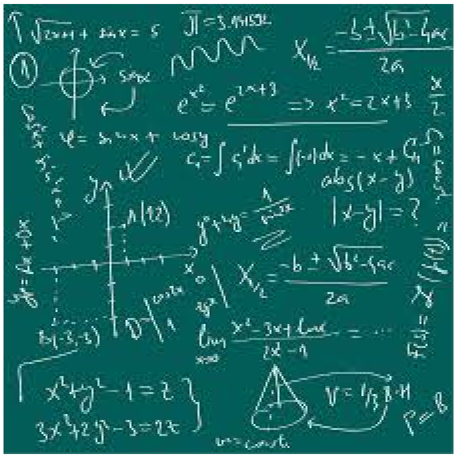


"I Can¨ Mascoma Standards
High School Math

I Can Use Complex Numbers to Help Me Understand Math

☐ I can recognize a complex number i where $i^2 = -1$ and $i = \sqrt{1}$ (NQ.9-12. CN. 1)

☐ I can represent every complex number in the form $a + bi$, where a and b are real numbers. (NQ.9-12. CN. 1)

☐ I can add and subtract complex numbers using the commutative and associative properties. (NQ.9-12. CN. 2)

☐ I can multiply complex numbers using the commutative, associative, and distributive properties. (NQ.9-12. CN. 2)

☐ I can use the equation $i^2 = -1$ to prove that $i^4 = i^8 = i^{4k}$ where k is a positive integer. (NQ.9-12. CN. 2)

☐ I can use the equation $i^2 = -1$ to prove that $i^{-5} = i^{-9} = i^{-4k-3}$ where k is a positive integer.. (NQ.9-12. CN. 2)

☐ I can determine the conjugate of a complex number and determine the quotients of a set of complex numbers by using the conjugate of the denominator. (NQ.9-12. CN. 3)

☐ I can use the equations $(\sqrt{(a^2 + b^2)} = r)$ to determine the modulus, r, of a complex number. (NQ.9-12. CN. 3)

<u>Keywords</u>: complex number, a+bi, commutative, associative, distributive, properties, conjugate, modulus, quotient

☐ I can represent complex numbers on the complex plane in rectangular form. (NQ. 9-12. CN. 4)

☐ I can represent complex numbers on the complex plane in polar form. (NQ. 9-12. CN. 4)

☐ I can explain why rectangular and polar forms of a complex number represent the same number. (NQ. 9-12. CN.4)

☐ I can represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on a complex plane. (NQ. 9-12. CN.5)

☐ I can use properties of this representation for computing, for example, $(-1 + \sqrt{3}i)^3 = 8$ because $(-1 + \sqrt{3})$ has modulus 2 and argument 120°. (NQ. 9-12. CN.5)

☐ I can determine whether it is desirable to use polar or rectangular form to add, subtract, multiply, or divide complex numbers. (NQ. 9-12. CN.4)

☐ I can 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. (NQ. 9-12. CN.5)

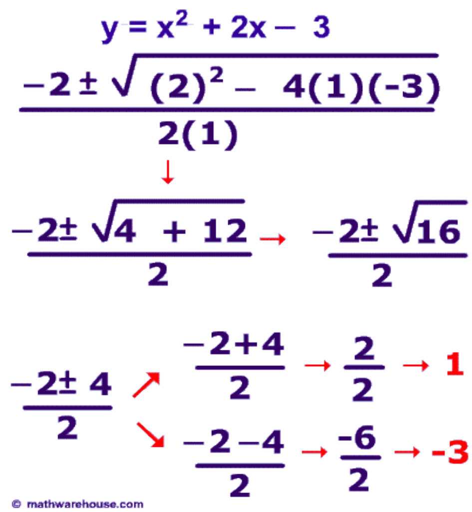
Keywords: complex number, a+bi, commutative, associative, distributive, properties, conjugate, modulus, quotient, polar, rectangular, form, plane

☐ I can determine if a quadratic equation with real coefficients has complex roots. (NQ. 9-12. CN.7)

☐ I can solve quadratic equations with real coefficients and present the solution as a complex number. (NQ. 9-12. CN.7)

☐ I can extend polynomial identities to the complex numbers such as rewriting $x^2 + 4$ as $(x + 2i)(x-2i)$. (NQ. 9-12. CN.8)

☐ I can understand the Fundamental Theorem of Algebra showing that it is true for quadratic polynomials. (NQ. 9-12. CN.9)



Keywords: complex number, a+bi, polynomial, coefficient, solution, Fundamental Theorem, quadratic equation

I Can Use Quantities to Help Me Understand Math

☐ I can apply units consistently when solving a multi-step problem and consistently label each unit to maintain accuracy. (NQ.9-12.Q.1)

☐ I can select appropriate units when solving real world problems. (NQ.9-12.Q.1)

Provides:	Nominal	Ordinal	Interval	Ratio
"Counts," aka "Frequency of Distribution"	✓	✓	✓	✓
Mode, Median		✓	✓	✓
The "order" of values is known		✓	✓	✓
Can quantify the difference between each value			✓	✓
Can add or subtract values			✓	✓
Can multiple and divide values				✓
Has "true zero"				✓

☐ I can scale graphs and data displays appropriately when solving problems. (NQ.9-12.Q.2)

☐ I can define relevant quantities when examining a set of data. (NQ.9-12.Q.2)

☐ I can choose relevant units of measure for each variable or quantity in a set of data. (NQ.9-12.Q.2)

☐ I can decide on the level of specificity of measurement data appropriate for a given measurement tool. (NQ.9-12.Q.3)

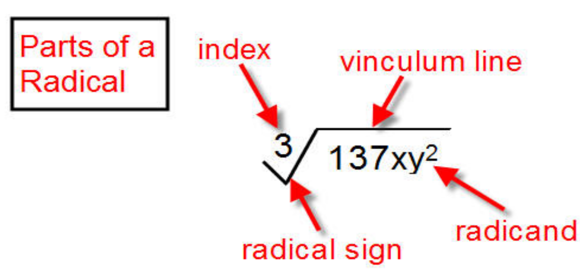
Keywords: quantity, measurement, unit, convert, graph, data scale, modeling, accuracy

I Can Use the Real Number System to Help Me Understand Math

☐ I can explain how the definition of the meaning of rational exponents follows from extending the properties on integer exponents of those values. (NQ.9-12.RN.1)

☐ I can understand the properties of exponents and use them to simplify expressions containing radical exponents. (NQ.9-12.RN.1)

☐ I can understand the properties of exponents and use them to simplify expressions containing integer exponents. (NQ.9-12.RN.2)



☐ I can demonstrate my understanding that for n (2, 3, 4, …), $(x^{1/n})^n = x$, and I can show why this is true. (NQ.9-12.RN.2)

☐ I can demonstrate my understanding that $x^{1/n} = \sqrt[n]{x}$ because $(\sqrt[n]{x})^n$ and $(x^{1/n})^n = x$, as well. (NQ.9-12.RN.2)

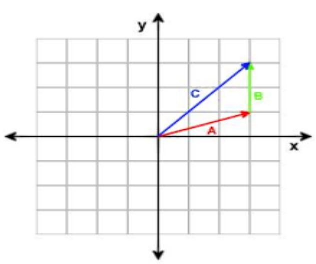
☐ I can rewrite radical expressions as expressions with radical exponents, and vice-versa. (NQ.9-12.RN.2)

☐ I can understand the definitions of rational and irrational numbers and explain why the sum of two rational numbers is rational, the sum of a rational and irrational number is irrational, and the product of a nonzero rational number and irrational number is irrational. (NQ.9-12.RN.3)

<u>Keywords</u>: rational, irrational, exponent, expression, integer, property, radical, root, real

I Can Use Vector and Matrix Quantities to Help Me Understand Math

☐ I can recognize both vector quantities of magnitude/length and direction/angle, and can represent vector quantities by directed line segments, such as $\vec{v}=\overrightarrow{RT}$, where R is the initial point and T is the terminal point. (NQ.9-12.VM.1)



☐ I can use appropriate symbols for vectors and their magnitudes (*v*, $\vec{v}$, $|v|$, $||v||$, *etc.*) . (NQ.9-12.VM.1)

☐ I can subtract coordinates of an initial point, *R*, from the coordinates of a terminal point, *T*, to find the components of a vector as follows: $v=\langle v_1, v_2\rangle=\langle T_1 - R_1, T_2 - R_2, \rangle$. (NQ.9-12.VM.2)

☐ I can solve problems where quantities can be represented by vectors and decide if these vectors can be represented by components, or by magnitude/length and direction/angle. (NQ.9-12.VM.3)

☐ I can understand and solve real-world problems involving vectors. (NQ.9-12.VM.3)

☐ I can solve problems involving velocity, force and other quantities by performing operations with vectors such as addition, subtraction, and scalar multiplication. (NQ.9-12.VM.3)

<u>Keywords</u>: vectors, velocity, force, magnitude, length, direction, angle, scalar multiplication, addition, subtraction, x axis, y axis, point, initial, terminal, coordinates

☐ I can add vectors end-to-end. (NQ.9-12.VM.4)

☐ I can add vectors component-wise. (NQ.9-12.VM.4)

☐ I can add vectors using the parallelogram rule. (NQ.9-12.VM.4)

☐ I can understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. (NQ.9-12.VM.4)

☐ I can determine the magnitude and direction of the sum of two vectors presented in magnitude and direction form. (NQ.9-12.VM.4)

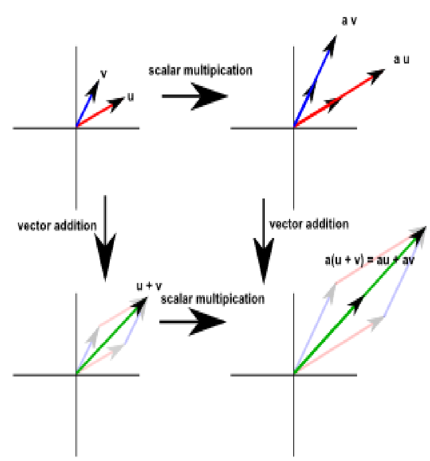
☐ I can understand vector subtraction *v-w* as *v + (-w),* where *–w* is the additive inverse of *w*, with the same magnitude as w and pointing in the opposite direction. (NQ.9-12.VM.4)

☐ I can perform vector subtraction component-wise. (NQ.9-12.VM.4)

☐ I can represent vector subtraction graphically by connecting the tips in the correct order. (NQ.9-12.VM.4)

<u>Keywords</u>: vectors, velocity, force, magnitude, length, direction, angle, subtraction, x axis, y axis, point, initial, terminal, coordinates

☐ I can represent scalar multiplication graphically by scaling vectors and possibly reversing their direction. (NQ.9-12.VM.5)



