7th Grade Pre-Algebra Curriculum Maps

Grade: 7 Subject: Pre-Algebra	**Unit 1: The Tools of Algebra** **Equations, Variables and Expressions, Graphing, Properties**
Big Idea/Rationale	Big Idea: In **Chapter 1**, you will translate verbal phrases into numerical expressions; evaluate expressions and use the order of operations; identify and use properties of addition and multiplication; and use words, tables, equations, and graphs to represent relations and functions. Rationale: Evaluating and understanding variables can help solve problems by representing relationships between variables using word descriptions, tables, graphs, and equations. This basic tool in algebra helps to address real life situations such as the speed of a car traveling, variations in traffic patterns and the change of prices in the market.
Enduring Understanding	• Algebra is used to represent and clarify situations we encounter in the world. • The real numbers is a field that conforms to a certain set of basic rules. • Properties provide structure to the world of mathematics. • Different representations (written descriptions, tables, graphs and equations) of the relationships between varying quantities may have different strengths and weaknesses. • With the development of mathematical reasoning, comes the recognition that many real life situations can be quantified. • Scatter plots and lines of best fit allow us to make predictions based on data.
Essential Questions	• How do you translate a real world problem into an algebraic expression, table and/or graph? • How do you predict, find and justify solutions to application problems using appropriate tables, graphs and algebraic equations? • How do you locate and name points on a coordinate graph? • How do you draw conclusions and make predictions using scatter plots? • How to you represent relationships among quantities, using concrete models? • How to you investigate methods for solving linear equations? • How do you look for patterns and represent generalizations algebraically?
Content (Subject Matter)	• Translate verbal phrases into numerical expressions • Use the order of operations to evaluate expressions • Determine rules for a given pattern • Translate verbal phrases into algebraic expressions • Evaluate expressions containing variables • Identify and use properties of addition and multiplication • Use properties to simplify algebraic expressions • Use ordered pairs to locate points • Use graphs to represent relations • Identify a function

	• Use multiple representations to represent a function • Translate among different verbal, tabular, graphical and algebraic representations of a function • Use a scatter plot to investigate the relationship between two sets of data • Construct scatter plots • Analyze trends in scatter plots
Standards	5.OA.A.1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. 5.OA.A.2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.* 5.G.A.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). 5.G.A.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. 7.EE.A.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. 7.EE.A.2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."* 8.SP.A.1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
Materials and Resources	Glencoe Pre-Algebra Textbook/Chapter Resources Mimios Brainpop
Notes	

Grade: 7 Subject: Pre-Algebra	**Unit 2: Operations with Integers**
	Big Idea: In **Chapter 2**, you will demonstrate an understanding of absolute value and select and use appropriate operations – addition, subtraction, multiplication, division to solve problems with rational numbers (including negatives). Rationale: Understanding and mastering operations with rational numbers including integers (positive and negative) will help with real world topics including banking, temperature, check accounting and personal finance. Graphing points in all four quadrants and transformations prepares one for assessing distance and movement of objects along a coordinate plane including landscape design.
Enduring Understanding	• Relationships among numbers and number systems form the foundations of number sense and mathematics communication. • Two different integers can have the same absolute value. • Patterns and relationships among operations are essential to making estimates and computing fluently. • Spatial relationships can be described and represented using coordinate geometry.
Essential Questions	• How do you compare and order integers? • How do you select and use appropriate operations to solve problems involving integers • How do you find and evaluate an algebraic expression to determine any term in an arithmetic sequence? • How do you locate and name points on a coordinate plane using ordered pairs of integers? • How to you graph reflections and translations on a coordinate plane? • How do you generate different representations of data given another representation of data?
Content (Subject Matter)	• To compare and order integers • To find the absolute value of an expression • To add two integers • To add more than two integers • To subtract integers • To evaluate expressions containing variables • To multiply integers • To simplify algebraic expressions • To divide integers • To find the mean (average) of a set of data • To graph points on a coordinate plane • To graph algebraic relationships

	• To define and identify transformations • To draw translations and reflections on a coordinate plane
Standards	7.NS.A.1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. A. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged*. B. Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. C. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. D. Apply properties of operations as strategies to add and subtract rational numbers. 7.NS.A.2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. A. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. B. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts. C. Apply properties of operations as strategies to multiply and divide rational numbers. 7.NS.A.3. Solve real-world and mathematical problems involving the four operations with rational numbers.[1] 7.EE.B.3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation*.

