacing
(5) Number Theory and the Real Number System	N.RN.2 - Rewrite expressions involving radicals and rational exponents using the properties of exponents. N.RN.3 - Explain why the sum or product of 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.	• Students determine divisibility rules • Students write prime factorization of composite numbers • Students solve problems using the greatest common divisor • Students solve problems using the least common multiple	15 Days

	N.Q.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.		
Unit 1: (6) Algebra: Equations and Inequalities (7) Algebra: Graphs, Functions, and Linear Systems	A.CED.3 - Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. A.CED.1 - Create equations and inequalities in one variable and use them to solve problems. F.BF.1 - Write a function that describes a relationship between two quantities. F.LE.1 - Distinguish between situations that can be modeled with linear functions and with exponential functions. S.ID.7 - Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	• Students simplify algebraic expressions • Students solve equations and inequalities • Students solve percent applications • Students graph equations and inequalities in two variables	22 Days
Unit 2: (8) Personal Finance (9) Measurement	N.Q.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays A.SSE.1 - Interpret expressions that represent a quantity in terms of its context.* a. Interpret parts of an expression, such as terms, factors, and coefficients. A.CED.4 - Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. A.REI.10 - 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)	• Solve percent applications • Students calculate simple and compound interest • Students calculate present and future values • Students use measurement concepts (both US Customary and Metric) to solve problems • Students use relationships between volume and weight to solve problems	18 Days
(2) Set Theory (If time allows)	N.Q.2 - Define appropriate quantities for the purpose of descriptive modeling.	• Students apply concepts of subsets and equivalent sets to infinite sets • Students use Venn diagrams to visualize relationships between sets • Students express quantified statements in multiple ways	10 Days
Semester I Ends			
Unit 3: (10) Geometry	G.CO.1 - Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	• Students apply geometric concepts • Students apply trigonometric concepts to solve problems • Students use relationships between parallel lines and transversals to solve problems	15 Days

	G.SRT.5 - Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. G.GMD.3 - Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. G.MG.3 - Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). G.MG.1 - Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* G.SRT.6 - Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	● Students solve problems involving properties of similar triangles and Pythagorean Theorem	
Unit 4: (11) Counting Methods and Probability Theory (12) Statistics	S.ID.1 - Represent data with plots on the real number line (dot plots, histograms, and box plots). S.ID.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. S.ID.3 - Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). S.ID.6 - Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. S.CP.6 - Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. S.CP.9 - Use permutations and combinations to compute probabilities of compound events and solve problems. S.MD.5 - Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. a. Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.	● Students solve problems involving probabilities ● Students develop and apply the Fundamental Counting Principle ● Students apply combinations and permutations ● Students calculate measures of central tendency ● Students determine data at specified standard deviations ● Students solve problems involving normal distribution ● Students interpret information given in a scatter plot	26 Days
(3) Logic (If time allows)	S.CP.7 - Apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpret the answer in terms of the model.	● Students express quantified statements in multiple ways ● Students express compound statements in symbolic	16 Days

	SP.CP.A.1 - Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). SP.CP.A.2 - 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 they are independent.	form ● Students determine the truth value of compound statements	
End of Course Assessment Administered; Scores Entered in Educlimber (Data Dashboard)			
Semester II Ends			