Pre-Calculus 4th Nine Weeks: Scope and Sequence

Content Standards	Dates Taught	% of Students scoring over 70%	Dates Re-taught (Optional)	Formative and Summative Assessments/ (Any Additional Comments Optional)
(5) (+) 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**, $\|\mathbf{v}\|$, $\|\mathbf{v}\|$, v). [N-VM1]	3/17-18	75%		Problem of the Day Quiz 6-1 – 6-4
(6) (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. [N-VM2]				
(7) (+) Solve problems involving velocity and other quantities that can be represented by vectors. [N-VM3]				
(8) (+) Add and subtract vectors. [N-VM4] a. (+) Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. [N-VM4a] b. (+) Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. [N-VM4b] c. (+) 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. [N-VM4c]				
(9) (+) Multiply a vector by a scalar. [N-VM5] a. (+) Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$. [N-VM5a] b. (+) Compute the magnitude of a scalar multiple $c\mathbf{v}$ using $\|\|c\mathbf{v}\|\| = \|c\|v$. Compute the direction of $c\mathbf{v}$ knowing that when $\|c\|v \neq 0$, the direction of $c\mathbf{v}$ is either along **v** (for $c > 0$) or against **v** (for $c < 0$). [N-VM5b]				
(26) Determine the amplitude, period, phase shift, domain, and range of trigonometric functions and their inverses.				
(28) Utilize parametric equations by graphing and by converting to rectangular form.				
(1) (+) 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. [N-CN4]				

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(30) (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. [F-TF4]				
(2) (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. [N-CN5]				
(3) (+) 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. [N-CN6]				
(15) Create graphs of conic sections, including parabolas, hyperbolas, ellipses, circles, and degenerate conics, from second-degree equations.				
(36) (+) Derive the equations of a parabola given a focus and directrix. [G-GPE2]				
(37) (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant. [G-GPE3]				
(38) (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. [G-GMD2]				
(13) (+) 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, with coefficients determined, for example, by Pascal's Triangle. (The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument.) [A-APR5]				
(50) (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions. [S-MD1]				
(51) (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution. [S-MD2]				
(52) (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. [S-MD3]				
(53) (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. [S-MD4]				

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(54) (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. [S-MD5]				
(45) Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. [S-IC2]				
(5) (+) 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). [N-VM1]				
(31) (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed. [F-TF6]				
(12) 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.* *(Extend to infinite geometric series*.) [A-SSE4]				
(39) 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. *(Focus on increasing rigor using standard deviation.)* [S-ID2]				
(40) Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers*). (Identify uniform, skewed, and normal distributions in a set of data. Determine the quartiles and interquartile range for a set of data.)* [S-ID3]				
(41) 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. [S-ID4]				
(44) Understand statistics as a process for making inferences about population parameters based on a random sample from that population. [S-IC1]				
(43) Distinguish between correlation and causation. [S-ID9]				
(45) Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. [S-IC2]				
(46) Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. [S-IC3]				

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(47) Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. [S-IC4]				
(48) Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. [S-IC5]				
(4) Determine numerically, algebraically, and graphically the limits of functions at specific values and at infinity.				