☐ I can perform scalar multiplication component wise (for example, $c(v_x, v_y) = (cv_x, cv_y)$). (NQ.9-12.VM.5)

☐ I can compute the magnitude of a scalar *cv* using $||cv|| = |c|v$. (NQ.9-12.VM.5)

☐ I can compute the direction of cv knowing that when $|c|v \neq 0$, the direction of *cv* is either along *v* (for $c > 0$) or against v (for $c < 0$). (NQ.9-12.VM.5)

☐ I can perform operations on matrices and use matrices in applications. (NQ.9-12.VM.5)

<u>Keywords</u>: vectors, velocity, force, magnitude, length, direction, angle, scalar, multiplication, x axis, y axis, point, initial, terminal, coordinates, matrix (matrices)

☐ I can use matrices to represent and manipulate data. For example, I can represent payoffs or incidence relationships in a network. (NQ.9-12.VM.6)

☐ I can multiply matrices by scalars to produce new matrices. (NQ.9-12.VM.7)

☐ I can manipulate matrices to solve real world problems. (NQ.9-12.VM.7)

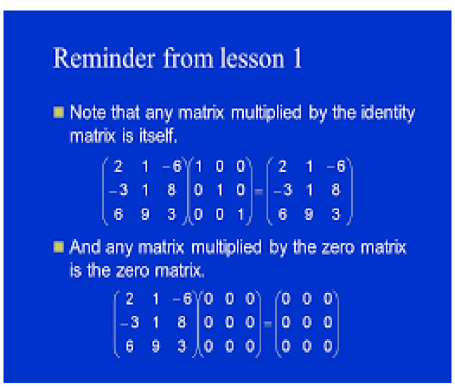
☐ I can add, subtract, and multiply matrices of appropriate dimensions (NQ.9-12.VM.8)

☐ I can explain why matrix multiplication for square matrices is not a commutative operation. (NQ.9-12.VM.9)

☐ I can explain why matrix multiplication for square matrices still satisfies the associative and distributive properties. (NQ.9-12.VM.9)

<u>Keywords</u>: vectors, velocity, force, magnitude, length, direction, angle, scalar, multiplication, x axis, y axis, point, initial, terminal, coordinates, matrix (matrices), commutative, associative, distributive

☐ I can explain how the role of zero and identity matrices behave in adding and multiplying matrices similarly to the role of *0* and *1* in real numbers. For example, I can explain that, as $x+0=x$, and $x(1)=x$, *Matrix M+0= Matrix M*, and *Matrix M(1) = Matrix M*. (NQ.9-12.VM.10)



☐ I can calculate the determinate of a square matrix. (NQ.9-12.VM.10)

☐ I can calculate the multiplicative inverse of a square matrix. (NQ.9-12.VM.10)

☐ I can understand that when the determinant of a square matrix equals *0*, the matrix does not have a multiplicative inverse. (NQ.9-12.VM.10)

☐ I can multiply a vector (expressed as a one column matrix) by a matrix of suitable dimensions to produce another vector. (NQ.9-12.VM.11)

☐ I can use matrices to transform vectors by adding and multiplying them. (NQ.9-12.VM.11)

☐ I can calculate the transformation that is represented by a matrix, and the matrix that will produce a composite transformation. (NQ.9-12.VM.12)

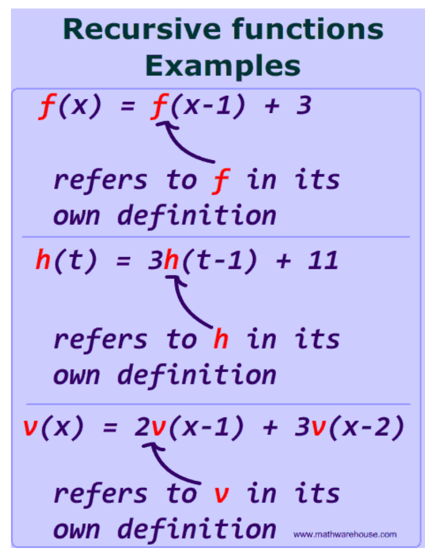
☐ I can work with 2 x 2 matrices as transformations of the plane. (NQ.9-12.VM.12)

☐ I can interpret the absolute value of the determinant in terms of area. (NQ.9-12.VM.12)

<u>Keywords</u>: vectors, velocity, force, magnitude, length, direction, angle, scalar, multiplication, x axis, y axis, point, initial, terminal, coordinates, matrix (matrices), determinant, square, transformation, multiplicative inverse

I can use the Building of Functions to Me Understand Math

☐ I can distinguish between and explicit and recursive expression of a function. (F.9-12.BF.1)



☐ I can write an explicit expression of a function to describe a real world scenario. (F.9-12.BF.1)

☐ I can write a recursive expression of a function to describe a real-world scenario. (F.9-12.BF.1)

☐ I can determine the steps for calculation for a real world scenario. (F.9-12.BF.1)

☐ I can combine standard function types using arithmetic operations for real world scenarios. (F.9-12.BF.1)

☐ I can compose functions to express real world scenarios. (F.9-12.BF.1)

<u>Keywords</u>: equation, variable, function, *f(x),* quantity, compose, build, operations

☐ I can distinguish between and explicit and recursive formula, and know what each will reveal about a given sequence. (F.9-12.BF.2)

☐ I can distinguish between arithmetic and geometric sequences. (F.9-12.BF.2)

☐ I can write explicit formulas for arithmetic and geometric sequences. (F.9-12.BF.2)

☐ I can write recursive formulas for arithmetic and geometric sequences. (F.9-12.BF.2)

Series Formulas

Arithmetic Series

$$S_n = \frac{n}{2}(a_1 + a_n)$$

Geometric Series

$$S_n = \frac{a_1 \bullet (1 - r^n)}{(1 - r)}$$

☐ I can identify when a real world scenario models an arithmetic sequence. (F.9-12.BF.2)

☐ I can identify when a real world scenario models a geometric sequence. (F.9-12.BF.2)

☐ I can translate between the recursive and explicit forms of both arithmetic and geometric sequences. (F.9-12.BF.2)

<u>Keywords</u>: equation, variable, function, *f(x),* quantity, compose, build, operations, recursive, explicit, geometric, arithmetic, model, sequence, translate

☐ I can explain the effect of *f(x)* + *k* on the original graph *f(x)* for both a positive and negative value for *k* and find the value of *k* given the graphs. (F.9-12.BF.3)

☐ I can explain the effect of *kf(x)* on the original graph *f(x)* for both a positive and negative value for *k* and find the value of *k* given the graphs. (F.9-12.BF.3)

☐ I can explain the effect of *f(kx)* on the original graph *f(x)* for both a positive and negative value for *k* and find the value of *k* given the graphs. (F.9-12.BF.3)

☐ I can explain the effect of *f(x+k)* on the original graph *f(x)* for both a positive and negative value for *k* and find the value of *k* given the graphs. (F.9-12.BF.3)

☐ I can use technology to illustrate the effects of transforming a function. (F.9-12.BF.3)

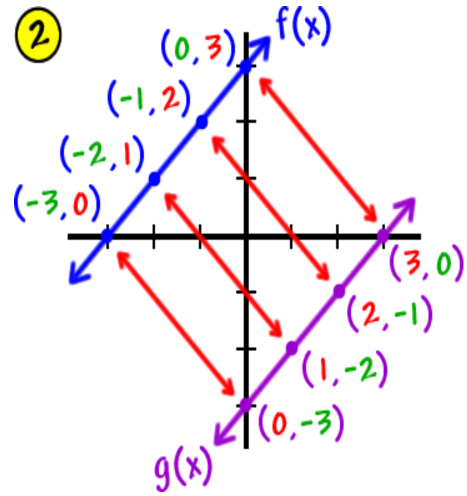
☐ I can recognize an even function from both its graph as well as its algebraic expression. (F.9-12.BF.3)

☐ I can recognize an odd function from both its graph as well as its algebraic expression. (F.9-12.BF.3)

<u>Keywords</u>: equation, variable, function, *f(x),* quantity, compose, build, operations, transformation, graphing, even, odd

☐ I can 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. (F.9-12.BF.4)

☐ I can verify by composition that one function is the inverse of another. (F.9-12.BF.4)



☐ I can understand how the horizontal line test can help me determine if a function has an inverse, and can use the test. (F.9-12.BF.4)

☐ I can read values of an inverse function from a graph or table, given the function has an inverse. (F.9-12.BF.4)

☐ I can understand how the vertical line test can help me determine if a function is represented in a given graph. (F.9-12.BF.4)

☐ I can use the vertical line test to restrict the domain of a relation. (F.9-12.BF.4)

☐ I can use the horizontal line test to restrict the domain of a relation. (F.9-12.BF.4)

☐ I can produce an invertible function from a non-invertible function. (F.9-12.BF.4)

<u>Keywords</u>: equation, variable, function, *f(x),* quantity, compose, build, operations, transformation, graphing, domain, invertible, non-invertible, horizontal, vertical

☐ I can distinguish between exponential and logarithmic functions. (F.9-12.BF.4)

☐ I can use the inverse relationship between exponential and logarithmic functions to solve problems involving them. (F.9-12.BF.4)

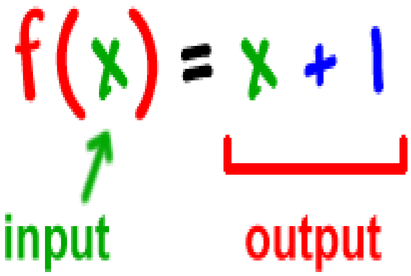
<u>Keywords</u>: equation, variable, function, *f(x),* quantity, compose, build, logarithm, exponent

☐ I can explain the difference between domain and range. (F.9-12.IF.1)

☐ I can 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. (F.9-12.IF.1)

☐ I can explain that, 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*. (F.9-12.IF.1)

☐ I can explain that the graph of *f* is the graph of the equation *y = f(x)*. (F.9-12.IF.1)



☐ I can assign letters other than *f* to label and organize multiple, separate functions such as *h(x)* and *g(x)*. (F.9-12.IF.1)

☐ I can understand function notation and recognize how the input of a function, *x*, corresponds to its output, *f*. (F.9-12.IF.1)

☐ I can utilize function notation to describe data in a table or graph. (F.9-12.IF.2)

☐ I can understand how function notation can be applied to real world problems. (F.9-12.IF.2)

<u>Keywords</u>: equation, variable, function, *f(x),* graph, domain, range, *y=f(x),* notation, input, output

☐ I can analyze a set of integers (a sequence) and create a function whose domain is a subset of the integers. (F.9-12.IF.3)

☐ I can analyze a set of integers (a sequence) and generate additional integers according to the function whose domain is a subset of the integers. (F.9-12.IF.3)

