Course Title: Pre-Calculus (edits)
Course Number: 1202340

NGSSS Benchmark	Content Focus	Number of Questions	Suggested Cognitive Complexity *(per CPALMS)*
Reporting Category 1: Trigonometry With Unit Circle			
MAFS.912.F-TF.1.2	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.	1	1 Level 2
MAFS.912.F-TF.1.3	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 $\pi-x$, $\pi+x$, and $2\pi-x$ in terms of their values for x, where x is any real number.	1	1 Level 2
~~MAFS.912.F-TF.1.4~~	~~Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.~~	~~1~~	~~1 Level 2~~
Reporting Category Total		~~3~~ 2	
Reporting Category 2: Trigonometric Functions			
MAFS.912.F-TF.2.5	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.	2	1 Level 1 1 Level 2
MAFS.912.F-TF.2.7	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.	1	1 Level 2
MAFS.912.G-SRT.3.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	1	1 Level 2
MAFS.912.G-SRT.4.10	Prove the Laws of Sines and Cosines and use them to solve problems.	1	1 Level 3
Reporting Category Total		5	
Reporting Category 3: Trigonometric Identities			
MAFS.912.G-SRT.4.11	Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).	2	1 Level 2 1 Level 3
MAFS.912.G-SRT.4.9	Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	1	1 Level 2
MAFS.912.F-TF.3.8	Prove the Pythagorean identity $\sin^2\theta + \cos^2\theta = 1$ and use it to calculate trigonometric ratios.	1	1 Level 2
MAFS.912.F-TF.3.9	Prove the addition and subtraction, half-angle, and double-angle formulas for sine, cosine, and tangent and use these formulas to solve problems.	2	1 Level 2 1 Level 3
Reporting Category Total		6	
Reporting Category 4: Vectors & Parametric Equations			
MAFS.912.N-VM.2.4	Add and subtract vectors. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two	1	1 Level 1

	vectors is typically not the sum of the magnitudes. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. 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. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.		
MAFS.912.N-VM.2.5	Multiply a vector by a scalar. a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$. b. Compute the magnitude of a scalar multiple c**v** using $\|c\mathbf{v}\| = |c|v$. Compute the direction of c**v** knowing that when $|c|v \neq 0$, the direction of c**v** is either along **v** (for $c > 0$) or against **v** (for $c < 0$).	1	1 Level 1
MAFS.912.N-VM.1.1	Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, ||v||, v).	1	1 Level 1
MAFS.912.N-VM.1.2	Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.	1	1 Level 1
~~MAFS.912.N-VM.1.3~~	~~Solve problems involving velocity and other quantities that can be represented by vectors.~~	~~1~~	~~1 Level 2~~
Reporting Category Total		~~5~~ 4	
Reporting Category 5: Polynomial, Rational & Inverse Functions			
MAFS.912.A-APR.4.6	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.	2	2 Level 2
~~MAFS.912.A-APR.4.7~~	~~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.~~	~~1~~	~~1 Level 2~~
MAFS.912.F-BF.2.4	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, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.* 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.	1	1 Level 2

Reporting Category Total		4	
Reporting Category 6: Limits			
~~MA.912.C.1.1~~	~~Understand the concept of limit and estimate limits from graphs and tables of values.~~	~~2~~	~~2 Level 2~~
~~MA.912.C.1.2~~	~~Find limits by substitution.~~	~~1~~	~~1 Level 1~~
MA.912.C.1.3	Find limits of sums, differences, products, and quotients.	4	3 Level 1 1 Level 2
~~MA.912.C.1.4~~	~~Find limits of rational functions that are undefined at a point.~~	~~1~~	~~1 Level 1~~
Reporting Category Total		~~6~~ 4	
Reporting Category 7: Sequences & Series			
~~MAFS.912.A-APR.3.5~~	~~Know and apply the Binomial Theorem for the expansion of (x in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascals Triangle.~~	~~1~~	~~1 Level 2~~
MAFS.912.F-BF.1.1	Write a function that describes a relationship between two quantities. Determine an explicit expression, a recursive process, or steps for calculation from a context. 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. 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.	2	2 Level 2 ~~1 Level 3~~
Reporting Category Total		~~3~~ 2	
Reporting Category 8: Conics			
MAFS.912.G-GPE.1.1	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	1	1 Level 2
MAFS.912.G-GPE.1.2	Derive the equation of a parabola given a focus and directrix.	1	1 Level 2
MAFS.912.G-GPE.1.3	Derive the equations of ellipses and hyperbolas given the foci and directrices.	2	2 Level 2 ~~1 Level 3~~
Reporting Category Total		4	
Reporting Category 9: Complex Numbers			
~~MAFS.912.N-CN.1.3~~	~~Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.~~	~~1~~	~~1 Level 1~~
MAFS.912.N-CN.3.9	Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.	1	1 Level 1
MAFS.912.N-CN.2.4	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.	1	1 Level 2
MAFS.912.N-CN.2.5	Represent addition, subtraction, multiplication, and conjugation of complex numbers	1	1 Level 2

	geometrically on the complex plane; use properties of this representation for computation. For example, $(-1 + \sqrt{3}\,i)^3 = 8$ because $(-1 + \sqrt{3}\,i)$ has modulus 2 and argument 120°.		
Reporting Category Total		3	

Overall Percentage for Written Test:___100%_____
Overall Percentage for Performance Tasks:____0%_____