Materials and Resources	Glencoe Pre-Algebra Textbook/Chapter Resources Mimios Brainpop
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Grade: 7 Subject: Pre-Algebra	**Unit 3: Operations with Rational Numbers**
Big Idea/Rationale	Big Idea: In Chapter 3 students will write fractions as terminating or repeating decimals, identify, add, subtract, multiply and divide rational numbers, and evaluate algebraic expressions with fractions. Rationale: Many real world problems require the use of operations involving fractions such as cooking which uses many fractions in recipes, comparing groups of unequal size, reading and understanding advertisements using fractions.
Enduring Understanding	• Rational numbers can be represented in multiple ways. • Mathematical properties reveal multiple appropriate methods to compute. • Rational numbers allow us to make sense of situations that involve numbers that are not whole. • Integers can be divided provided the divisor does not equal zero, and every quotient of integers is a rational number. • Multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers.
Essential Questions	• How do you convert between fractions, decimals, whole numbers and percents? • How do you solve problems involving fractions and decimals? • How do you evaluate the effectiveness of different representations to communicate ideas? • How do you add/subtract, multiple and divide integers and rational expressions? • How do you identify and apply mathematics to everyday experiences, to activities in and outside school, with other disciplines and with other mathematical topics? • How do you simplify rational expressions?
Content (Subject Matter)	• Represent positive and negative fractions and decimals on a number line. • Write fractions as terminating or repeating decimals. • Compare fractions and decimals • Write rational numbers as fractions • Identify and classify rational numbers▪ • Multiply positive and negative fractions • Evaluate algebraic expressions with fractions • Divide positive and negative fractions using multiplicative inverses • Divide algebraic fractions • Add rational numbers with common denominators • Subtract rational numbers with common denominators

	• Add unlike fractions • Subtract unlike fractions.
Standards	7.NS.A.1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. D. Apply properties of operations as strategies to add and subtract rational numbers. 7.NS.A.2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. A. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. C. Apply properties of operations as strategies to multiply and divide rational numbers. D. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. 7.NS.A.3. Solve real-world and mathematical problems involving the four operations with rational numbers.[1] 7.EE.B.3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*
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Grade: 7 Subject: Pre-Algebra	**Unit 4: Expressions and Equations**
Big Idea/Rationale	Big Idea: In **Chapter 4** we will use the distributive property, solve one and two step equations by using properties of equalities, and write equations to solve problems. Students are able to look at a relationship between two variables using an equation, a table and a graph. Rationale: Expressions and equations are part of our everyday life. There are different ways of grouping numbers in order to use mental math to calculate amounts. There are formulas (equations) used every day in calculating costs and comparing prices. There are also equations used to complete tables in order to compare a relationship in various amounts. These tools help students rationalize and solve real life problems involving financial decisions and comparisons of different amounts.
Enduring Understanding	• Rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. • A variable represents an unknown that will change in different settings. • Proportional relationships express how quantities change in relationship to each other. • Mathematicians formulate equations/functional relationships to communicate generalizations so that problems can be solved more efficiently. • Equations depict patterns of change and are solved using inverse operations.
Essential Questions	• How do you use the concepts and properties of equality to solve algebraic equations? • How do you use the concepts and properties of equality to solve algebraic equations? • How do you use models to connect to algorithms? • How do you select and use appropriate operations? • How do you communicate mathematical ideas using algebraic mathematic models? • How do you use inverse operations to solve equations? • How do you predict, find and justify solutions to application problems using algebraic equations?
Content (Subject Matter)	• To use the Distributive Property to write equivalent numerical expressions. • To use the Distributive Property to write equivalent algebraic expressions. • To use algebra tiles to represent and simplify algebraic expressions. • To identify parts of an algebraic expression. • To solve equations by using the Addition and Subtraction Properties of Equalities • To translate verbal sentences into equations. • To solve equations by using the Division Property of Equality

