SEVENTH GRADE MATHEMATICS CURRICULUM

Course 17002

Seventh grade students will deepen their understanding of the use of ratios in problem solving as well as multiply and divide fractions. They will continue to extend their fluency or mathematical operations with multi-digit numbers. The course will cover the relationships between dependent and independent variables. Students will extend their previous understanding to algebraic expressions and the process of solving one-variable equations. They will solve problems of area, surface, and volume. Coordinate graphing in all 4 quadrants will be used to solve problems. Students will also learn about statistical variability and be able to summarize a distribution of data.

SEVENTH GRADE MATHEMATICS OUTLINE:

Goals	Skills	Summative Assessments	Time Frame	Main Resources
• Analyze proportional relationships and use them to model and solve real-world and mathematical problems. • Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations. • Visualize and represent geometric figures and describe the relationships between them. • Draw inferences about populations based on random sampling concepts. • Draw informal comparative inferences about two populations. • Investigate chance processes and develop, use, and evaluate probability models.	• Apply and extend previous understandings of operations with fractions to operations with rational numbers. • Apply properties of operations to generate equivalent expressions. • Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.	Mid-year and End of Year Benchmark Assessments, PSSA	1-year	Glencoe Math: Course 2 ©2015

SEVENTH GRADE MATHEMATICS MAP:

TIME FRAME	BIG IDEAS	CONCEPTS	ESSENTIAL QUESTIONS	STANDARDS	OBJECTIVES	DIFFERENTIATION	ASSESSMENT
Chapter 1 (Weeks 1-5)	• Ratio and proportional reasoning can be used to help represent relationships in the real world as direct variations to help make predictions of what may happen outside of our data values. • We can use rates and proportions to help us model real world relationships to help use make predictions about the future of these relationships.	1. Rates/ Unit Rates 2. Complex Fractions 3. Converting Unit Rates Proportional Relationships 4. Constant Rate Of Change 5. Slope 6. Direct Variation	• How can you show that two objects are proportional?	CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems. M07.A-R.1 Demonstrate an understanding of proportional relationships. M07.A-R.1.1 Analyze, recognize, and represent proportional relationships and use them to solve real-world and mathematical problems. 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. 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. M07.A-R.1.1.1a Find the unit rate in a real-world problem. M07.A-R.1.1.2 Determine whether	• Students should be able to identify, find, and use unit rates. • Students should be able to use properties of division of rational numbers to rewrite complex fractions as mixed numbers. • Students should be able to use known unit rates to convert between units of measure. • Students should be able to identify whether fractions are proportional or non-proportional. • Students should be able to use cross multiplication to determine whether relations are proportional or non-proportional. • Given a relation in the form of a table students should be able to graph the relation as ordered pairs. • Given the fact that 2 ratios are proportional students should be able to use cross multiplication to solve for a missing part of the proportion. • Students should be able to determine a rate of change from a table or graph.	Additional time Additional practice Partner/group work	Homework Classwork and Activities Quizzes Mid-Chapter Check Vocabulary Test Test

				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.1.1.3a Represent a proportional relationship on a line graph. M07.A-R.1.1.4 Represent proportional relationships by equations. 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. 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.	• Students should be able to determine whether the rate of change is constant. • Students will be able to determine the slope of a line from its graph. • Given a direct variation students should be able to identify the constant of proportionality and be able to describe what it means in the context of a problem.		

				M07.A-R.1.1.5a Interpret an ordered pair in a real-world problem. M07.A-R.1.1.6 Use proportional relationships to solve multi-step ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease. M07.A-R.1.1.6a Use percentages to solve a real-world problem.			
Chapter 2 (Weeks 6-9)	• Percents can be used to help us determine what type of profits we will make and what sort of debts we can afford.	1. Using percents as fractions to find a percent of a number. 2. Estimating the percent of a number 3. Finding exact percent values of a number 4. Understanding what a percent of change shows. 5. Percents of change in the real world : Discounts, Sales tax, Markups, and Tips 6. Understanding how simple and compound interest work and how we can use it to make money over a long term investment.	• How are percents involved in real world problems? • How can percents make our live easier?	CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems. M07.A-R.1.1.4 Represent proportional relationships by equations. 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. M07.A-R.1.1.5a Interpret an ordered pair in a real-world problem.	• Students should be able to rewrite percents as fractions. • Students should be able to use the fraction form of a percent to find the percent of numbers. • Students should be able to estimate the percent of a number by rounding the number or the percent to a "nice" number to make the math easier to do. • Students should be able to use proportions to find either the part, whole or percent of a number given the other 2 pieces. • Students should be able to write percents as decimals.	Additional time Additional practice Partner/group work	Homework Classwork and Activities Quizzes Mid-Chapter Check Vocabulary Test Test