☐ I can determine any element of a sequence by inputing its position into a given formula. (F.9-12.IF.3)

☐ I can interpret functions as they arise in real world applications. (F.9-12.IF.3)

☐ I can interpret key features of graphs and tables in terms of the quantities for a function that models a relationship between two quantities. Thus, I can understand how relationships between two quantities are conveyed through:

X and *Y* intercepts	Ordered pairs	Increasing intervals
Decreasing intervals	Positive intervals	Negative intervals
Relative maximums	Negative minimums	Symmetries
Positive end behavior	Negative end behavior	Periodicity

(F.9-12.IF.4)

☐ I can recognize key information in written problems as components of an underlying function and sketch a graph that conveys this information and indicates all key features of the underlying function. (F.9-12.IF.4)

<u>Keywords</u>: equation, variable, function, *f(x),* graph, domain, range, *y=f(x),* notation, input, output, sequence, integer

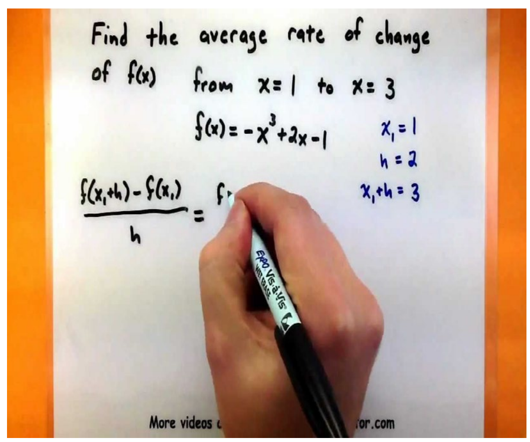
☐ I can describe how the domain of a function is conveyed in graph form and, where applicable, to the quantitative relationship it describes. (F.9-12.IF.5)

☐ I can relate the domain of a function to its graph in real world scenarios. (F.9-12.IF.5)

☐ I can calculate and interpret the average rate of change of a function presented symbolically over a specified interval. (F.9-12.IF.6)

☐ I can calculate and interpret the average rate of change of a function presented in a table over a specified interval (F.9-12.IF.6)

☐ I can calculate and interpret the average rate of change of a function presented in functional notation over a specified interval (F.9-12.IF.6)



☐ I can estimate the rate of change from a graph . (F.9-12.IF.6)

<u>Keywords</u>: equation, variable, function, *f(x),* graph, domain, range, *y=f(x),* rate, change, slope, interval

☐ I can decide how best to display a function graphically, either by hand or by using technology. (F.9-12.IF.7)

☐ I can graph linear functions $f(x)=x$ and understand:

- point-slope form as $y-y_1=m(x-x_1)$
- slope-intercept form as $f(x)=mx+b$
- standard form as $Ax+By=C$

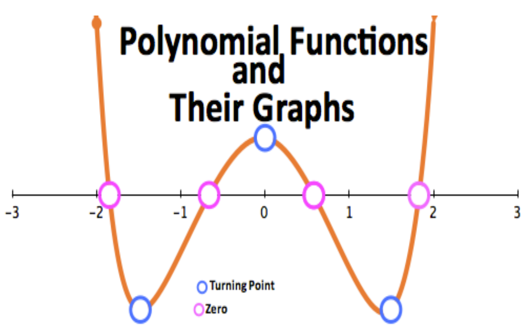
and determine the *x*- and *y*- intercepts for each graph. (F.9-12.IF.7)

☐ I can graph quadratic functions $f(x) = x^2$, can understand that the vertex of a quadratic function is either the maximum or the minimum, and can identify which it will be by analyzing the equation. I can determine the *x*- and *y*- intercepts for a quadratic. (F.9-12.IF.7)

☐ I can graph square root functions $f(x) = \sqrt{x}$, cube root functions $f(x)= \sqrt[3]{x}$, and piecewise-defined functions. (F.9-12.IF.7)

☐ I can graph step functions by substituting values for *x* and plotting the points. (F.9-12.IF.7)

☐ I can graph absolute value function $f(x)=|x|$, and can understand the vertex of an absolute value function is either the maximum or the minimum, and can identify which it will be by analyzing the equation. I can determine the *x*- and *y*- intercepts for an absolute value. (F.9-12.IF.7)



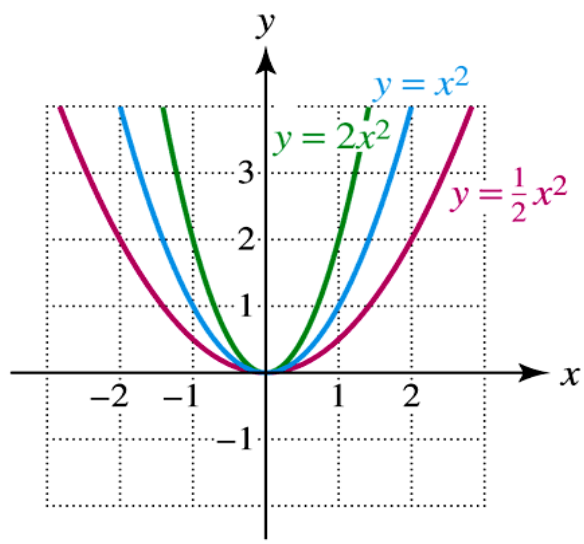
☐ I can graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. (F.9-12.IF.7)

☐ I can explain rational functions as the ratio of two polynomials, and graph them, identifying zeros. (F.9-12.IF.7)

Keywords: graph, function, linear, quadratic, square root, cube root, piecewise, step, absolute value, polynomial, factorization, end behavior, x-intercept, y-intercept, slope

☐ I can explain that, for a quadratic function, standard form is $f(x) = ax^2 + bx + c$; that vertex form is $f(x) = a(x-h)^2 + k$ where point (h,k) is the location of the vertex; and that factored form is $f(x)=a(x-x_1)(x-x_2)$ where x_1 and x_2 are x-intercepts. (F.9-12.IF.8)

☐ I can explain that all quadratic functions result in graphs that are parabolas. (F.9-12.IF.8)



☐ I can determine if a quadratic has x-intercepts by analyzing the equation and use x-intercepts of a quadratic to find the axis of symmetry. (F.9-12.IF.8)

☐ I can use the axis of symmetry to determine the vertex of a quadratic. (F.9-12.IF.8)

☐ I can convert a quadratic in one form to another form. (F.9-12.IF.8)

☐ I can understand and interpret a quadratic function in a real-world problem or scenario. (F.9-12.IF.8)

☐ I can classify exponential models that represent exponential growth and exponential decay. (F.9-12.IF.8)

☐ I can use properties of exponents to interpret expressions for exponential functions. (F.9-12.IF.8)

☐ I can compare properties of two functions, each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). (F.9-12.IF.9)

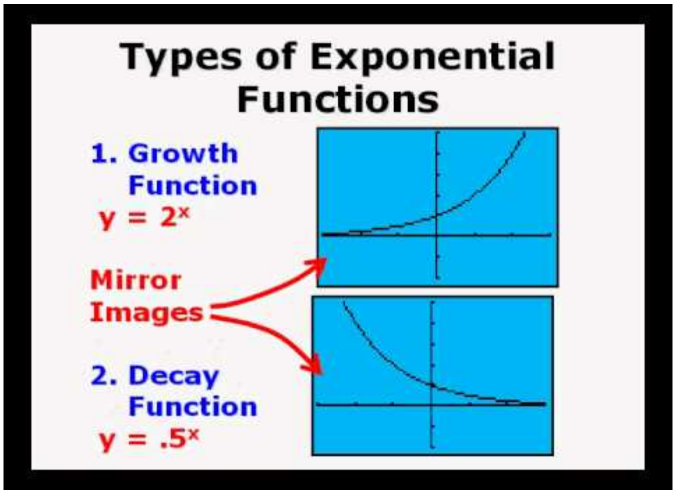
<u>Keywords</u>: graph, function, linear, quadratic, x-intercept, y-intercept, slope, parabola, exponent, growth, decay, percentage

 I can distinguish between linear functions and exponential functions. (F.9-12.LQE.1)

 I can prove that a linear function has a constant slope over equal intervals. (F.9-12.LQE.1)

 I can prove that an exponential functions grows by a constant multiplier over equal intervals. (F.9-12.LQE.1)

 I can recognize situations (real world as well as theoretical) in which a quantity grows or decays by a constant rate per unit interval relative to another. (F.9-12.LQE.1)



 I can recognize situations (real world as well as theoretical) in which a quantity grows or decays by a constant percent rate per unit interval relative to another. (F.9-12.LQE.1)

 I can explain why a function is linear or exponential from data presented in a graph, a table, or a written description. (F.9-12.LQE.1)

 I can 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). (F.9-12.LQE.2)

<u>Keywords</u>: equation, variable, function, *f(x),* quantity, composition, build, operations

 I can distinguish use graphs and tables to show and compare the different output values and rates of change for linear, quadratic, exponential, and polynomial functions. (F.9-12.LQE.3)

 I can understand that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or as a polynomial function. (F.9-12.LQE.3)

 I can describe the inverse relationship of exponential and logarithmic functions. (F.9-12.LQE.4)

☐ I can rewrite an exponential equation in logarithmic form and explain why it is equivalent. (F.9-12.LQE.4)

☐ I can evaluate a logarithm using technology such as a calculator. (F.9-12.LQE.4)

☐ I can interpret and understand the quantities, rates of change, and other values of a linear function $f(x) = mx + b$ in the context of a real-world scenario. (F.9-12.LQE.5)

☐ I can interpret and understand the quantities, rates of change, and other values of an exponential function $f(x) = b^x + c$. (F.9-12.LQE.5)

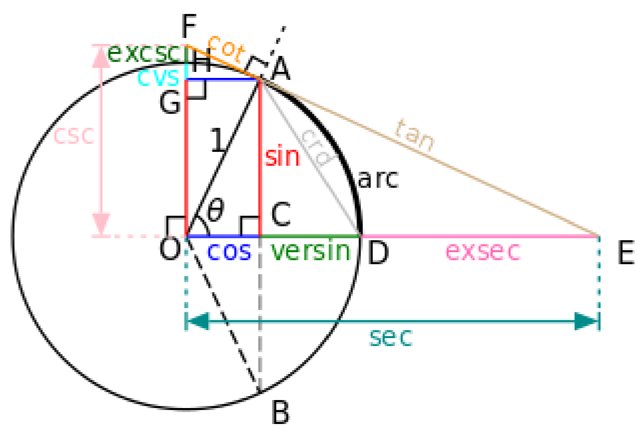
Keywords: equation, variable, function, *f(x),* graph, table, linear, quadratic, exponential, polynomial, logarithm