	• To solve equations by using the Multiplication Property of Equality. • To use algebra tiles to solve two-step equations. • To solve two-step equations • To solve real-world problems involving two-step equations. • To write two-step equations • To solve verbal problems by writing and solving two-step equations.
Standards	7.NS.A.2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. A. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. C. Apply properties of operations as strategies to multiply and divide rational numbers. 7.EE.A.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. 7.EE.B.4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. A. 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. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* 8.EE.C.7. Solve linear equations in one variable. B. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
Materials and Resources	Glencoe Pre-Algebra Textbook/Chapter Resources Mimios Brainpop
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Grade: 7 Subject: Pre-Algebra	**Unit 5: Multistep Equations and Inequalities**
Big Idea/Rationale	Big Idea: In Chapter 5, students use the distributive property to solve equations and inequalities. They select and use appropriate operations to solve problems and justify solutions. Rationale: This chapter helps students utilizing budgeting techniques for allowances, saving money for various purchases. Students can use inequalities to calculate minimum and maximum amounts of time or money for decision making. Comparison shopping with fixed and variable rates can help make real life decisions. Graphs provide visual displays of data needed for decision making when there are two variables involved.
Enduring Understanding	• To obtain a solution to an equation, no matter how complex, always involves the process of undoing operations. • Real world situations can be modeled and solved by using equations and inequalities. • The equal sign indicates that two expressions are equivalent, thus forming an equation. • An inequality is another way to describe a relationship between expressions; instead of showing that the values of two expressions are equal, inequalities indicate that the value of one expression is greater than (or greater than or equal to) the value of the other expression. • In solving an inequality, multiplying or dividing both expressions by a negative number reverses the sign that indicates the relationships between the two expressions.
Essential Questions	• How do you use models to solve equation? • How do you select and solve problems with rational numbers? • How do you select and use appropriate operations to solve problems? • How do you predict, find, and justify solutions to application problems using appropriate tables, graphs, and algebraic equations? • How do you use formulas to solve problems? • How do you translate verbal phrases into inequalities?
Content (Subject Matter)	• Solve problems involving the perimeters of triangles and rectangles. • Solve problems involving the areas of triangles and rectangles. • Use algebra tiles to solve equations with variables on each side. • Solve equations with variables on each side. • Solve equations that involve grouping symbols. • Write inequalities. • Graph inequalities on a number line. • Solve inequalities by using the Addition and Subtraction Properties of Inequality. • Solve inequalities by multiplying or dividing by a positive or negative

	number. • Solve multi-step equations. • Solve multi-step inequalities.
Standards	7.NS.A.1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. A. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged*. B. Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. C. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. D. Apply properties of operations as strategies to add and subtract rational numbers. 7.NS.A.2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. A. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. B. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts. C. Apply properties of operations as strategies to multiply and divide rational numbers. 7.NS.A.3. Solve real-world and mathematical problems involving the four operations with rational numbers.[1] 7.EE.B.3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation*.

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Grade: 7 Subject: Pre-Algebra	**Unit 6: Ratio, Proportion, and Similar Figures**
Big Idea/Rationale	Big Idea: In Chapter 6, students will write ratios as fractions in simplest form, find and compare unit rates, and use and solve proportions. Rationale: This chapter helps students utilize ratios, proportions, scales and scale factors to convert between models and actual objects as well as find missing measurements on similar figures. Scale drawings can be created using scale and scale factors. In Biology, comparisons are made using proportions for predictions of environmental factors. Students can project a unit rate given a specific ratio. Students will be able to convert between systems of measurement. Students can use tools of ratio and proportion to explore indirect measurement using shadow reckoning and surveying methods.
Enduring Understanding	• A ratio is a multiplicative comparison of two quantities, or it is a joining of two quantities in a composed unit. • Proportional relationships express how quantities change in relationship to each other. • An equation can be written stating that two ratios are equal, and if the equation contains a variable, it can be solved to find the value of the variable. • Ratios and proportions can be used to decide whether two polygons are similar and to find unknown side lengths of similar figures. • Proportional relationships can be used to solve real-world problems related to simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. • Proportional relationships can be used to solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
Essential Questions	• How do you use division to find unit rates and ratios in proportional relationships? • How do you select and use appropriate forms of rational numbers to solve real-life problems? • How do you use appropriate operations to solve problems involving rational numbers in problem situations? • How do you compare and contrast proportional and non-proportional linear relationships? • How do you use proportional relationships in similar two-dimensional figures to find missing measurements? • How do you use ratios to solve problems involving similar figures?
Content (Subject Matter)	• Write ratios as fractions in simplest form. • Simplify ratios involving measurements. • Find unit rates.

