School District of Marshfield Course Syllabus

Course Name: Pre-Algebra
Length of Course: 1 Year
Credit: 1

Program Goal:

The School District of Marshfield Mathematics Program will prepare students for college and career in the 21st century by ensuring ***all*** students learn based on skills and knowledge needed to succeed in post-secondary education/training, career, and life. The 4K through High School Mathematics curriculum is designed to support every student in achieving success. Students will be placed in to the driver's seat. Innovative educators will tailor instruction to student need through engaging learning activities and relevant assessment.

Course Description:

The class is self-paced using a computer program called Accelerated Math from Renaissance Learning. A student must master all objectives to successfully pass the course. Students will develop skills in Number Sense and Operation, Relationships with Quantities, Reasoning with Equations, Algebra Concepts, Linear and Exponential Relationships, Geometry and Measurement, Congruence, Proof and Construction, Connecting Algebra and Geometry through Coordinates, Data Analysis, Statistics and Probability.

NOTE: A calculator is required for this course.
PREREQUISITES: Instructor's recommendation.

Standards:	
Wisconsin Standards for Mathematical Practice (MP)	
MP: 1, 2, 3, 4, 5, 6, 7, 8	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
Wisconsin Standards for Mathematics- Number and Quantity	
The Real Number System (N-RN)	
Use properties of rational and irrational numbers. N-RN: 3	3. Explain why the sum or product of two rational numbers 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.
Quantities (N-Q)	
Reason quantitatively and use units to solve problems. N-Q: 1	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.
Wisconsin Standards for Mathematics- Algebra	
Seeing Structure in Expressions (A-SSE)	
Interpret the structure of expressions. A-SSE: 1a	1. Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients.
Arithmetic with Polynomials and Rational Expressions (A-APR)	
Perform arithmetic operations on polynomials. A-APR: 1	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.
Creating Equations (A-CED)	
Create equations that describe numbers or relationships. A-CED: 1, 2, 4	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.* 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. 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.*

Reasoning with Equations and Inequalities (A-REI)	
Understand solving equations as a process of reasoning and explain the reasoning. A-REI: 1	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.
Solve equations and inequalities in one variable. A-REI: 3	3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
Wisconsin Standards for Mathematics- Functions	
Interpreting Functions (F-IF)	
Understand the concept of a function and use function notation. F-IF: 1, 2	1. 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. 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*). 2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
Interpret functions that arise in applications in terms of the context. F-IF: 4, 5, 6	4. 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 given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* 5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.* 6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
Analyze functions using different representations. F-IF: 7a, 7e, 9	7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. 9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a*

	graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
Building Functions (F-BF)	
Build a function that models a relationship between two quantities. F-BF: 1a, 1b, 2	1. Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. 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. 2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
Build new functions from existing functions. F-BF: 3	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.*
Linear, Quadratic and Exponential Models (F-LE)	
Construct and compare linear models and exponential models and solve problems. F-LE: 2	2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (including reading these from a table).
Interpret expressions for functions in terms of the situation they model. F-LE: 5	5. Interpret the parameters in a linear or exponential function in terms of a context.
Wisconsin Standards for Mathematics- Geometry	
Similarity, Right Triangles and Trigonometry (G-SRT)	
Prove theorems involving similarity. G-SRT: 5	5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
Define trigonometric ratios and solve problems involving right triangles. G-SRT: 8	8. Use the Pythagorean Theorem to solve right triangles in applied problems.
Expressing Geometric Properties with Equations (G-GPE)	
Use coordinates to prove simple geometric theorems algebraically. G-GPE: 5, 7	5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). 7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Geometric Measurement and Dimension (G-GMD)	
Explain volume formulas and use them to solve problems. G-GMD: 3	3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
Visualize relationships between two-dimensional and three-dimensional objects. G-GMD: 4	4. Identify the shapes of two-dimensional cross-sections of three dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
Wisconsin Standards for Mathematics- Statistics and Probability	
Interpreting Categorical and Quantitative Data (S-ID)	
Summarize, represent, and interpret data on a single count or measurement variable. S-ID: 1, 2, 3	1. Represent data with plots on the real number line (dot plots, histograms, and box plots). 2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range) of two or more different data sets. 3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
Summarize, represent, and interpret data on two categorical and quantitative variables. S-ID: 5, 6a, 6b, 6c	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. 6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.
Interpret linear models. S-ID: 7	7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
Making Inferences and Justifying Conclusions (S-IC)	
Understand and evaluate random processes underlying statistical experiments. S-IC: 1	1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
Make inferences and justify conclusions from sample surveys, experiments, and observational studies. S-IC: 3	3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
Conditional Probability and the Rules of Probability (S-CP)	
Understand independence and conditional probability and use them to interpret data.	1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the

S-CP: 1, 2	outcomes, or as unions, intersections, or complements of other events ("or," "and," "not"). 2. Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.

Key Vocabulary:			
Expression	Ratio	Pythagorean theorem	Similar figures
Equation	Unit rate	Square root	Congruent figures
Like-terms	Proportion	Monomial	Slant height
Exponents	Scale	Interest	Diameter
Absolute value	Dilation	Linear equation	Radius
Integer	Function	Slope	Volume
Rational number	Evaluate	Slope-intercept form	Surface area
Irrational number	Percent	Compound interest	Cross Section
Parallel lines	Perpendicular lines	Cartesian Plane	Scatter Plot
Units of Quantity	Linear Equations	Linear Inequalities	Formula
Exponential Equations	Function Notation	Linear Functions	Recursive
Exponential Functions	Domain	Range	Arithmetic Sequence
Geometric Sequence	Explicit	Histogram	Line of best fit
Translation	Rotation	Reflection	Congruent Triangles
Vertex	Venn Diagram	Sample Population	Probability

Topics/Content Outline- Units and Themes:

Quarter 1:

- Number Sense and Operation
- Relationships with Quantities
- Reasoning with Equations

Quarter 2:

- Algebra Concepts
- Linear and Exponential Relationships

Quarter 3:

- Geometry and Measurement
- Congruence, Proof, and Construction

Quarter 4:

- Connecting Algebra and Geometry Through Coordinates
- Data Analysis, Statistics and Probability

Primary Resource(s):
Renaissance Learning - Accelerated Math & STAR Math assessment