SPRING GROVE AREA SCHOOL DISTRICT

PLANNED COURSE OVERVIEW

Course Title: Pre-Algebra-7	**Length of Course:** 30 cycles
Grade Level(s): 7	**Periods Per Cycle:** 6
Units of Credit: N/A	**Length of Period:** 47 minutes
Classification: Required	**Total Instructional Time:** 141 hours

Course Description

The Pre-Algebra-7 class provides the foundation for learning algebra before introducing the concepts of Algebra 1 and is inclusive of 7th and 8th grade PA Core Standards for math. The topics covered include properties, integers, rational numbers, equations, systems of equations, inequalities, functions, graphing, proportions, percent, probability, statistics, and geometry.

Instructional Strategies, Learning Practices, Activities, and Experiences

Anchor Charts	Graphic Organizers	Remediation
Anticipatory Sets	Guided Practice	Review (Games, Study Guides)
Assessments (Quizzes, Unit, Teacher-Created)	Higher-Level Questioning	Rocket Period
Bell Ringers	Homework	Simulations
Calculators	Interaction Sequence	Standardized Test Preparation
Class Discussions	Journals	Teacher Demonstrations
Closure (Exit Passes)	Manipulatives	Teacher Observations
Computer Websites and/or Software	Notes (Templates, Teacher or Student Generated)	Technology Integration (iPods, iPads, Clickers,
Cooperative Learning	Partners (Think-Pair-Share)	Computer Labs)
Critical Thinking	Posted and Numbered Objectives	Videos/DVDs
Cross Curricular Connections	Practice Exercises and Tests	Vocabulary (Cards, Strategies, and Lists)
Drill and Practice	Presentations	Wait Time and Wait Time Extended
Flexible Groups	Projects	

Assessments

Assessments (Quizzes, Unit, Teacher-Created)	Evaluation (Summative and Formative)	Presentations
Bell Ringers	Higher-Level Questioning	State Standardized Assessments
Closure	Homework Review	Projects
Classroom Diagnostic Tools (CDT)	Interaction Sequence	Teacher Observations

Materials/Resources

Anchor Charts	Internet Resources	Resource Books
Calculators	Journals	Technology Integration
Graphic Organizers	Literature	Videos/DVDs
McDougal Littel 2008	Manipulatives	Vocabulary (Cards, Strategies, and Lists)

Adopted: 8/18/83
Revised: 11/18/98; 9/17/03; 8/17/09; 5/19/14; 5/20/2019

2.1 Numbers and Operations	
The Standards of Mathematical Practices	
Make sense of problems and persevere in solving them. **Construct viable arguments and critique the reasoning of others.** **Use appropriate tools strategically.** **Look for and make use of structure.**	**Reason abstractly and quantitatively.** **Model with mathematics.** **Attend to precision.** **Look for and express regularity in repeated reasoning.**
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Integers and Rational Numbers • Determine whether a number is rational or irrational • Properties with rational numbers • Terminating and repeating decimals • Conversions of number forms (fraction to decimal) • Order of operations • Operations with rational numbers • Estimation with rational numbers	**M07.A-N.1.1.1** - Apply properties of operations to add and subtract rational numbers, including real-world contexts. **M07.A-N.1.1.2** - Represent addition and subtraction on a horizontal or vertical number line. **M07.A-N.1.1.3** - Apply properties of operations to multiply and divide rational numbers, including real-world contexts; demonstrate that the decimal form of a rational number terminates or eventually repeats. **M08.A-N.1.1.1** - Determine whether a number is rational or irrational. For rational numbers, show that the decimal expansion terminates or repeats (limit repeating decimals to thousandths). **M08.A-N.1.1.2** - Convert a terminating or repeating decimal to a rational number (limit repeating decimals to thousandths).
Ratios and Proportions • Ratios and unit rates • Proportions • Represent proportional relationships with graphs, tables, equations, diagrams, and verbal descriptions • Convert percent to fractions to decimals • Use proportions to solve multi-step ratio and percent problems (tax, tip, discount, simple interest, percent of change) • Explain what a point on the graph of a proportional relationship means	**M07.A-N.1.1.3** - Apply properties of operations to multiply and divide rational numbers, including real-world contexts; demonstrate that the decimal form of a rational number terminates or eventually repeats. **M07.A-R.1.1.1** - Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. **M07.B-E.2.1.1** - Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate **M07.A-R.1.1.2** - Determine whether two quantities are proportionally related (e.g., by testing for equivalent ratios in a table, graphing on a coordinate plane, and observing whether the graph is a straight line through the origin). **M07.A-R.1.1.3** - Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. **M07.A-R.1.1.4** - Represent proportional relationships by equations. **M07.A-R.1.1.5** - Explain what a point (*x, y*) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r*), where *r* is the unit rate. **M07.A-R.1.1.6** - Use proportional relationships to solve multi-step ratio and percent problems.