	• Compare and use unit rates to solve problems. • Convert rates using dimensional analysis. • Convert between systems of measurement. • Identify proportional and nonproportional relationships in tables and graphs. • Describe a proportional relationship using an equation. • Solve proportions. • Use proportions to solve real-world problems. • Use scale drawings. • Construct scale drawings. • Use scale factor to draw enlargements and reductions. • Find missing measures of similar figures. • Use scale factors to solve problems. • Graph dilations on a coordinate plane. • Find the scale factor of a dilation. • Solve problems using shadow reckoning. • Solve problems using surveying methods.
Standards	7.RP.A.1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction* $^{1/2}/_{1/4}$ *miles per hour, equivalently 2 miles per hour.* 7.RP.A.2. Recognize and represent proportional relationships between quantities. A. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. B. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. C. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.* D. 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. 7.NS.A.3. Solve real-world and mathematical problems involving the four operations with rational numbers.[1] 7.G.A.1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. 8.G.A.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. 8.G.A.4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe

	a sequence that exhibits the similarity between them.
Materials and Resources	Glencoe Pre-Algebra Textbook/Chapter Resources Mimios Brainpop
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Grade: 7 Subject: Pre-Algebra	**Unit 7: Percent**
Big Idea/Rationale	Big Idea: In Chapter 7, students will express percents as fractions and decimals and fractions as percents. They will use the percent proportion and percent equations to solve problems, and construct and interpret circle graphs. Rationale: Percents are incorporated in everyday life in many ways. They are used to represent statistics for many things such as advertising and sports. Percents are important in financial matters including tax, tip and discounts.
Enduring Understanding	• A part of a whole can be expressed as a decimal, fraction, or percent. • Numbers may be represented in different forms to enable people to use them in real life situations. • Unit rates allow us to compare quantities measured in like or different units. • Circle graphs are effective for displaying data categorized by percents.
Essential Questions	• How do you convert between fractions, decimals, whole numbers, and percents mentally, on paper, or with a calculator? • How do you select and use appropriate forms of rational numbers to solve real-world problems? • How do you use appropriate operations to solve problems involving rational numbers in problem situations? • How do you use ratios, proportions, and percent of change to solve problems? • How do you evaluate a solution for reasonableness? • How do you select and use appropriate representations for presenting and displaying relationships among collected data? • How do you solve problems involving proportional change? • How do you generate a different representation of data given another representation of data?
Content (Subject Matter)	• Express percents as fractions. • Express fractions as percents. • Express percents as decimals and vice versa. • Compare and order fractions, decimals, and percents. • Use a percent model to find a percent or a part. • Use the percent proportion to solve problems. • Apply the percent proportion to real-world problems. • Compute mentally with percents. • Estimate with percents. • Solve percent problems using percent equations. • Apply the percent equation to real-world problems. • Use percents to describe a change when a number increases or decreases. • Find percent of increase and decrease.

	• Solve real-world problems involving markup and discount. • Solve simple interest problems and apply the simple interest equation to real-world problems. • Solve compound interest problems. • Construct circle graphs. • Analyze circle graphs to solve real-world problems.
Standards	7.EE.A.2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."* 7.EE.B.3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation*. 7.RP.A.2. Recognize and represent proportional relationships between quantities. A. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. C. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn*. 7.RP.A.3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.
Materials and Resources	Glencoe Pre-Algebra by McGraw Hill, Glencoe Resource Master Chapter 7, Lesson Mimeos, Olive Garden Restaurant Menu, Various Catalogues for shopping, supplied prices on school supplies.
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Grade: 7 Subject: Pre-Algebra	**Unit 8: Linear Functions and Graphing**
Big Idea/Rationale	Big Idea: In Chapter 8, students solve and graph linear equations with two variables and write and graph linear equations using the slope and the y-intercept in order to understand and explain a relationship between two normally unrelated variables. Rationale: This chapter helps students to use what they have learned about functions, rates of change and slope to analyze many things such as facts on food, heart rates, speeds and other rates of change in real life. Students can read graphs in newspapers and magazines or advertising and understand the change portrayed in them.
Enduring Understanding	• The properties of operations can be used as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. • Rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. • Many real-world situations can be modeled by linear functions. • The slope of a line represents the constant rate of change for the data modeled by the line. • The graph of a linear equation represents all points that are represented by the linear model. • Direct variation equations are linear equations that pass through the origin. • Scatter plots and lines of best fit allow us to use available data to make viable predictions.
Essential Questions	• How do you graph data? • How do you use division to find unit rates? • How does one locate and name points on a coordinate plane? • How do you generate a different representation of data given another representation of data? • How do you predict, find, and justify solutions to application problems using appropriate tables, graphs, and algebraic equations? • How do you draw conclusions and make predictions by analyzing trends in scatter plots?
Content (Subject Matter)	• Determine whether a relation is a function. • Write a function using function notation. • Describe sequences using words and symbols. • Find terms of arithmetic sequences. • Solve linear equations with two variables. • Graph linear equations using ordered pairs. • Find rates of change. • Solve problems involving rates of change. • Identify proportional and non-proportional relationships by finding a