				M07.A-R.1.1.6 Use proportional relationships to solve multi-step ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease. M07.A-R.1.1.6a Use percentages to solve a real-world problem.	• Students should be able to use the decimal form of a percent to find the part of a whole by using the percent equation. • Students should be able to find a percent change. • Students should be able to identify a percent change as either a percent increase or a percent decrease. • Students should be able to understand what a sales tax, tip, gratuity, and markup are identify the prior. • Students should be able to find a sales tax, tip, gratuity, and markup by using our percent change. • Students should be able to determine a total amount that would be paid after including a sales tax, tip, gratuity, and markup and the original price. • Students should be able to find the amount of a discount given the percent. • Students should be able to find the total amount owed after factoring in a discount and the original price. • Students should be able to find a total amount of money owed given any		

					combination of sales tax, tip, gratuity, markup, and discount and the original price. • Students should be able to define what a simple and compound interest are. • Students should be able to find the simple interest an account earns given the principal, interest rate, and years in the account by using I=PRT. • Students should be able to find the compound interest of an account given the principal, interest rate, and years in the account by finding the interest after each year and adding it to the starting amount to determine the principal for the next year.		
Chapter 3 (Weeks 10-11)	• Integers can be used to help us model real world situations and can use the same operations and whole numbers.	1. Identifying integers and absolute values 2. Adding and Subtracting Integers 3. Multiplying and Dividing integers	• How can we use integers to help expand our ability to do operate with numbers and represent real world scenarios?	CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers. M07.A-N.1.1.1a Solve a 1-step addition or subtraction problem with fractions, decimals, or positive/negative integers. M07.A-N.1.1.2 Represent addition	• Students should be able to define the terms integer and absolute value. • Students should be abe to find the absolute value of any integer. • Students should be able to add any combination of negative and positive numbers. • Students should be able to subtract any combination of negative and positive numbers.	Additional time Additional practice Partner/group work	Homework Classwork and Activities Quizzes Mid-Chapter Check Vocabulary Test Test

				and subtraction on a horizontal or vertical number line. M07.A-N.1.1.2a Identify the difference between two numbers on the number line.	• Students should be able to multiply any combinations of negative and positive numbers. • Students should be able to divide any combinations of negative and positive numbers.		
Chapter 4 (Weeks 12-14)	• We can use rational numbers convert between representations of numbers to help us best represent a problem.	1. Terminating and Repeating Decimals 2. Compare and order rational Numbers. 3. Adding and Subtracting Fractions 4. Adding and Subtracting Mixed numbers 5. Multiplying Fractions 6. Converting between measurement systems 7. Dividing Fractions	• What are rational numbers and how do we apply our arithmetic operations to them?	CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations 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.1.1.1a Solve a 1-step addition or subtraction problem with fractions, decimals, or positive/negative integers. M07.A-N.1.1.2 Represent addition and subtraction on a horizontal or vertical number line. M07.A-N.1.1.2a Identify the difference between two numbers on the 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	• Students should be able to write rational numbers as fractions and decimals. • Students should be able to identify a repeating and a terminating decimal. • Students should understand and be able to use bar notation. • Students should be able to order a set of rational numbers from least to greatest by rewriting all terms in a similar form. • Students should be able to find the least common denominator between multiple fractions. • Students should be able to add and subtract fractions with like denominators. • Students should be able add and subtract fractions with unlike denominators by finding the LCD. • Students should be able to add and subtract mixed numbers by finding	Additional time Additional practice Partner/group work	Homework Classwork and Activities Quizzes Mid-Chapter Check Vocabulary Test Test