☐ I can define unit circle, radian measure of an arc, and intercepted arc. (F.9-12.TF.1)

☐ I can understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. (F.9-12. TF.1)

☐ I can define cosine and sine of angles on the unit circle to be the x-coordinates and y-coordinates respectively, where the terminal rays of the angle cross the circle. (F.9-12. TF.2)

☐ I can distinguish between the right triangle definitions of sine and cosine and the unit circle definitions of sine and cosine. (F.9-12. TF.3)



☐ I can define and identify co-terminal angles and can express the measure of an angle as a radian. (F.9-12. TF.3)

☐ I can create a right isosceles triangle in quadrant one of a unit circle and use it to determine cosine, sine, and tangent of $\Pi/4$. (F.9-12. TF.3)

☐ I can create an equilateral triangle centered on the positive x-axis of the unit circle to determine cosine, sine, and tangent of $\Pi/6$. (F.9-12. TF.3)

☐ I can combine geometric reflection with the values of cosine, sine, and tangent of $\Pi/6$ to determine cosine, sine, and tangent of $\Pi/3$. (F.9-12. TF.3)

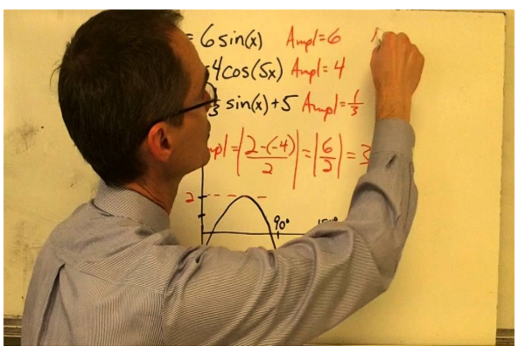
☐ I can employ reference angles, reflections and rotations to find the values of sine, cosine, and tangent for x, $\Pi+x$, and $2\Pi-x$ in terms of their values for x. (F.9-12. TF.3)

<u>Keywords</u>: circle, radian, pi, triangle, unit, coordinate, plane, x-axis, y-axis, isosceles, equilateral, reference, arc, angle, geometric, reflection, rotation, sine, cosine, tangent

☐ I can define unit circle, radian measure of an angle, and periodicity. (F.9-12. TF.4)

☐ I can show why cosine functions are even and the sine and tangent functions are odd by using angle measurements and their coordinates on the unit circle. (F.9-12. TF.4)

☐ I can demonstrate why the period for tangent is Π and for cosine and sine is 2Π by referencing the unit circle. (F.9-12. TF.4)



☐ I can show why cosine functions are even and sine and tangent functions are odd by using reflections. (F.9-12. TF.4)

☐ I can understand amplitude, frequency and midline. (F.9-12. TF.5)

☐ I can create a trigonometric function that models a real-world scenario given the amplitude, frequency, and mid-line of periodic phenomena. (F.9-12. TF.5)

<u>Keywords</u>: circle, radian, pi, triangle, unit, coordinate, plane, x-axis, y-axis, arc, geometric, reflection, rotation, sine, cosine, tangent, periodic, phenomena, amplitude, frequency, midline

☐ I can define horizontal line test and restrict the domain of a trigonometric function by removing values of x that do not pass the horizontal line test. (F.9-12. TF.6)

☐ I can show why trigonometric functions do not have inverses using graphs of the functions from 0 to 2Π. (F.9-12. TF.6)

☐ I can create a trigonometric function that models a real-world scenario given the amplitude, frequency, and midline of periodic phenomena. (F.9-12. TF.7)

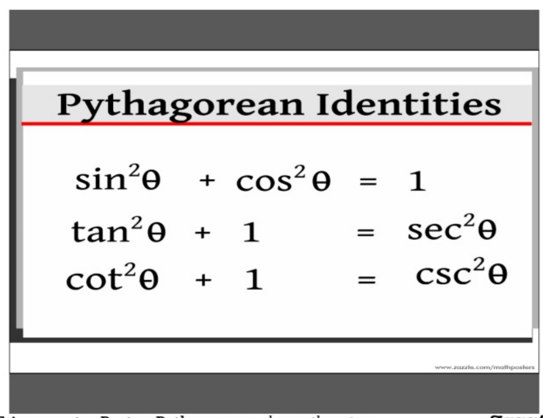
☐ I can use inverse functions to solve trigonometric equations that arise in modeling contexts. (F.9-12. TF.7)

☐ I can create a real-world problem scenario, write a trigonometric function to model the scenario, solve the equation and interpret the solutions in terms of the scenario. (F.9-12. TF.7)

<u>Keywords</u>: circle, radian, pi, triangle, unit, coordinate, plane, x-axis, y-axis, arc, geometric, reflection, rotation, sine, cosine, tangent, periodic, phenomena, amplitude, frequency, midline, horizontal line test, restrict, domain, model, real world

☐ I can prove the Pythagorean identity *sin2 (Θ) + cos2(Θ) = 1* by combining the Pythagorean Theorem with the unit circle definitions of cosine and sine. (F.9-12. TF.8)

☐ I can use the Pythagorean identity *sin2 (Θ) + cos2(Θ) = 1* to find *sin2 (Θ)* or *cos2(Θ)* provided I am given *sin2 (Θ)* or *cos2(Θ)* and the quadrant of the angle. (F.9-12. TF.8)



Trigonometry Poster: Pythagorean ... by mathposters Zazzle

☐ I can calculate *tan(Θ)* by applying the quotient identity . (F.9-12. TF.8)

☐ I can prove the sum of angles identities for cosine and sine with right angles. (F.9-12. TF.8)

☐ I can derive the difference of angles identities from the sum of angles identities. (F.9-12. TF.9)

☐ I can determine angle identity for tangent with the sum and difference formulas for sine and cosine. (F.9-12. TF.9)

☐ I can use the addition and subtraction formulas for sine, cosine, and tangent to derive the values of trigonometric functions of different angles. (F.9-12. TF.9)

<u>Keywords</u>: circle, radian, pi, triangle, unit, coordinate, plane, x-axis, y-axis, arc, geometric, reflection, rotation, sine, cosine, tangent, periodic, phenomena, amplitude, frequency, midline

I can Use Algebra to Help Me Understand Math

☐ I can explain the distinguishing factors of a term, a factor, a co-efficient, and an expression. (A.9-12.SSE.1)

☐ I can understand the context of expressions that represent a quantity. (A.9-12.SSE.1)

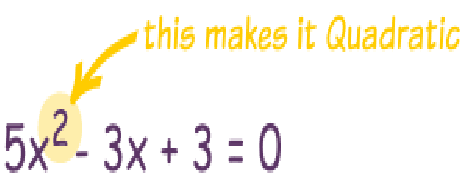
☐ I can interpret an expression functioning as one or more single entities containing multiple components. (A.9-12.SSE.1)

☐ I can rewrite the structure of an expression by identifying common factors, terms, and other similarities. (A.9-12.SSE.2)

☐ I can identify equivalent expressions according to their common factors, terms, and other similarities. (A.9-12.SSE.2)

<u>Keywords</u>: expression, term, factor, factoring, coefficient, equation

☐ I can factor a quadratic expression to reveal the zeros of the function it defines. (A.9-12.SSE.3)



☐ I can complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. (A.9-12.SSE.3)

☐ I can use the properties of exponents to transform expressions for exponential functions. For example, I can rewrite the expression 1.15t as (1.151/12) 12t ≈ 1.01212t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%. (A.9-12.SSE.3)

☐ I can explain what finite geometric series and common ratios are. (A.9-12.SSE.4)

☐ I can express the sum of a finite geometric series when the common ratio is not one. (A.9-12.SSE.4)

☐ I can determine the formula of a sum of finite geometric series to solve real world math problems. (A.9-12.SSE.4)

<u>Keywords</u>: expression, term, factor, factoring, coefficient, equation, geometric, sequence, finite, series, common, ratio

☐ I can understand the definition of a polynomial and show how adding, subtracting, and multiplying two polynomials always produces a polynomial. (A.9-12.APR.1)

☐ I can add polynomials. (A.9-12. APR.1)

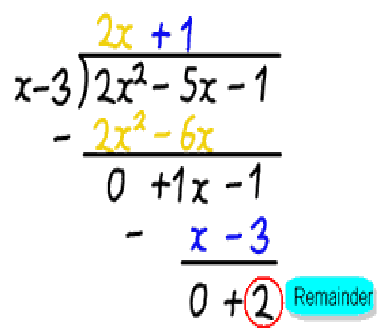
☐ I can subtract polynomials. (A.9-12. APR.1)

☐ I can multiply polynomials. (A.9-12. APR.1)

<u>Keywords</u>: polynomial, add, subtract, multiply, integer, definition

☐ I can divide polynomials using long division. (A.9-12.APR.2)

☐ I can understand and apply the Remainder Theorem to show that, for polynomial $p(x)$ and a number b, the remainder on division by $x-b$ is $p(b)$, so $p(b) = 0$ if and only if $(x-b)$ is a factor of $p(x)$. (A.9-12. APR.2)



☐ I can identify zeros of polynomials when suitable factorizations are available. (A.9-12. APR.3)

☐ I can use zeros of polynomials to construct a rough graph of the function defined by the polynomial. (A.9-12. APR.3)

<u>Keywords</u>: polynomial, definition, divide, Remainder Theorem, zero, graph, function

☐ I can prove polynomial identities and use them to describe numerical relationships. For example, I can show how the polynomial identity $(x^2+y^2)^2 = (x^2 – y^2)2 + (2xy)^2$ can be used to generate Pythagorean triples . (A.9-12. APR.4)

☐ I can factor polynomials by applying polynomial identities. (A.9-12. APR.4)

☐ I can know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers $(x + y)^n = {}_nC_0a^nb^0 + {}_nC_1a^{n-1}b^1 + {}_nC_2a^{n-2}b^2 + \ldots + {}_nC_na^0b^n$. (A.9-12. APR.5)

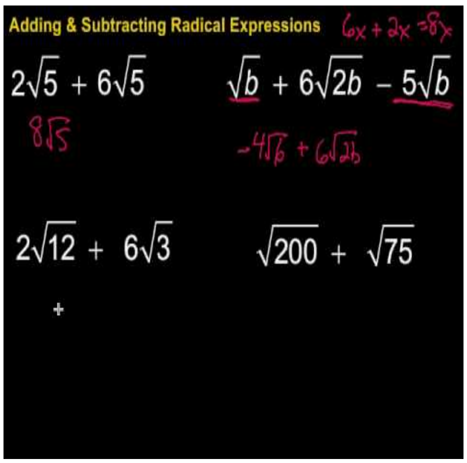
<u>Keywords</u>: polynomial, identity, Pythagorean, triple, factoring, binomial, theorem