	constant rate of change. • Solve problems involving direct variation. • Find the slope of a line. • Use slope to describe a constant rate of change. • Determine the slope and y-intercepts of lines. • Graph linear equations using the slope and the y-intercept. • Write equations given the slope and y-intercept, a graph, a table, or two points. • Use linear equations to solve problems. • Draw lines of fit for sets of data. • Use lines of fit to make predictions about data.
Standards	7.EE.B.3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation*. 7.EE.B.4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. 8.EE.B.5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. 8.EE.B.6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; 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. 8.F.A.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. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line*. 8.F.B.4. 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. 8.F.B.5. 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 a graph that exhibits the qualitative features of a function that has been described verbally.
Materials and Resources	Glencoe Pre-Algebra Textbook/Chapter Resources Mimios Brainpop
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Grade: 7 Subject: Pre-Algebra	**Unit 9: Powers and Nonlinear Functions**
Big Idea/Rationale	Big Idea: In Chapter 9, students write and evaluate expressions with exponents. They will write and compare numbers in scientific notation. Students learn how to represent very large and very small numbers using scientific notation. Rationale: This chapter helps students to recognize and explain very small and very large numbers and how frequently they are used in many real world situations. For example, the solar system uses measurements that are very large and need to be written in scientific notation. Our medical field uses extremely small measurements that also use scientific notation to represent measurements.
Enduring Understanding	• Exponents provide a structure for representing really large or small values as well as complex expressions. • In certain situations, an estimate is as useful as an exact answer.
Essential Questions	• How do you simplify numerical expressions? • How do you solve problems involving fractions and decimals? • How do you communicate mathematical ideas? • How do you select appropriate operations? • How do you use a problem solving model? • How do you examine factors and monomials? • How do you evaluate expressions with powers and exponents? • How do you multiply and divide monomials? • How do you express numbers using positive and negative exponents? • How do you use scientific notation?
Content (Subject Matter)	• Find the factors of a given number. • Write expressions using exponents. • Evaluate expressions containing exponents. • Write the prime factorizations of composite numbers. • Factor monomials. • Apply prime factorization to find the greatest common factor (GCF) and least common multiple (LCM) of two or more numbers or monomials. • Multiply monomials. • Divide monomials. • Write expressions using negative exponents. • Evaluate numerical expressions containing negative exponents. • Express numbers in standard form and in scientific notation. • Compare and order numbers written in scientific notation. • Find the power of a power. • Find the power of a product. • Model and evaluate squares and square roots. (Chapter 10.1) • Find square roots. (Chapter 10.1)