				decimal form of a rational number terminates or eventually repeats. M07.A-N.1.1.3a Solve a multiplication or division problem with positive/negative rational numbers.	the LCD. • Students should be able to multiply fractions. • Students should be able to identify the procedure to dividing fractions. • Students should be able to divide fractions. • Students should be able to convert a measurement to a different system of measure.		
Chapter 5 (Weeks 14-17)	• We can generalize mathematics by replacing numbers with variables to help us represent unknowns in a problem. By doing this we can still use our properties of operations to account for unknowns in real world scenarios.	1. Algebraic Expressions 2. Sequences 3. Properties of Operations 4. Simplifying Algebraic Expressions 5. Adding and Subtracting Linear Expressions 6. Factoring linear expressions	• How can we use our basic understanding of operations to account for unknowns in a problem?	A1.1.1.4.1 Use estimation to solve problems. CC.2.2.7.B.1 Apply properties of operations to generate equivalent expressions. CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations. M07.B-E.1.1.1 Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. Example 1: The expression 1/2 • (x + 6) is equivalent to 1/2 • x + 3. Example 2: The expression 5.3 – y + 4.2 is equivalent to 9.5 – y (or –y + 9.5). Example 3: The	• Students should be able to define the terms variable and algebraic expressions. • Students should be able to identify a coefficient in an algebraic expression. • Students should be able to evaluate an algebraic expression. • Students should be able to create an algebraic expression from a word problem by defining the variable. • Students should be able to define the terms sequence, term, and arithmetic sequence. • Students should be able to describe the relationship of a sequence. • Students should be able to identify the next three terms. • Students should be able to identify	Additional time Additional practice Partner/group work	Homework Classwork and Activities Quizzes Mid-Chapter Check Vocabulary Test Test

				expression 4w – 10 is equivalent to 2(2w – 5).	different properties of numbers given an example. • Students should be able to use the distributive property to generate equivalent expressions. • Students should be able to identify like terms and the constants of an expression. • Students should be able to combine like terms to get an algebraic expression into simplest form. • Students should be able to apply their knowledge of combining like terms to add linear expressions. • Students should be able to apply their knowledge of combining like terms and the distributive property to subtract linear expressions. • Students should be able to factor monomials. • Students should be able to identify the GCF between multiple monomials. • Students should be able to write linear equations in their factored form.		
Chapter 6 (Weeks 18-21)	• We can use algebra to help us model problems we find in the physical world when we run into an	1. Solving one step equations. 2. Solving equations with rational coefficients	• How can we use our basic understanding of numerical operations to find	A1.1.1.4.1 Use estimation to solve problems. CC.2.2.7.B.1	• Students should be able to apply the addition and subtraction property of equality to	Additional time Additional practice Partner/group work	Homework Classwork and Activities

	unknown.	3. Solve two step equations 4. Solve inequalities	unknowns in a problem?	Apply properties of operations to generate equivalent expressions. CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations. M07.B-E.1.1.1 Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. Example 1: The expression 1/2 • (x + 6) is equivalent to 1/2 • x + 3. Example 2: The expression 5.3 – y + 4.2 is equivalent to 9.5 – y (or –y + 9.5). Example 3: The expression 4w – 10 is equivalent to 2(2w – 5). M07.B-E.2.1.1 Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate. 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 an hour (or 1.1 × $25 = $27.50).	generate equivalent expressions. • Students should be able to apply the multiplication and division property of equality to generate equivalent expressions. • Students should be able to solve an equation for a variable involving one of the 4 operations. • Students should be able to solve equations involving rational coefficients. • Students should be able to solve for a variable involving two of the four basic operations. • Students should be able to apply the knowledge of solving equations to solving an inequality.		Quizzes Mid-Chapter Check Vocabulary Test Test

