Pre-Algebra

Course Description

The goal of Pre-Algebra is to develop fluency with rational numbers and proportional relationships. Student will extend their elementary skills and begin to learn algebra concepts that serve as a transition into formal Algebra and Geometry. Students will learn to think flexibly about relationships among fractions, decimals, and percents. Students will learn to recognize and generate equivalent expressions and solve single-variable equations and inequalities. Students will investigate and explore mathematical ideas using technology and models to develop multiple strategies for analyzing complex situations. Students will analyze situations verbally, numerically, graphically, and symbolically. Students will apply mathematical skills and make meaningful connections to life's experiences.

Pre-Algebra students learn to use and understand the following fundamental concepts:

1. Simplify expression
2. Solve Equations
3. Use proportional reasoning
4. Use graphical representation
5. Algebraic notation

The following matrix lists topics covered in Pre-Algebra and is designed to show flow of understanding for students as they progress from other math classes to this course. The two columns following each big idea detail how this topic should be covered. "Solidify" indicates students have seen this concept in a previous course (see the 6th grade or Math 7 core); it is not intended to be an exhaustive list of all topics previously covered. These concepts may need to be reviewed and should be used throughout the course so that students have mastery by the end of this class. "Develop" indicates new aspects of the big idea presented in this course and it is expected that students successfully completing Pre-Algebra will have facility with these new topics. The USOE Core is linked to big ideas and sub topics, and should be referenced for clarification of concepts. In addition, a blank column is included for textbook alignment. It is suggested that each school match this curriculum with their text book and other instructional resources for alignment.

Indicators have been created in outline form for each "develop" topic and are included as an attachment to this document. These indicators provide clarification for each topic.

Big Idea	Solidify	Develop	State Core Correlation	Textbook Alignment
Integers	• Add, subtract, multiply and divide positive integers • Know the difference between positive and negative integers • Graph coordinate pairs in the first quadrant • Compare and order positive integers	• Add, subtract, multiply, and divide positive and negative integers • Locate integers on a number line • Identify the absolute value of positive and negative integers • Simplify numerical expressions using order of operations including those with absolute value and exponents • Compare and order integers • Graph ordered pairs of integers in all four quadrants of a coordinate graph	• 1.1.a • 1.2.a • 1.3.a • 1.3.b • 1.2.a • 3.3.b	

Rational Numbers	• Add, subtract, multiply and divide positive rational numbers • Locate positive rational numbers on a number line • Recognize and create equivalent forms of rational numbers in the form of percents, decimals, and fractions	• Compare and order rational numbers	• 1.2.a
		• Locate rational numbers on a number line	• 1.2.a
		• Write large and small numbers using scientific notation	• 1.2.a
		• Approximate the location of a rational coordinate point on a coordinate graph	• 3.3.a
		• Solve problems involving rational numbers and percents	• 1.3.c
		• Add, subtract, multiply, and divide rational numbers	• 1.1.b
		• Recognize and use the commutative property of addition and multiplication	• 1.2.c
		• Recognize and use the associative property of addition and multiplication	• 1.2.c
		• Recognize and use the identity property of addition and multiplication	• 1.2.c
		• Recognize and use the multiplicative property of zero	• 1.2.c
		• Recognize and use the distributive property of multiplication over addition	• 1.2.c
		• Recognize and use the inverse operations of addition and subtraction, multiplication and division, and square roots and squares	• 1.2.d
		• Predict the effect of operation with fractions, decimals, percents, and integers as an increase or a decrease of the original value	• 1.2.b

Rates, Ratios, Proportions and Similarity	• Compare fractions • Read maps and scales • Use Metric and Customary units of measurement • Identify congruent shapes	• Compare ratios to determine if they are equivalent	• 2.1.a
		• Compare ratios using the unit rate	• 2.1.b
		• Represent percents as ratios based on 100 and decimals as ratios based on powers of ten	• 2.1.c
		• Graph proportional relationships and identify the unit rate as the slope of the related line	• 2.1.d
		• Set up and solve problems using simple proportion	• 2.2.a
		• Solve percent problems, including problems involving discounts, interest, taxes, tips, and percent increase or decrease	• 2.2.b

		• Solve ratio and rate problems using informal methods (mental math, scale factor)	• 2.2.c
		• Define similar polygons	• 2.3.a
		• Identify pairs of similar triangles	• 2.3.b
		• Find missing lengths of similar triangles using proportions	• 2.3.c
		• Measure inaccessible lengths using similar triangles and proportions	• 2.3.c
		• Create and interpret scale drawings	• 4.1.b
		• Determine the approximate distance on maps using scale factors	• 4.1.b
		• Solve problems using scale factors	• 4.1.c
		• Define the slope of a line as the ratio and show the slope is constant	• 2.3.d
Algebra	• Recognize and extend simple patterns • Solve one-step equations using manipulatives (drawing) • Make simple comparisons using inequalities • Graph in the First Quadrant • Organize data in tables	• Compare representations of a relation using tables, graphs, algebraic symbols, and mathematical rules	• 3.1.a
		• Describe, create, and extend simple patterns using a rule or expression	• 3.1.b, 3.1.c
		• Evaluate algebraic expressions when given values for the variables	• 3.2.a
		• Simplify expressions using order of operations, algebraic properties, and exponent rules	• 3.2.b
		• Solve single-variable linear equations and inequalities, including simplifying on one side and variables on both sides of the equation	• 3.2.c
		• Graph linear equations using ordered pairs or tables	• 3.3.c
		• Recognize that all first order equations produce linear graphs	• 3.3.d
		• Model real-world problems using graphs, tables, equations, manipulatives and pictures, and identify extraneous information	• 3.3.e
Geometry	• Classify two- and three-dimensional shapes • Find area and perimeter (circumference) of triangles, squares, rectangles, parallelograms, trapezoids and circles	• Convert units of measure within the same system	• 4.1.a
		• Derive formulas and calculate surface area and volumes of right prisms and cylinders	• 4.2.a
		• Explain that a scale factor describes how corresponding lengths in two similar objects relate	• 4.2.b
		• Explain that a scale factor squared describes how corresponding areas in two similar objects relate	• 4.2.b

		• Explain that a scale factor cubed describes how corresponding volumes in two similar objects relate	• 4.2.b
		• Find lengths, area, and volumes of similar figures, using the scale factor	• 4.2.c
		• Solve real-world problems using surface area and volume	• 4.2.d
Data, Statistics, and Probability	• Interpret circle, bar, stem-and-leaf, line, and scatter plots • Calculate the mean, median, mode and range • Find probability of simple events	• Solve counting problems using the Fundamental Counting Principle	• 5.1.a
		• Calculate the probability of a sequence of events with or without replacement	• 5.1.b
		• Know the sum of the probability of an event and the probability of its complement is one	• 5.1.c
		• Make approximate predictions using theoretical probability and proportions	• 5.1.d
		• Recognize that experimental probability approaches theoretical probability (Law of Large Numbers)	• 5.1.e
		• Formulate questions that can be answered through data collection and analysis	• 5.2.a
		• Determine first and third quartiles of a data set	• 5.2.b
		• Summarize a set of data using a histogram and box-and-whisker plot	• 5.2.c
		• Compute the mean and median of a numerical characteristic and relate these values to the histogram of the data.	• 5.2.d
		• Use graphical representations and numerical summaries to answer questions and interpret data	• 5.2.e