Mapleton Public Schools

Math

Priority Standards: Algebra I

Domain: Number and Quantities

HS.N-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 for radicals in terms of rational exponents. (Located in A1M3)

For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $5^{(1/3)3}$ must equal 5.

HS.N-RN.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents. (Located in A1M3)

HS.N-Q.A.1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (Located in A1M1)

HS.N-Q.A.2: Define appropriate quantities for the purpose of descriptive modeling. (Located in A1M1)

HS.N-Q.A.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (Located in A1M1)

Domain: Algebra and Functions

Seeing Structure in Expressions:

HS.A-SSE.A Interpret the structure of expressions.

- Interpret expressions that represent a quantity in terms of its context. (CCSS: HS.A-SSE.A.1)
  - Interpret parts of an expression, such as terms, factors, and coefficients. (CCSS: HS.A-SSE.A.1.a)
  - Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r)∏ as the product of P and a factor not depending on P (CCSS: HS.A-SSE.A.1.b)

HS.A-SSE.A.2: Use the structure of an expression to identify ways to rewrite it. (Located in A1M5 and again in A2M1)

For example, see $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$, *thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$.

i) Tasks are limited to numerical expressions and polynomial expressions in one variable. ii) Examples: Recognize $53^2 - 47^2$ as a difference of squares and see an opportunity to rewrite it in the easier-to-evaluate form (53+47)(53−47). See an opportunity to rewrite $a^2 + 9a + 14$ as $(a+7)(a+2)$.

HS.A-SSE.B.3: Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. (Located in A1M5)

- **HS.A-SSE.B.3.a:** Factor a quadratic expression to reveal the zeros of the function it defines.
- **HS.A-SSE.B.3.b:** Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

Arithmetic with Polynomials & Rational Expressions:

HS.A-APR.A Perform arithmetic operations on polynomials.

- Explain 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. (CCSS: HS.A-APR.A.1)

Creating Equations:

HS.A-CED.A: Create equations that describe numbers or relationships

- 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. (CCSS: HS.A-CED.A.1)

  i) Tasks are limited to linear, quadratic, or exponential equations with integer exponents.

- Create equations in two or more variables to represent relationships between quantities and graph equations on coordinate axes with labels and scales. (CCSS: HS.A-CED.A.2)
- Represent constraints by equations or inequalities and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.* (CCSD: HS.A-CED.A.3) (Located in A1M2)
- 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. (CCSS: HS.A-CED.A.4)

Reasoning with Equations & Inequalities:

HS.A-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.(Located in A1M2)

HS.A-REI.B: Solve equations and inequalities in one variable.

- Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. (CCSS: HS.A-REI.B.3)
- Solve quadratic equations in one variable. (CCSS: HS.A-REI.B.4)
- b. Solve quadratic equations (e.g., for x2=49) by inspection, 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 (CCSS: HS.A-REI.B.4.b)

HS.A-REI.C.5: Prove that, given a system of two equations in two variables, replacing one equation with the sum of that equation and multiple of the other produces a system with the same solutions. (A1M2)

HS.A-REI.C.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. (A1M2)

HS.A-REI.D Represent and solve equations and inequalities graphically.

- Explain 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). (CCSS: HS.A-REI.D.10)

Interpreting Functions:

HS.F-IF.A Understand the concept of a function and use function notation.

- Explain that a function is a correspondence from one set (called the domain) to another set (called the range) that assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f (x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y=f(x). (CCSS:HS.F-IF.A.1)
- Use function notation evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. (CCSS: HS.F-IF.A.2)
- Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1. (CCSS:HS.F-IF.A.3)(Located A1M1 and A1M2)

HS.F-IF.B Interpret functions that arise in applications in terms of context.

- For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities and sketch graphs showing key features. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. (CCSS: HS.F-IF.B.4)
- Calculate and interpret the average rate of change presented symbolically or as a table, of a function over a specified interval. Estimate the rate of change from a graph. (CCSS: HS.F-IF.B.6)

HS.F-IF.C Analyze Functions using different representations

- Graph functions expressed symbolically and show key features of the graph by hand in simple cases and using technology for more complicated cases. (HS.F-IF.C.7)
- Compare properties of two functions, each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). (CCSS: HS.F-IF.C.9)

Linear, Quadratic, and Exponential Modeling:

HS.F-LE.A.1: Distinguish between situations that can be modeled with linear functions and with exponential functions:

- Prove that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals. (HS.F-LE.A.1a)(Located in A1M3)
- Recognize situations where a quantity grows or decays by a constant percent rate per unit interval relative to another. (HS.F-LE.A.1.c)(Located in A1M3)

Domain: Statistics and Probability

Interpreting Categorical and Quantitative Data:

HS.S-ID.B.5: Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. (A1M4)

HS.S-ID.B.6: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. (A1M1T3)