				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. Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? M07.B-E.2.2.1a Select an algebraic expression (equations or inequalities) using addition or subtraction of fractions, decimals, or positive/negative integers to solve a 1-step real-world problem. 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. Example: A salesperson is paid $50 per week plus $3 per sale. This week she wants her pay to be at least $100. Write an inequality for the number of sales the salesperson needs to make and describe the solutions. M07.B-E.2.3.1 Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the			

				problem. Example: If you want to place a towel bar that is 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. M07.B-E.2.3.1a Identify a reasonable solution in the context of a problem using the four basic operations and numbers under 20.			
Chapter 7 (Weeks 22-25)	• Geometric shapes and figures are the building blocks for all things. By understanding the basics of angles and how the work with triangles we can use that to communicate problems accurately to others.	1. Classifying different angle 2. Classifying Triangles by their angle 3. 3-Dimensional Figures and Scale Drawings	• In what ways can we classify triangles and angles that allow me to use incomplete information to determine an unknown that is necessary to a problem?	CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume. 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.2.1.1a Use angle relationships to find the missing angle. M07.C-G.2.1.2 Identify and use properties of angles formed when two parallel lines are cut by a transversal (e.g.,	• Students should be able to classify angles based on their measure. • Students should be able to classify angles based on their position. • Students should be able to determine whether 2 angles form a pair of complementary or supplementary angles. • Students should be able to use complementary and supplementary angles to find a missing angle measure. • Students should be able identify triangles based on their angle. • Students should be able to find the missing angle on a triangle. • Students should be	Additional time Additional practice Partner/group work	Homework Classwork and Activities Quizzes Mid-Chapter Check Vocabulary Test Test

				angles may include alternate interior, alternate exterior, vertical, corresponding).	able to scale a drawing or a picture either to make it larger or smaller. • Students should be able to draw 3-d figures. • Students should understand what a cross section is and how they are found.		
Chapter 8 (Weeks 26-29)	• The point to most of mathematics is what can we now measure or what around us can we use this math to figure out. Given that we need to be able to identify the things around us as a combination of simple 3 Dimensional figures. Once we can identify and breakdown figures we can use those figures to make predictions or determine quantity of materials needed.	1. Circumference and Area of circles 2. Area of Composite figures 3. Volume and Surface area of Prisms and Pyramids 4. Volume and Surface Area of composite figures	• How can we use three dimensional figures to represent all physical objects so we can find a missing piece that we need?	CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume. CC.2.3.7.A.2 Visualize and represent geometric figures and describe the relationships between them. M07.C-G.1.1.1 Solve problems involving scale drawings of geometric figures, including finding length and area. M07.C-G.1.1.1a Solve a 1-step real-world problem related to scaling. M07.C-G.1.1.4 Describe the two-dimensional figures that result from slicing three-dimensional figures. Example: Describe plane sections of right rectangular prisms and right rectangular	• Students should be able to identify the parts of a circle. • Students should be able to identify and use PI. • Students should be able to find the circumference of a circle any part of a circle. • Students should be able to find the area of a circle given the radius or diameter of a circle. • Students should be able to break a composite figure into simple figures to find the total area. • Students should be able to find the volume of a prism. • Students should be able to find the surface area of a prism. • Students should be able to find the volume and surface area of a pyramid. • Students should be able to find the volume and surface area of a composite figure that is made up of pyramids and	Additional time Additional practice Partner/group work	Homework Classwork and Activities Quizzes Mid-Chapter Check Vocabulary Test Test

				pyramids. M07.C-G.1.1.4a Identify a three-dimensional figure with specific attributes. 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. M07.C-G.2.2.2a Use a conversion table to identify equivalent standard measurements of length or mass.	prisms.		
Chapter 9 (Weeks 30-33)	• As we encounter events in everyday life and make schedules, the general population likes to be able to reasonably assume what will happen. Being able to find the probability of an event occurring helps us to understand how likely it is for	1. Probability of simple events 2. Theoretical vs. Experimental Probability 3. Probability of compound events 4. Fundamental counting principle 5. Permutations 6. Independent and Dependent events	• How can we use the probability of an event occurring to help us best plan for our future or even make easy money quickly?	A1.2.3.3.1 Find probabilities for compound events (e.g., find probability of red and blue, find probability of red or blue) and represent as a fraction, decimal or percent). CC.2.4.7.B.3 Investigate chance processes and develop, use, and evaluate probability	**Lessons 1 and 2** • Probability is the chance that an event will occur. • The probability that an event will occur is a number from 0 to 1. • The probability of an event is the ratio of the number of favorable outcomes to the number of possible outcomes.	Additional time Additional practice Partner/group work	Homework Classwork and Activities Quizzes Mid-Chapter Check Vocabulary Test Test

	something unexpected to happen and then make predictions of what may happen. These predictions can help us communicate to other people either relative safety or relative danger.			models.
				