2.1 Numbers and Operations	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Powers and Roots • Apply properties of integer exponents • Express numbers in standard form and scientific notation • Perform operations with numbers in scientific notation	**M08.A-N.1.1.3** - Estimate the value of irrational numbers without a calculator (limit whole number radicand to less than 144). **M08.A-N.1.1.4** - Use rational approximations of irrational numbers to compare and order irrational numbers. **M08.A-N.1.1.5** - Locate/identify rational and irrational numbers at their approximate locations on a number line.

2.2 Algebraic Concepts	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Expressions and Equations • Write expressions • Simplify linear expressions • Operations with monomials • Solve multi-step equations and inequalities with integers, decimals, and rational numbers • Solve equations that involve square root and cube root solutions. • Use variables with equations and inequalities • Determine reasonableness of an answer • Write and identify linear equations with one solution, no solution, and infinitely many solutions	**M07.B-E.1.1.1** - Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. **M07.B-E.2.2.1** - Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. **M07.B-E.2.2.2** - Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers, and graph the solution set of the inequality. **M08.B-E.3.1.1** - Write and identify linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). **M08.B-E.3.1.2** - Solve linear equations that have rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **M08.B-E.3.1.3** - Interpret solutions to a system of two linear equations in two variables as points of intersection of their graphs because points of intersection satisfy both equations simultaneously. **M08.B-E.3.1.4** - Solve systems of two linear equations in two variables algebraically and estimate solutions by graphing the equations. Solve simple cases by inspection. **M08.B-E.3.1.5** - Solve real-world and mathematical problems leading to two linear equations in two variables.
Functions and Graphs • Determine whether a relation is a function • Graph proportional relationships • Compare proportional relationships described in different ways • Derive an equation in slope-intercept form for a line • Give examples of functions that are not linear • Construct a function to model a linear relationship between two quantities	**M08.B-E.2.1.1** - Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. **M08.B-E.2.1.2** - Use similar right triangles to show and explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane. **M08.B-E.2.1.3** - Derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b. **M08.B-F.1.1.1** - Determine whether a relation is a function.

2.2 Algebraic Concepts	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
• Determine and interpret the rate of change and initial value of a linear function in terms of the situation it models, graph, or table of values • Analyze a graph and describe the functional relationship (where it is increasing/decreasing, linear or nonlinear) • Sketch a graph from a verbal description	**M08.B-F.1.1.2** - Compare properties of two functions, each represented in a different way (i.e., algebraically, graphically, numerically in tables, or by verbal descriptions). **M08.B-F.1.1.3** - Interpret the equation $y = mx + b$ as defining a linear function whose graph is a straight line; give examples of functions that are not linear. **M08.B-F.2.1.1** - Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values. **M08.B-F.2.1.2** - Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch or determine a graph that exhibits the qualitative features of a function that has been described verbally.
Systems of Equations • Interpret solutions of two linear equations as the point of intersection that satisfy both equations • Solve linear systems algebraically, and estimate solutions by graphing • Solve simple cases by inspection • Solve real-world problems leading to a system of two linear equations in two variables	**M08.B-E.3.1.1** - Write and identify linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). **M08.B-E.3.1.2** - Solve linear equations that have rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **M08.B-E.3.1.3** - Interpret solutions to a system of two linear equations in two variables as points of intersection of their graphs because points of intersection satisfy both equations simultaneously. **M08.B-E.3.1.4** - Solve systems of two linear equations in two variables algebraically and estimate solutions by graphing the equations. Solve simple cases by inspection. **M08.B-E.3.1.5** - Solve real-world and mathematical problems leading to two linear equations in two variables.

