Common Core Standards Alignment (High School)

Math www.seaperch.org

Legend

●	Standard addressed in **SeaPerch Build Guide**
○	Standard could be addressed by **additional activities during the SeaPerch build**
△	Standard could be met at a **SeaPerch competition**

Note: Only standards groups where at least one standard is met are included in the mapping below.

Number & Quantity

Indicator	Indicator Statement	Addressed
HSN.RN.A.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation in radicals in terms of rational exponents	○
HSN.RN.A.2	Rewrite expressions involving radicals and rationa exponents using the properties of exponents	○
HSN.RN.A.3	Explain why the sum or product of two rational numebrs 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	
HSN.Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistenlty in formulas, choose and interpret the scale and the origin in graphs and data display	●○△
HSN.Q.A.2	Define the appropriate quantities for the purpose of descripitive modeling	●○△
HSN.Q.A.3	Choose a level of accuracy appropriate to limiations on measurement when reporting quantities	●○△

Algebra

Indicator	Indicator Statement	Addressed
HSA.SSE.A.1	Interpret expressions that represent a quantity in terms of its context.	○
HSA.SSE.A.1.A	Interpret parts of an expression, such as terms, factors, and coefficients.	○
HSA.SSE.A.1.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.	

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HSA.SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see x4 - y4 as (x2)2 - (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 - y2)(x2 + y2).	
HSA.SSE.B.3.A	Factor a quadratic expression to reveal the zeros of the function it defines.	○
HSA.SSE.B.3.B	Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	○
HSA.SSE.B.3.C	Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15t can be rewritten as (1.151/12)12t ≈ 1.01212t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.	
HSA.SSE.B.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.*	
HSA.APR.A.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.	○
HSA.APR.B.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).	
HSA.APR.B.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	
HSA.APR.C.4	Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity (x2 + y2)2 = (x2 - y2)2 + (2xy)2 can be used to generate Pythagorean triples.	
HSA.APR.C.5	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	
HSA.APR.D.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.	●○
HSA.APR.D.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.	
HSA.CED.A.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.	●○

Indicator	Indicator Statement	Addressed
HSA.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	○
HSA.CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.	○
HSA.CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.	
HSA.REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	●○
HSA.REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	
HSA.REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	●○
HSA.REI.B.4	Solve quadratic equations in one variable.	○
HSA.REI.B.4.A	Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x - p)2 = q that has the same solutions. Derive the quadratic formula from this form.	○
HSA.REI.B.4.B	Solve quadratic equations by inspection (e.g., for x2 = 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.	
HSA.REI.C.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.	
HSA.REI.C.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	○
HSA.REI.C.7	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line y = -3x and the circle x2 + y2 = 3.	
HSA.REI.C.8	Represent a system of linear equations as a single matrix equation in a vector variable.	○

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HSA.REI.C.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).	
HSA.REI.D.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).	
HSA.REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*	
HSA.REI.D.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

Indicator	Indicator Statement	Addressed
HSF.BF.A.1	Write a function that describes a relationship between two quantities.	●○
HSF.BF.A.1.A	Determine an explicit expression, a recursive process, or steps for calculation from a context.	●○
HSF.BF.A.1.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.	○
HSF.BF.A.1.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.	○
HSF.BF.A.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms	
HSF.BF.B.3	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	

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HSF.BF.B.4	Find inverse functions.	
HSF.BF.B.4.B	Verify by composition that one function is the inverse of another.	
HSF.BF.B.4.C	Read values of an inverse function from a graph or a table, given that the function has an inverse.	
HSF.BF.B.4.D	Produce an invertible function from a non-invertible function by restricting the domain.	
HSF.LE.A.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.	
HSF.LE.A.1.B	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.	
HSF.LE.A.1.C	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	
HSF.LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	●○
HSF.LE.A.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	●○
HSF.LE.A.4	For exponential models, express as a logarithm the solution to abct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	●○
HSF.LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.	●○