☐ I can rewrite simple rational expressions in different forms. (A.9-12. APR.6)

☐ I can write a rational expression $^{a(x)}/_{b(x)}$ 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)* . (A.9-12. APR.6)

☐ I can simplify radical expressions using inspection. (A.9-12. APR.6)

☐ I can simplify radical expressions using long division. (A.9-12. APR.6)



☐ I can simplify radical expressions using a computer-based algebra program. (A.9-12. APR.6)

☐ I can explain why adding, subtracting, multiplying two rational expressions, and dividing a rational expression by a non-zero rational expression always yields a rational expression. (A.9-12. APR.7)

☐ I can add, subtract, multiply, and divide rational expressions. (A.9-12. APR.7)

Keywords: polynomial, identity, rational, expression, addition, subtraction, multiplication, division

☐ I can create equations and inequalities (arising from linear functions, quadratic functions, simple rational functions, and exponential functions) in one variable and use them to solve problems, including real-world problems. (A.9-12. CED.1)

☐ I can create equations in two or more variables to represent relationships between quantities, as well as graph equations on coordinate axes with labels and scales. (A.9-12. CED.2)

☐ I can represent constraints by equations or inequalities. (A.9-12. CED.3)

☐ I can represent constraints by systems of equations and/or inequalities. (A.9-12. CED.3)

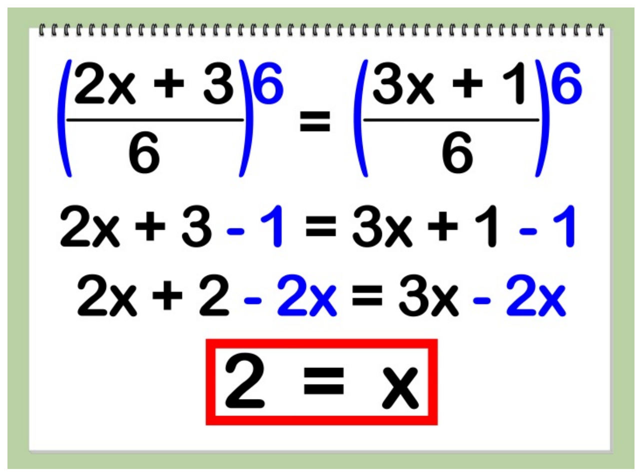
☐ I can determine which solutions are appropriate for the context of a given real-world problem. (A.9-12. CED.3)

☐ I can rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations, such as rearranging Ohm's Law $V=IR$ to highlight resistance, or R. (A.9-12. CED.4)

Keywords: equation, inequality, variable, linear, quadratic, rational, exponential, function, graph, formula

☐ I can understand solving equations as a process of reasoning and explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step. (A.9-12. REI.1)

☐ I can construct a viable argument to justify the solution method I have chosen. (A.9-12. REI.1)



☐ I can explain what extraneous solutions are, and how they may arise while solving equations. (A.9-12. REI.1)

☐ I can solve simple rational equations in one variable. (A.9-12. REI.2)

☐ I can solve radical equations in one variable. (A.9-12. REI.2)

Keywords: equation, inequality, variable, argument, solution, method, extraneous, radical

☐ I can solve linear equations in one variable, including equations with coefficients represented by letters. (A.9-12. REI.3)

☐ I can solve linear inequalities in one variable, including equations with coefficients represented by letters. (A.9-12. REI.3)

☐ I can identify and factor a perfect square trinomial. (A.9-12. REI.3)

☐ I can complete the square to transform any quadratic equation in x into an equation of the form $(x-p)^2 = q$ that has the same solutions. (A.9-12. REI.4)

□ I can derive the quadratic formula by completing the square of $ax^2 + bx = c$. (A.9-12. REI.4)

□ I can solve quadratic equations by inspection, taking square roots, completing the square, and/or by the quadratic formula and factoring, as appropriate to the initial form of the equation. (A.9-12. REI.4)

□ I can solve recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. (A.9-12. REI.4)

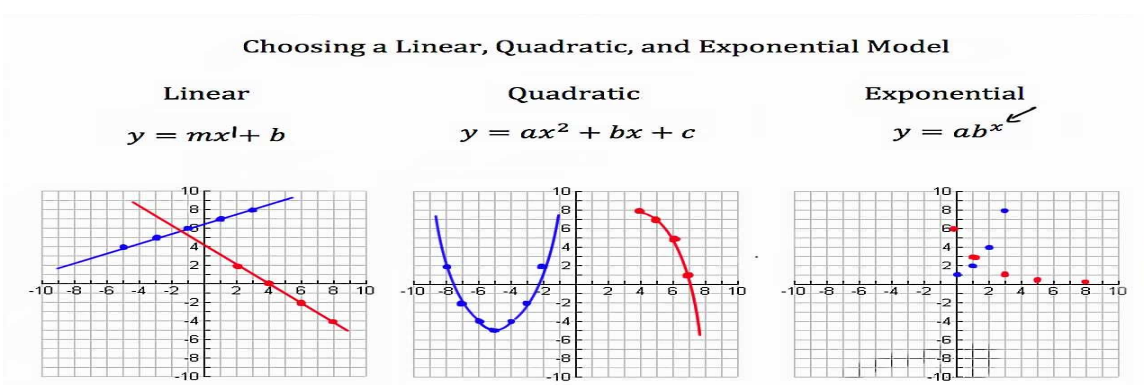
Keywords: equation, inequality, variable, linear, quadratic, rational, exponential, function, trinomial, square, complex, i, factor

□ I can show that when an equation is multiplied by the same quantity on both sides of the equal sign, an equivalent equation results. (A.9-12. REI.5)

□ I can demonstrate 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 solution. (A.9-12. REI.5)

□ I can solve systems of linear equations exactly and approximately (for example, with graphs, where I can estimate the point of intersection between each line), focusing on pairs of linear equations in two variables. (A.9-12. REI.6)

Keywords: equation, inequality, variable, linear, quadratic, rational, exponential, function, graph, formula



□ I can explain the difference between linear and quadratic equations. (A.9-12. REI.7)

☐ I can solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. (A.9-12. REI.7)

☐ I can solve systems of linear equations exactly and approximately (for example, with graphs, where I can estimate the point of intersection between each line), focusing on pairs of linear equations in two variables. (A.9-12. REI.8)

☐ I can represent a system of linear equations as a single matrix equation in a vector variable. (A.9-12. REI.8)

☐ I can define the inverse of a matrix and calculate it, if it exists. (A.9-12. REI.9)

☐ I can use the inverse of a matrix to solve systems of linear equations (using technology for matrices of dimension 3 x 3 or greater. (A.9-12. REI.9)

Keywords: equation, variable, linear, quadratic, matrix, inverse, graph, solution

☐ I can understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane (as represented by point variables *x, y*. (A.9-12. REI.10)

☐ I can 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 $f(x) = g(x)$. (A.9-12. REI.11)

☐ I can approximate the solutions of the equations $f(x) = g(x)$ by recognizing that the intersections of the graphs of the equations $y = f(x)$ and $y = g(x)$ will indicate a solution. (A.9-12. REI.11)

☐ I can use appropriate tools (such as a computer or a graphing calculator) to solve systems of equations $f(x) + g(x)$, including cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. (A.9-12. REI.11)

☐ I can graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality). (A.9-12. REI.12)

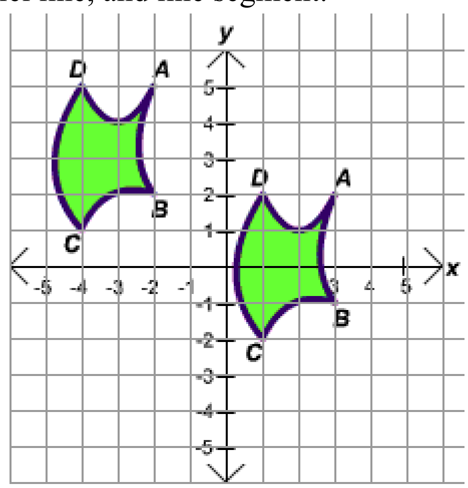
□ I can graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. (A.9-12. REI.12)

Keywords: equation, variable, linear, quadratic, graph, solution, x-coordinate, y-coordinate, plane, intersect, inequality, plane, polynomial, rational, absolute, value, exponential, logarithm

I can Use Geometry to Understand Math

□ I can explain the characteristics of the undefined notions of point, line, distance along a line, and distance around a circular arc, and use these notions as a basis for defining other geometric elements. (G.9-12. CO.1)

□ I can precisely define angle, circle, perpendicular line, parallel line, and line segment. (G.9-12. CO.1)



□ I can draw transformations in the plane using transparencies, graph paper, computers or white boards. (G.9-12. CO.2)

□ I can describe transformations as functions that take points in the plane as inputs (pre-image) and other points as outputs (image). (G.9-12. CO.2)

□ I can distinguish between transformations that preserve distance and angle to those that do not. (G.9-12. CO.2)

□ I can distinguish between a rectangle, parallelogram, trapezoid, or regular polygon. (G.9-12. CO.3)

□ I can describe the rotations and reflections a rectangle, parallelogram, trapezoid, or regular polygon carries onto itself. (G.9-12. CO.3)

Keywords: point, line, distance, segment, perpendicular, parallel, circle, angle, definition, transformation, plane, function, input, output, draw, graph, rectangle, parallelogram, trapezoid, polygon

☐ I can explain the definition of rotation in terms of angles, circles, perpendicular lines, parallel lines, and line segments. (G.9-12. CO.4)

☐ I can explain the definition of reflection in terms of angles, circles, perpendicular lines, parallel lines, and line segments. (G.9-12. CO.4)

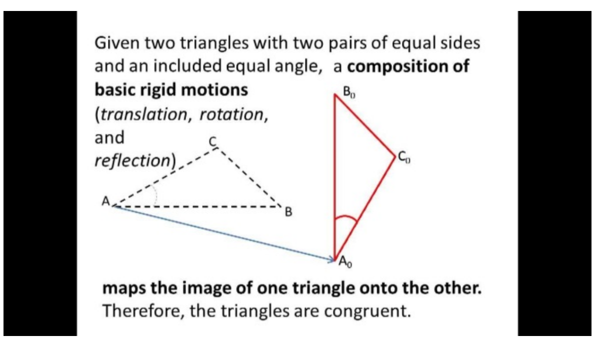
☐ I can explain the definition of translation in terms of angles, circles, perpendicular lines, parallel lines, and line segments. (G.9-12. CO.4)

☐ I can, given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using graph paper or other technology. (G.9-12. CO.5)

☐ I can specify a sequence of transformations that will carry a given figure onto another. (G.9-12. CO.5)

Keywords: point, line, distance, segment, perpendicular, parallel, circle, angle, definition, transformation, plane, function, input, output, draw, graph