	• Estimate square roots. (Chapter 10.1)
Standards	7.EE.A.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. 8.EE.A.1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. 8.EE.A.3. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger*. 8.EE.A.4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
Materials and Resources	Glencoe Pre-Algebra Textbook/Chapter Resources Mimios Brainpop
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Grade: 7 Subject: Pre-Algebra	**Unit 10: Real Numbers and Right Triangles (Pythagorean Theorem and Distance Formula)**
Big Idea/Rationale	Big Idea: In Chapter 10, students identify irrational numbers and classify real numbers. They classify triangles and solve problems using the Pythagorean Theorem. Rationale: This chapter has many recreational applications including finding distances where a right triangle is present and can be used to find an indirect measurement. Designers use mathematics such as square roots when trying to create things like sails for boats, ladders, houses and other recreational spaces.
Enduring Understanding	• The Pythagorean Theorem is a central problem solving tool in both Algebra and Geometry. • The distance formula is derived using the Pythagorean Theorem. • The Pythagorean Theorem and the distance formula are used for finding missing information in the real world and on a coordinate grid.
Essential Questions	• How do you use properties to classify triangles? • How do you estimate and find solutions involving proportional relationships such as similarity? • How do you estimate and find solutions involving percents and proportional relationships? • How do you communicate mathematical ideas using algebraic mathematical models? • How do you use geometric concepts and properties to solve problems in fields such as art and architecture? • How do you use the Pythagorean Theorem to solve real-world problems?
Content (Subject Matter)	• Find square roots. • Estimate square roots. • Identify and compare numbers in the real number system. • Solve equations by finding square roots. • Find the missing angle measure of a triangle. • Classify triangles by properties and attributes. • Use the Pythagorean Theorem to find the length of a side of a right triangle. • Use the converse of the Pythagorean Theorem to determine whether a triangle is a right triangle. • Use the Distance Formula to find the distance between two points on a coordinate plane. • Apply the Distance Formula to solve problems about figures on the coordinate plane.
Standards	7.EE.A.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. 8.EE.A.1. Know and apply the properties of integer exponents to generate

	equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. 8.EE.A.3. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger*. 8.EE.A.4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
Materials and Resources	Glencoe Pre-Algebra Textbook/Chapter Resources Mimios Brainpop
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Grade: 7 Subject: Pre-Algebra	**Unit 11: Geometry - Distance and Angle**
Big Idea/Rationale	Big Idea: Students will identify the relationship of parallel and intersecting lines, identify properties of congruent triangles, and find the area of polygons, irregular figures, and circles. Rationale: Two-dimensional figures are an integral part of our world. These figures are used in art designs, building designs, and in statistical graphs. Many figures are constructed of two-dimensional figures such as rooms, art, furniture, landscapes and need to be measured in different ways. Understanding the use of angles helps people in sports, household projects, painting, landscaping and many other applications. There are endless examples in real life that require our understanding and ability to measure two-dimensional figures.
Enduring Understanding	• Both the real and the man-made world are designed using geometric figures. • Measurement helps us understand and describe our world. • Scale drawings preserve shape within similar figures. • All circles are similar. • Common area, volume, and surface area formulas can be combined to find the area, volume, and surface area of composite figures or solids.
Essential Questions	• How do you use angle measurement to classify pairs of angles? • How do you use properties to classify triangles? • How do you predict, find, and justify solutions? • How do you locate and name points on a coordinate plane? • How do you use geometric concepts and properties to solve problems in fields such as art and architecture? • How do you graph rotations on a coordinate plane? • How do you use properties to classify quadrilaterals and other polygons?
Content (Subject Matter)	• Examine relationships between pairs of angles. • Examine relationships of angles formed by parallel lines and a transversal. • Identify corresponding parts of congruent triangles. • Find missing angle measures of a quadrilateral. • Classify quadrilaterals. • Classify polygons. • Determine the sum of the measures of the interior angles of a polygon. • Find area of parallelograms. • Find areas of triangles and trapezoids. • Find the circumference of circles. • Solve problems involving circumference. • Find areas of circles. • Find areas of sectors. • Find the area of composite figures.

	• Solve problems involving the area of composite figures. • Define, identify, and draw rotations. • Determine if a figure has rotational symmetry.
Standards	7.G.A.1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. 7.G.A.2. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. 7.G.A.3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. 7.G.B.4. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. 7.G.B.5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. 7.G.B.6. 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. 8.G.A.1. Verify experimentally the properties of rotations, reflections, and translations: A. Lines are taken to lines, and line segments to line segments of the same length. B. Angles are taken to angles of the same measure. C. Parallel lines are taken to parallel lines. 8.G.A.2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. 8.G.A.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. 8.G.A.4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. 8.G.A.5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so*.