				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.3.1.1a Identify the probability of events occurring as possible/impossible or likely/unlikely.
				
				M07.D-S.3.2.1 Determine the probability of a chance event given relative frequency. Predict the approximate relative frequency given the probability. 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.
				
				M07.D-S.3.2.2 Find the probability of a simple event, including the probability of a simple event not occurring. Example: What is the probability of not rolling a 1 on a
					Consider rolling a number cube. The outcomes of rolling a number cube are 1, 2, 3, 4, 5, and 6.
					• The probability of rolling a 4, or $P(4)$ = $\frac{\text{number of favo}}{\text{number of pos}}$ $\frac{1}{6}$ =
					• The probability of *not* rolling a 4 or $P(\textit{not}\ 4)$ = $\frac{\text{number of favo}}{\text{number of pos}}$ $\frac{5}{6}$ =
					• $P(4)$ and $P(\textit{not}\ 4)$ are complementary events. The sum of the probability of an event and its complement is 1.
					Lessons 3 through 7
					• Probabilities can be determined using either of the following:
					  • theoretically, through the use of formulas, without actually performing an experiment, or
					  • experimentally, which requires collecting data from experiments.
					• The sample space consists of all the possible outcomes of a probability experiment. To find		

				number cube? M07.D-S.3.2.3 Find probabilities of independent compound events using organized lists, tables, tree diagrams, and simulation.	the number of outcomes, you can use one or both of the following methods: • A tree diagram displays all of the possible outcomes. Bag A contains two green marbles and Bag B contains one green marble and one red marble. • The Fundamental Counting Principle uses multiplication of the number of ways each event can occur to find the total number of possible outcomes. • Compound events consist of two or more simple events. They can either be: • Independent, which means the outcome of one event does not affect the outcome of the other event. Selecting a blue marker from the four markers below and tossing a coin are examples of independent events. • Dependent, which means the outcome of one event affects the outcome of the second event.		
Unit 10 (Weeks 34-36)	• Just like we can use probability to help us find the likelihood of the unexpected happening we can use statistics to	1. Make predictions 2. Unbiased and Biased samples 3. Misleading graphs and statistics 4. Compare populations	• How can we determine whether the numbers in the news are accurate representations of a population or not?	CC.2.4.7.B.1 Draw inferences about populations based on random sampling concepts. CC.2.4.7.B.2	• Students should be able to make predictions about a population given a sample using ratios or equations. • Students should be	Additional time Additional practice Partner/group work	Homework Classwork and Activities Quizzes

	predict what may happen with a population instead of an event. These predictions can help us communicate to other people what to expect when walking into an unknown area so as to best control our surroundings.	5. Select an appropriate display		Draw informal comparative inferences about two populations. 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. Example 1: Estimate the mean word length in a book by randomly sampling words from the book. Example 2: Predict the winner of a school election based on randomly sampled survey data. M07.D-S.2.1.1 Compare two numerical data distributions using measures of center and variability. Example 1: The mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team. This difference is equal to approximately twice the variability (mean absolute deviation) on either team. On a line plot, note the difference between the two distributions of heights. Example 2: Decide whether the	able to identify an unbiased or a biased source. • Students should be able to determine whether they can make an accurate prediction about a population depending of the type of sample. • Students should be able to identify a misleading graph and explain why the graph is misleading. • Students should be able to identify misleading statistics given a group of data points. • Students should be able to compare two populations by comparing their measures of center and their measures of variation. • Students should be able to make a box and whisker plot. • Students should be able to identify the best measure of center to describe a group of data. • Students should be able to identify an appropriate display of statistical data so as not to mislead.		Mid-Chapter Check Vocabulary Test Test

				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. M07.D-S.2.1.1a Compare two sets of data within a single pictograph, line plot, or bar graph. M07.D-S.2.1.1b Use measures of central tendency to interpret data, including overall patterns in the data.			