☐ I can provide descriptions of rigid motions and explain how each preserves distance and angle. (G.9-12. CO.6)



☐ I can predict the effect of a given rigid motion on a given figure. (G.9-12. CO.6)

☐ I can define congruence as equality in shape and size and use congruence in terms of rigid motions to decide if two figures are congruent. (G.9-12. CO.7)

☐ I can recognize triangle congruence (ASA, SAS, SSS) in terms of rigid motions that preserve distance (S) and angle (A). (G.9-12. CO.8)

☐ I can show how preserving correlating distances (S) and angles (A) between two triangles results in congruence. (G.9-12. CO.8)

Keywords: point, line, distance, segment, perpendicular, parallel, angle, definition, transformation, plane, function, input, output, draw, graph, congruent, ASA, SAS, SSS, triangle, rigid, motion

□ I can prove theorems about lines and angles using deductive reasoning (such as the law of syllogism). (G.9-12. CO.9)

□ I can prove a theorem stating vertical angles are congruent. (G.9-12. CO.9)

□ I can prove a theorem stating when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent. (G.9-12. CO.9)

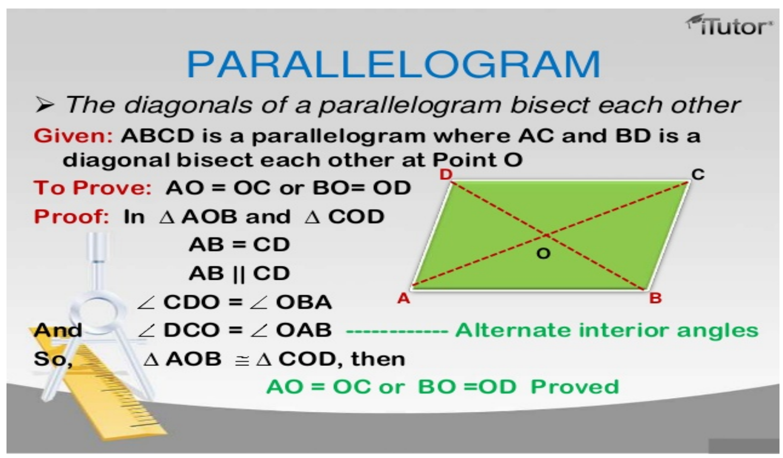
□ I can prove a theorem stating points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. (G.9-12. CO.9)

□ I can prove theorems about triangles using deductive reasoning (such as the law of syllogism). (G.9-12. CO.10)

□ I can prove a theorem about triangles such as measures of interior angles of a triangle sum to 180°. (G.9-12. CO.10)

□ I can prove theorems about parallelograms using deductive reasoning (such as the law of syllogism). (G.9-12. CO.11)

□ I can prove a theorem about parallelograms such as the diagonals of a parallelogram bisect each other. (G.9-12. CO.11)



Keywords: point, line, distance, segment, perpendicular, parallel, angle, definition, transformation, plane, function, theorem, axiom, postulate, deductive, reasoning, law, syllogism, draw, graph, congruent, triangle, parallelogram, rectangle

□ I can define identify and correctly use tools such as a compass and straightedge, string, reflective devices, paper folding, and dynamic geometric software to create formal geometric constructions. (G.9-12. CO.12)

□ I can accurately create geometric constructions such as copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line. (G.9-12. CO.12)

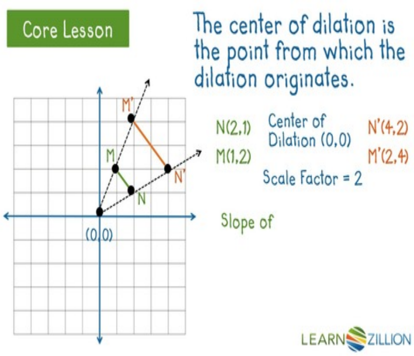
☐ I can define polygons inscribed in a circle. (G.9-12. CO.12)

☐ I can construct an equilateral triangle, a square, and a regular hexagon inscribe in a circle. (G.9-12. CO.13)

<u>Keywords</u>: point, line, distance, segment, perpendicular, parallel, angle, definition, transformation, plane, function, theorem, axiom, postulate, deductive, reasoning, law, syllogism, draw, graph, congruent, triangle, parallelogram, rectangle, construction, polygon, inscribe, equilateral, square, hexagon

☐ I can explain the properties of dilations given by a center and a scale factor. (G.9-12. SRT.1)

☐ I can perform dilations given by a center and a scale factor on figures in a plane. (G.9-12. SRT.1)



☐ I can verify that a dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. (G.9-12. SRT.1)

☐ I can verify that the dilation of a line segment is longer or shorter in the ratio given by the scale factor. (G.9-12. SRT.1)

☐ I can explain similarity in terms of similarity transformations where angle measure is preserved and side length changes proportionally. (G.9-12. SRT.2)

☐ I can determine if two figures are similar, including triangles. (G.9-12. SRT.2)

☐ I can explain why, if two angle measures are known, the third angle is also known using the properties of similarity transformations. (G.9-12. SRT.3)

<u>Keywords</u>: point, line, distance, dilation, triangle, segment, angle, length, scale, factor, ratio, transformation, corresponding, AA, criterion

☐ I can prove theorems about triangles, such as a line parallel to one side of a triangle divides the other two proportionally, and conversely. (G.9-12. SRT.4)

☐ I can prove theorems about triangles, such as using triangles similarly to prove the Pythagorean Theorem. (G.9-12. SRT.4)

☐ I can apply the concepts of congruence and similarity criteria to solve problems involving triangles. (G.9-12. SRT.5)

☐ I can apply the concepts of congruence and similarity criteria to prove relationships in geometric figures. (G.9-12. SRT.5)

<u>Keywords</u>: point, line, distance, dilation, triangle, segment, angle, length, scale, factor, proof, theorem, axiom, postulate, similar, corresponding, proportion, figure, Pythagorean, parallel, side, split, congruent

☐ I can explain by angle-angle similarity of two right triangles that side ratios are properties of the angles in the triangle. (G.9-12. SRT.6)

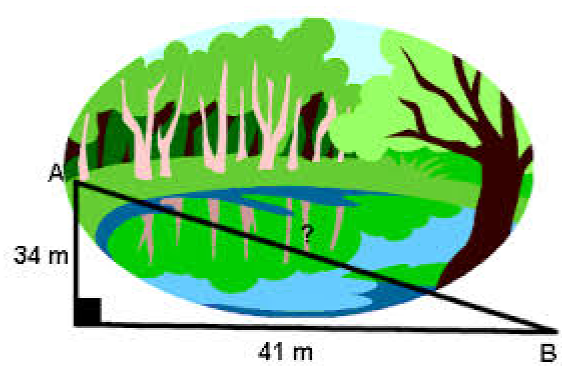
☐ I can use similarity to define trigonometric ratios (tangent, sine, and cosine) for acute angles in right triangles. (G.9-12. SRT.6)

☐ I can determine cosine and sine ratios for acute angles in right triangles given the lengths of two sides. (G.9-12. SRT.6)

☐ I can explain the relationship between sine and cosine of complementary angles and construct a diagram to illustrate the relationship. (G.9-12. SRT.7)

☐ I can express the Pythagorean Theorem as $a^2 + b^2 + c^2$ and use it to find the unknown length of a right triangle side. (G.9-12. SRT.8)

☐ I can use trigonometric ratios and the Pythagorean Theorem to solve real-world problems. (G.9-12. SRT.8)



☐ I can define altitude as an auxiliary line extending from a vertex perpendicular to the opposite side. (G.9-12. SRT.9)

 I can derive the formula *A = ½ ab sin(c)* for the area of a triangle. (G.9-12. SRT.9)

Keywords: point, line, distance, dilation, triangle, segment, angle, length, scale, factor, proof, theorem, axiom, postulate, similar, corresponding, proportion, figure, Pythagorean, parallel, congruent, application, sine, cosine, tangent

 I can prove the Law of Sines. (G.9-12. SRT.10)

 I can use the Law of Sines to formulate solutions in real-world scenarios. (G.9-12. SRT.10)

 I can prove the Law of Cosines. (G.9-12. SRT.10)

 I can use the Law of Cosines to formulate solutions in real-world scenarios. (G.9-12. SRT10)

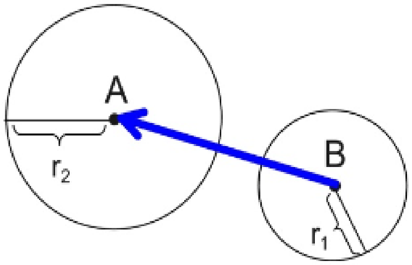
 I can distinguish between the problems that call for the Law of Sines and those that call for the Law of Cosines. (G.9-12. SRT.10)

 I can apply the Law of Sines to find the unknown measurements in right and non-right triangles. (G.9-12. SRT.11)

 I can apply the Law of Cosines to find the unknown measurements in right and non-right triangles. (G.9-12. SRT.11)

Keywords: point, line, distance, dilation, triangle, segment, angle, length, scale, factor, proof, theorem, axiom, postulate, similar, corresponding, proportion, figure, Pythagorean, congruent, application, sine, cosine, tangent

 I can prove similarities among all circles by demonstrating that the preimage of a dilation central to the circle is equal to the image in terms of the measure of the central angle. (G.9-12. C.1)



 I can define central angle, inscribed angle, circumscribed angle, diameter, radius, and chord. (G.9-12. C.2)

□ I can explain the relationship between central, incised, and circumscribed angles. (G.9-12. C.2)

□ I can explain that inscribed angles on a diameter are right angles. (G.9-12. C.3)

□ I can explain that the radius of a circle is perpendicular to the tangent where the radius intersects the circle. (G.9-12. C.3)

□ I can distinguish between inscribed and circumscribed circles of a triangle. (G.9-12. C.3)

□ I can prove properties of angles for a quadrilateral inscribed in a circle, such as opposite angles in an inscribed quadrilateral are supplementary. (G.9-12. C.3)

□ I can construct a tangent line from a point outside a given circle to the circle. (G.9-12. C.4)

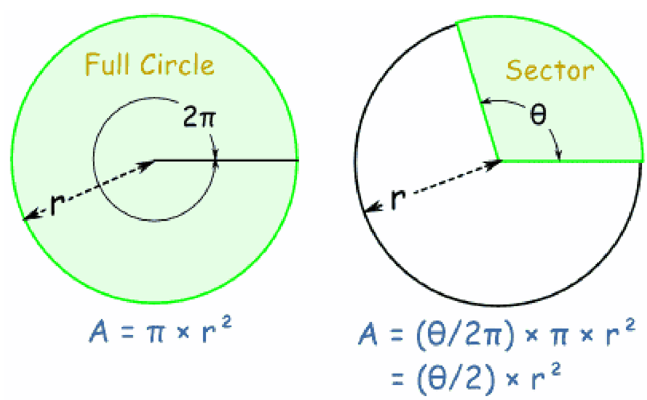
<u>Keywords</u>: circle, arc, chord, tangent, angle, central, point, radius, inscribed, circumscribed, proof, construction, line, point, dilation, intersect, perpendicular