Materials and Resources	Glencoe Pre-Algebra Textbook/Chapter Resources Mimios Brainpop
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Grade: 7 Subject: Pre-Algebra	**Unit 12: Surface Area and Volume**
Big Idea/Rationale	Big Idea: In Chapter 12, students describe three-dimensional figures. They find volumes and surface areas of three-dimensional figures and examine properties of similar solids. Rationale: The world is full of dimensional figures and this chapter helps students understand the way everything around them fills and occupies space. There are many real world applications such as the world of art and design relies heavily on the use of three-dimensional figures. Many forms of art are geometric masterpieces.
Enduring Understanding	• Volume can be calculated for three dimensional figures. • Surface area can be calculated for three dimensional figures. • The attributes of geometric objects makes it possible for us to classify them. • Proportional reasoning can be used to find missing measures in similar figures.
Essential Questions	• How do you use properties to classify three-dimensional figures? • How do you connect models to formulas? • How do you communicate mathematical ideas? • How do you use geometric concepts and properties? • How do you draw three-dimensional figures from different perspectives? • How do you connect models of prisms, cylinders, pyramids, spheres, and cones to formulas for volume of these objects? • How do you estimate measurements and use formulas to solve application problems involving lateral and surface area? • How do you use proportional relationships in similar three-dimensional figures to find missing measurements?
Content (Subject Matter)	• Identify and draw three-dimensional figures. • Describe and draw vertical, horizontal, and angled cross sections of three-dimensional figures. • Find volumes of prisms. • Find volumes of composite figures. • Find the volumes of circular cylinders. • Find the volumes of composite figures involving circular cylinders. • Find the surface area of prisms. • Find lateral area and surface area of prisms. • Find surface area of real-world objects shaped like prisms. • Find lateral and surface areas of cylinders. • Compare surface areas of cylinders. • Find lateral areas and surface areas of pyramids. • Find lateral areas and surface areas of cones.

	• Identify and investigate similar solids. • Examine properties of similar solids.
Standards	7.G.A.3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. 7.G.B.6. 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. 8.G.C.9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
Materials and Resources	Glencoe Pre-Algebra by McGraw Hill, Pre-Algebra Resource Master Chapter 12, Mimeo Files, Cardboard boxes, 3-D Manipulatives Kit, rice, funnel
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Grade: 7 Subject: Pre-Algebra	**Unit 13: Statistics and Probability**
Big Idea/Rationale	**Big Idea:** Find and use measures of central tendency and measures of variation and display and interpret data. Find probabilities of simple events and compound events including independent and dependent events. **Rationale:** Statistics and statistical displays are frequently used in many real world situations including sports, marketing and advertising, medical and historical data and rankings of many things. Often you can find data displays in social media including newspapers, online articles and magazines. Probability is found in many areas including carnivals, games of chance and sports as well. Sampling and probability is used to make predictions in many situations including sporting events and politics.
Enduring Understanding	• Data can be described by a single value used to describe the set. • Data can be displayed in many different forms with each form having advantages and disadvantages. • Probability leads to reasonable predictions. • Probability shows the risk factors in life. • The principles of the probability of a single event apply to the probability of independent events.
Essential Questions	• How do you select and use an appropriate representation for presenting and displaying relationships among collected data, including line plot, line graph, bar graph, stem-and-leaf plot, circle graph, histograms, and box-and-whisker plot with and without the use of technology? • How do you make inferences and convincing arguments based on an analysis of given or collected data? • How do you find the probabilities of dependent and independent events?
Content (Subject Matter)	• Use the mean, median, and mode as measures of central tendency. • Choose an appropriate measure of central tendency and recognize measures of statistics. • Display data in stem-and-leaf plots. • Interpret data in a stem-and-leaf plot. • Find measures of variation. • Display data in a box-and-whisker plot. • Interpret data in a box-and-whisker plot. • Display data in a histogram. • Interpret data in a histogram. • Find the probability of simple events. • Predict the actions of a larger group. • Find probability using area models. • Identify various sampling techniques. • Use tree diagrams or the Fundamental Counting Principle to count

	outcomes. • Use tree diagrams or the Fundamental Counting Principle to find the probability of an event. • Find the probability of events. • Use permutations. • Use combinations. • Find the probability of independent and dependent events. • Find the probability of mutually exclusive events.
Standards	7.SP.A.1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. 7.SP.A.2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be*. 7.SP.B.4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.* 7.SP.C.5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. 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. 7.SP.C.6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times*. 7.SP.C.7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. A. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected*. B. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a*

	tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies? 7.SP.C.8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. A. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. B. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. C. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*
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