2.3 Geometry	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Geometry • Angle relationships • Triangle relationships • Proportions/Scale drawings • 3D figures • Area and volume • Pythagorean theorem • Transformation	**M07.C-G.2.1.1** - Identify and use properties of supplementary, complementary, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure. **M07.C-G.2.1.2** - Identify and use properties of angles formed when two parallel lines are cut by a transversal (e.g., angles may include alternate interior, alternate exterior, vertical, corresponding). **M07.C-G.1.1.2** - Identify or describe the properties of all types of triangles based on angle and side measures. **M07.C-G.1.1.3** - Use and apply the triangle inequality theorem. **M07.C-G.1.1.1** - Solve problems involving scale drawings of geometric figures, including finding length and area. **M07.C-G.1.1.4** - Describe the two-dimensional figures that result from slicing three-dimensional figures. **M07.C-G.2.2.1** - Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). **Formulas will be provided.** **M07.C-G.2.2.2** - Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. **Formulas will be provided.** **M08.C-G.3.1.1** - Apply formulas for the volumes of cones, cylinders, and spheres to solve real-world and mathematical problems. **Formulas will be provided.** **M08.C-G.2.1.1** - Apply the converse of the Pythagorean theorem to show a triangle is a right triangle. **M08.C-G.2.1.2** - Apply the Pythagorean theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two- and three-dimensions. (Figures provided for problems in three dimensions will be consistent with Eligible Content in grade 8 and below.) **M08.C-G.2.1.3** - Apply the Pythagorean theorem to find the distance between two points in a coordinate system. **M08.C-G.1.1.1** - Identify and apply properties of rotations, reflections, and translations. **M08.C-G.1.1.2** - Given two congruent figures, describe a sequence of transformations that exhibits the congruence between them. **M08.C-G.1.1.3** - Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. **M08.C-G.1.1.4** - Given two similar two-dimensional figures, describe a sequence of transformations that exhibits the similarity between them.

2.4 Measurement, Data, and Probability	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Statistics and Probability • Recognize random samples (misleading data) • Draw inferences about a population from a random sample (data predictions) • Use statistical measures to compare two numerical data distributions (scatter plots and trend lines) • Predict the likelihood of outcomes • Determine probability of an event given relative frequency (theoretical vs. experimental) • Find probability of a simple event occurring and not occurring • Find the probabilities of independent compound events using lists, tables, tree diagrams, and simulations. (independent vs. dependent)	**M07.D-S.1.1.1** - Determine whether a sample is a random sample given a real-world situation. **M07.D-S.1.1.2** - Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. **M07.D-S.2.1.1** - Compare two numerical data distributions using measures of center and variability. **M07.D-S.3.1.1** - Predict or determine whether some outcomes are certain, more likely, less likely, equally likely, or impossible (i.e., a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event). **M07.D-S.3.2.1** - Determine the probability of a chance event given relative frequency. Predict the approximate relative frequency given the probability. **M07.D-S.3.2.2** - Find the probability of a simple event, including the probability of a simple event **not** occurring. **M07.D-S.3.2.3** - Find probabilities of independent compound events using organized lists, tables, tree diagrams, and simulation.