□ I can explain similarity in terms of similarity transformations where angle measure is preserved and side length changes proportionally. (G.9-12. C.5)

□ I can use similarity to derive the fact that the length of the arc intercepted by an angle is proportional to the radius. (G.9-12. C.5)

□ I can define the radian measure of the angle as a constant of proportionality. (G.9-12. C.5)

□ I can derive the formula for the area of a sector. (G.9-12. C.5)

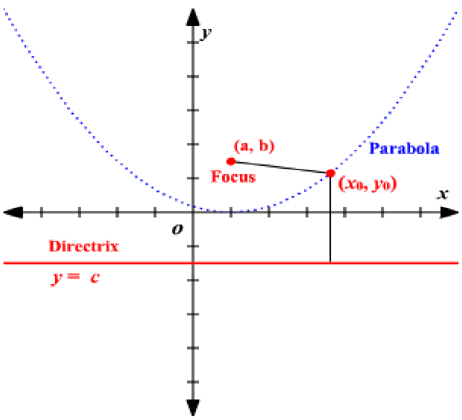


<u>Keywords</u>: circle, arc, chord, tangent, angle, central, point, radius, inscribed, circumscribed, proof, construction, line, point, dilation, intersect, perpendicular, sector, proportionality

□ I can derive the equation of a circle of radius *(0, 0)* by applying the Pythagorean Theorem to the right angle formed by extending the radius as the hypotenuse from the circle's center to a point on the circle *(x, y)*. (G.9-12. GPE.1)

□ I can determine the center of a circle given the equation of the circle. (G.9-12. GPE.1)

□ I can complete the square to find the center and the radius of a circle given by equation. (G.9-12. GPE.1)



□ I can define parabola, focus, and directix. (G.9-12. GPE.1)

□ I can derive the equation of a parabola given a focus and directix. (G.9-12. GPE.2)

□ I can determine the distance from the focus of a parabola to a point on the parabola *(x, y)* using the Pythagorean Theorem. (G.9-12. GPE.2)

□ I can distinguish between a parabola, ellipsis, and hyperbola. (G.9-12. GPE.3)

□ I can determine the sum of the distances from each focus of an ellipse to a point on the ellipse *(x, y)* using the Pythagorean Theorem. (G.9-12. GPE.3)

<u>Keywords</u>: circle, arc, chord, tangent, angle, central, point, radius, inscribed, Pythagorean, theorem, circumscribed, proof, square, parabola, focus, directix, coordinate, Cartesian

□ I can identify the appropriate algebraic method to prove or disprove simple geometric theorems given a set of coordinates. (G.9-12. GPE.4)

□ I can use slope to determine if lines in a polygon are parallel. (G.9-12. GPE.5)

□ I can use the Pythagorean Theorem to determine if the point *(a, b)* lies on a circle centered at the origin and containing the point *(x, y)*. (G.9-12. GPE.5)

□ I can graph a line on the coordinate plane. (G.9-12. GPE.5)

□ I can translate a line parallel to another line on the coordinate plane by preserving its angle. (G.9-12. GPE.5)

□ I can determine if two lines are parallel by examining their slope. (G.9-12. GPE.5)

□ I can find the equation of a line parallel or perpendicular to a given line that passes through a given point. (G.9-12. GPE.5)

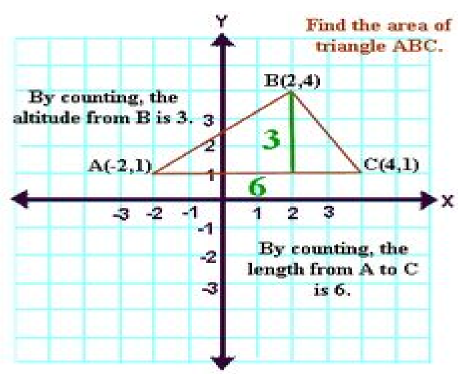
□ I can rotate a line perpendicular to another line on the coordinate plane. (G.9-12. GPE.35)

□ I can determine if two lines are perpendicular by examining their slopes. (G.9-12. GPE.5)

□ I can prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems. (G.9-12. GPE.5)

Keywords: circle, arc, chord, tangent, angle, central, point, radius, inscribed, Pythagorean, theorem, proof, square, parabola, focus, directix, coordinate, Cartesian

□ I can use the formula $x = (r_2x_1 + r_1x_2) / (r_1 + r_2)$ to determine the point or points on a directed line segment (x_1, y_1) (x_2, y_2) that partitions the segment in a given ration, r_1 to r_2. (G.9-12. GPE.6)



□ I can use coordinates to compute perimeters of polygons and areas of triangles and rectangles. (G.9-12. GPE.7)

Keywords: circle, arc, chord, tangent, angle, central, point, radius, inscribed, Pythagorean, theorem, proof, square, segment, ratio, polygon, triangle, rectangle, coordinate, Cartesian

□ I can determine the formulas for the circumference of a circle, arc of a circle, volume of a cylinder, pyramid and cone. (G.9-12. GMD.1)

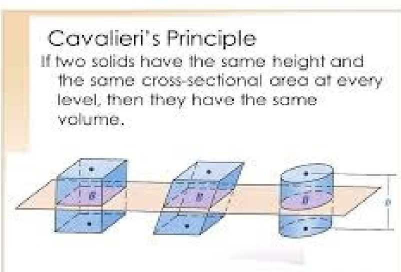
☐ I can describe the relationship between the circumference and area of a circle. (G.9-12. GMD.1)

☐ I can inscribe a polygon to determine its area. (G.9-12. GMD.1)

☐ I can calculate the base area for a prism, cylinder, cone, and pyramid. (G.9-12. GMD.1)

☐ I can determine the volume for a prism, cylinder, cone, and pyramid. (G.9-12. GMD.1)

☐ I can explain the conceptual relationships among the volume formulas of prisms, cylinders, cones, and pyramids. (G.9-12. GMD.1)



☐ I can use dissection arguments, Cavalieri's principle, informal limit arguments. (G.9-12. GMD.1)

☐ I can explain Cavalieri's principle informally using everyday objects such as a stack of pennies to illustrate the principle. (G.9-12. GMD.2)

☐ I can define the volume formulas for cylinders, pyramids, cones, and spheres. (G.9-12. GMD.3)

☐ I can calculate the volume of cylinders, pyramids, cones and spheres to solve real-world problems. (G.9-12. GMD.3)

<u>Keywords</u>: circle, arc, chord, tangent, angle, central, point, radius, inscribed, Pythagorean, theorem, formula, Cavalieri's principle, indivisibles, method, cylinder, pyramid, cone, sphere, volume, circumference, dissection, limit

☐ I can identify the shapes of two-dimensional cross-sections of three-dimensional objects. (G.9-12. GMD.4)

☐ I can identify three-dimensional objects generated by rotations of two-dimensional objects. (G.9-12. GMD.5)

<u>Keywords</u>: circle, arc, chord, tangent, angle, central, point, radius, inscribed, Pythagorean, theorem, formula, Cavalieri's principle, indivisibles, method, cylinder, pyramid, cone, sphere, volume, circumference, dissection, limit

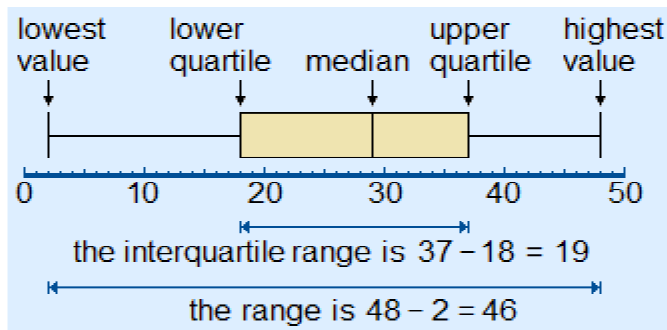
I can Use Statistics and Probability to Understand Math

□ I can represent data on the real number line using dot plots, histograms, and box plots, understanding which approach best represents the data set. (SP.9-12.ID.1)

□ I can determine the appropriate range and scale when representing the data on the real number line. (SP.9-12.ID.2)

□ I can determine the five number summary when creating a box plot. (SP.9-12.ID.2)

□ I can define median, mean, interquartile range, and standard deviation. (SP.9-12.ID.2)



□ I can compare the center of the data distribution (median, mean) of multiple data sets. (SP.9-12.ID.2)

□ I can compare the spread (interquartile range, standard deviation) of multiple data sets. (SP.9-12.ID.2)

□ I can compare the shape, center, and spread of several data sets displayed on the same scale. (SP.9-12.ID.3)

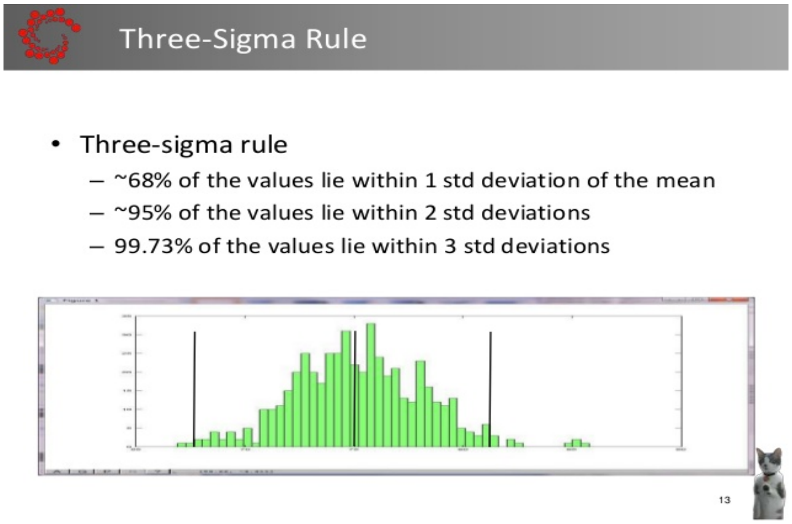
□ I can compare the shape, center, and spread of several data sets within the context of a problem or real-world scenario. (SP.9-12.ID.3)

□ I can identify extreme data points in multiple data sets. (SP.9-12.ID.3)

□ I can account for possible effects of extreme data points and decide to omit them, if necessary. (SP.9-12.ID.3)

<u>Keywords</u>: data, set, statistics, distribution, spread, standard deviation, real, box plot, histogram, dot plot, range, interquartile, scale, mean, median, outlier, compare

☐ I can use the mean and standard deviation of a data set to fit it to a normal distribution curve. (SP.9-12.ID.4)



☐ I can use the three-sigma rule to calculate the percent of a normal population that lies within three deviations of the mean. (SP.9-12.ID.4)

☐ I can recognize that there are data sets (asymmetrical, for example) for which such a procedure is not accurate. (SP.9-12.ID.4)

☐ I can use calculators, spreadsheets, and tables to estimate areas under the normal curve. (SP.9-12.ID.4)

<u>Keywords</u>: data, set, statistics, distribution, spread, standard deviation, real, box plot, histogram, dot plot, range, interquartile, scale, mean, median, outlier, compare, three-sigma rule, empirical, technology, normal population

☐ I can represent data on a scatter plot given the data is on quantitative variables only. (SP.9-12.ID.5)

☐ I can describe how quantitative variables are related on a scatter plot. (SP.9-12.ID.5)

☐ I can decide which type of function (linear, quadratic, exponential) is appropriate to represent a data set. (SP.9-12.ID.5)

☐ I can solve problems by using a function appropriately fitted to the data set. (SP.9-12.ID.5)

☐ I can analyze the scale and shape of a scatter plot to estimate the function with the best fit for the data set. (SP.9-12.ID.6)

☐ I can calculate and plot residuals for the data set and function with a possible fit. (SP.9-12.ID.6)

☐ I can informally assess the fit of a function by analyzing residuals. (SP.9-12.ID.6)

☐ I can fit a linear function for a scatter plot that suggests a linear association. (SP.9-12.ID.6)

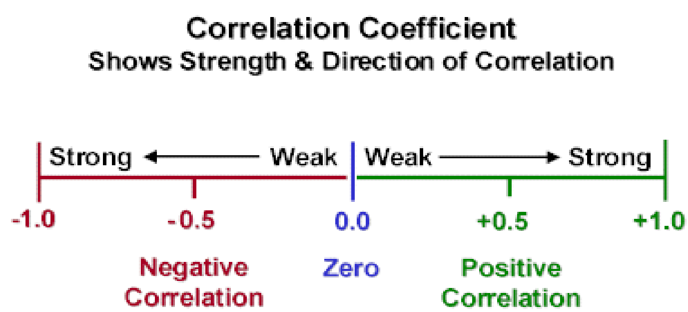
Keywords: data, set, statistics, distribution, spread, standard deviation, real, box plot, histogram, dot plot, range, interquartile, scale, mean, median, outlier, residual, function, linear, quadratic, exponential

☐ I can analyze and interpret the meaning of slope (rate of change) of a linear model in context of the data. (SP.9-12.ID.5)

☐ I can analyze and interpret the meaning of the intercept (constant term) of a linear model in the context of the data. (SP.9-12.ID.5)

☐ I can define correlation coefficient and understand that it can only apply to a linear fit. (SP.9-12.ID.5)

☐ I can use technology to compute and interpret the correlation coefficient of a linear fit. (SP.9-12.ID.5)



☐ I can understand that correlation does not imply causation. (SP.9-12.ID.6)

☐ I can determine if two variables seem reasonably linked through correlation. (SP.9-12.ID.6)

☐ I can determine if two variables seem reasonably linked through causation. (SP.9-12.ID.6)

Keywords: data, set, statistics, distribution, spread, standard deviation, real, box plot, histogram, dot plot, range, interquartile, scale, mean, median, outlier, residual, function, linear, slope, correlation, coefficient, causation, intercept

☐ I can explain the concepts of inference, population parameter, and random sample. (SP.9-12.IC.1)

☐ I can understand how random samples are used to make inferences about population parameters. (SP.9-12. IC.1)

☐ I can understand why random samples are used to make inferences about population parameters. (SP.9-12. IC.1)

☐ I can decide if a probability model is consistent with results from a given data-generating process. (SP.9-12. IC.2)

☐ I can compare two probability models to determine which is more consistent with results from a given data-generating process. (SP.9-12. IC.2)

<u>Keywords</u>: statistics, inference, population, parameter, random, sample, data, data-generating, simulation, probability, conclusion, model, experiment

☐ I can describe the distinguishing features of sample surveys, experiments, and observational studies. (SP.9-12.IC.3)

☐ I can explain the purposes of sample surveys, experiments, and observational studies, and decide where each data-gathering system is most appropriate. (SP.9-12. IC.3)

☐ I can explain how randomization relates to sample surveys, experiments, and observational studies. (SP.9-12. IC.3)

$$\mu = \frac{\Sigma X}{N}$$

☐ I can define population mean and population proportion. (SP.9-12. IC.3)

☐ I can use data from a sample survey to estimate a population mean or proportion. (SP.9-12. IC.4)

☐ I can conduct a simulation to gather a random sample mean or proportion and determine which results match the population mean or proportion and which results are extreme. (SP.9-12. IC.4)

☐ I can develop a margin of error by comparing the random sample mean or proportion to the population mean or proportion. (SP.9-12. IC.4)

<u>Keywords</u>: statistics, inference, population, parameter, random, sample, data, data-generating, simulation, probability, conclusion, model, experiment, survey, observation, randomization, mean, proportion

☐ I can compare two treatment groups by determining the sample mean and standard deviation of each. (SP.9-12.IC.5)

☐ I can create simulations for two treatment groups to decide if differences between parameters such as mean and standard deviation are significant. (SP.9-12. IC.5)

☐ I can represent the finding of a simulation for two treatment groups in a histogram. (SP.9-12. IC.5)

☐ I can evaluate reports for accuracy and breadth of data. (SP.9-12. IC.6)

☐ I can determine if reports present quantitative or categorical data. (SP.9-12. IC.6)

☐ I can analyze reports for biased or skewed conclusions. (SP.9-12. IC.6)

☐ I can distinguish facts from opinions presented in reports. (SP.9-12. IC.6)

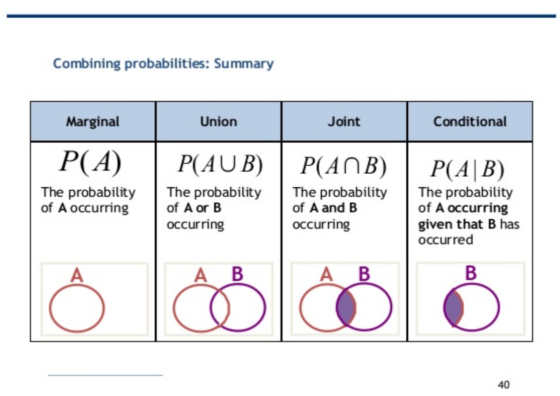
<u>Keywords</u>: statistics, inference, population, parameter, random, sample, data, data-generating, simulation, probability, conclusion, model, experiment, survey, observation, randomization, mean, proportion, accuracy, bias, quantitative, categorical, fact, opinion

☐ I can define event, sample space, union, intersection, and complements as related to probability. (SP.9-12. CP.1)

☐ I can describe events as subsets of a sample space (the set of outcomes) using characteristics or categories of the outcome. (SP.9-12. CP.1)

☐ I can describe events as unions, intersections, or complements of other events (*"or", "and", "not"*). (SP.9-12. CP.1)

☐ I can show why two events A and B are independent if the probability of A and B occurring together is the product of their probabilities with the equation $P(A \text{ and } B) = P(A) \times P(B)$. (SP.9-12. CP.2)

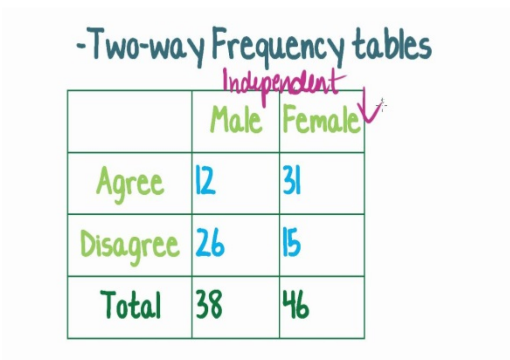


Keywords: probability, events, subset, sample space, characteristic, outcome, union, intersection, complement, independent, characterization

□ I can explain the conditional probability of *A* given *B* as *P(A and B)/P(B)*, and illustrate this relationship using examples. (SP.9-12.CP.3)

□ I can understand conditional probability and explain independence of *A and B* as saying that the conditional probability of *A given B* is the same as the probability of *A*, and the conditional probability of *B given A* is the same as the probability of *B*. (SP.9-12. CP.3)

□ I can distinguish between events that are independent, and those that are not. (SP.9-12. IC.5)


-Two-way Frequency tables

Independent

	Male	Female
Agree	12	31
Disagree	26	15
Total	38	46

□ I can construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. (SP.9-12. CP.4)

□ I can use a two-way frequency table to decide if events are independent and to approximate conditional probabilities. (SP.9-12. CP.4)

□ I can collect data from a random sample to determine if events are independent. (SP.9-12. CP.4)

□ I can explain the concepts of conditional probability and independence in everyday language and everyday situations. (SP.9-12. CP.5)

Keywords: probability, events, subset, sample space, characteristic, outcome, union, intersection, complement, independent, characterization, conditional, two-way, frequency

□ I can define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space. (SP.9-12. MD.1)

□ I can calculate the expected value of a random variable. (SP.9-12. MD.2)

☐ I can recognize a random variable as the mean of a probability distribution. (SP.9-12. MD.3)

☐ I can create a probability distribution table for a random variable to define it for a sample space and calculate its theoretical values. (SP.9-12. MD.4)

☐ I can create a probability distribution table for a random variable to define it for a sample space in which probabilities are assigned empirically and calculate its theoretical values. (SP.9-12. MD.4)

<u>Keywords</u>: probability, events, interest, distribution, random, variable, expected value, theoretical, empirical

☐ I can weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. (SP.9-12. MD.5)

Number of Orders per Week x_i	Probability p_i
41	.03
42	.10
43	.15
44	.17
45	.25
46	.15
47	.10
48	.05

☐ I can create a probability distribution table for a game of chance by listing each possible outcome and assigning a probability to each based on the data. (SP.9-12. MD.5)

☐ I can determine the expected payoff for a game of chance by executing the formula $E(x) = \Sigma(x_1P_1)$. (SP.9-12. MD.5)

☐ I can determine expected values for multiple strategies and compare them to make an informed decision. (SP.9-12. MD.5)

☐ I can use probabilities to make fair decisions. (SP.9-12. MD.6)

☐ I can analyze decisions and strategies using probability concepts. (SP.9-12. MD.7)

<u>Keywords</u>: probability, events, interest, distribution, random, variable, expected value, real-world, application, payoff, risk, chance, strategy, concepts