

7th Grade Math Unit and Lesson Plans, rev. 2019  
DHH Lengel Middle School  
Pottsville, PA

Block Length: 75 minutes  
Blocks per cycle: 5  
Length of Course: One Year  
Developed by: Nathan Kraft, lead teacher

The Grade 7 curriculum is based on the newly adopted Pearson enVision 2.0 program. It begins with arithmetic of integers and rational numbers. Students then explore the concepts of proportional relationships, percent problems, equivalent expressions, equations and inequalities, sampling, probability, and geometry.

Resources: Pearson enVision 2.0,  
Online Resources Include: Pearson Realize, Desmos, Khan Academy, Get More Math

7th Grade Math Instructional Guide

Marking Period	Units	Standards and Eligible Content	Assessments	Lessons	Objectives	Vocabulary
1	1 Integers and Rational Numbers	<p>CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers.</p> <p>M07.A-N.1.1.1 Apply properties of operations to add and subtract rational numbers, including real-world contexts.</p> <p>M07.A-N.1.1.2 Represent addition and subtraction on a horizontal or vertical number line.</p> <p>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.</p>	Quizzes, Test, Open-Ended Questions, Khan Academy	1-1 Relate Integers and Their Opposites	Understand how integers and their opposites are related.	
				1-2: Understand Rational Numbers	Identify rational numbers and write them in decimal form.	repeating decimal, terminating decimal
				1-3: Add Integers	Add positive and negative integers. Model integer addition in real-life applications.	additive inverse
				1-4: Subtract Integers	Understand subtraction of integers as adding the additive inverse.	
				1-5: Add and Subtract Rational Numbers	Use properties of operations to add and subtract rational numbers.	
				1-6: Multiply Integers	Multiply positive and negative integers. Apply integer multiplication to real-life applications.	
				1-7: Multiply Rational Numbers	Find the product of rational numbers.	
				1-8: Divide Integers	Understand how to divide integers by applying the rules of multiplying integers. Determine equivalencies among integer quotients.	
				1-9: Divide Rational Numbers	Understand how the signs of integers in a multiplication sentence relate to the signs in a related division statement.	complex fraction, multiplicative inverse
				1-10: Solve Problems with Rational Numbers	Decide which operations to use to solve problems. Use precision when solving problems with rational numbers.	

1	2 Analyze and Use Proportional Relationships	<p>CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems.</p> <p>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 <math>\frac{1}{2}</math> mile in each <math>\frac{1}{4}</math> hour, compute the unit rate as the complex fraction <math>\frac{1/2}{1/4}</math> miles per hour, equivalently 2 miles per hour.</p> <p>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).</p> <p>M07.A-R.1.1.3 Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.</p> <p>M07.A-R.1.1.4 Represent proportional relationships by equations. Example: If total cost <math>t</math> is proportional to the number <math>n</math> of items purchased at a constant price <math>p</math>, the relationship between the total cost and the number of items can be expressed as <math>t = pn</math>.</p> <p>M07.A-R.1.1.5 Explain what a point <math>(x, y)</math> on the graph of a proportional relationship means in terms of the situation, with special attention to the points <math>(0, 0)</math> and <math>(1, r)</math>, where <math>r</math> is the unit rate.</p>	Quizzes, Test, Open-Ended Questions, Khan Academy	2-1: Connect Ratios, Rates, and Unit Rates	Use ratios and rates to describe the relationship between two quantities. Find equivalent ratios and use unit rates to solve multi-step problems.	
				2-2: Determine Unit Rates with Ratios of Fractions	Find unit rates with ratios of fractions. Use unit rates to solve multi-step problems.	
				2-3: Understand Proportional Relationships: Equivalent Ratios	Determine whether quantities are proportional by testing for equivalent ratios.	proportional relationship, proportion
				2-4: Describe Proportional Relationships: Constant of Proportionality	Use the constant of proportionality to write equations that represent proportional relationships. Use equations to solve problems involving proportional relationships.	constant of proportionality
				2-5: Graph Proportional Relationships	Use a graph to recognize proportionality. Identify a constant of proportionality from a graph. Interpret a point on a graph of a proportional relationship.	
				2-6: Apply Proportional Reasoning to Solve Problems	Explain whether a situation represents a proportional relationship. Use representations to find entry points into problems.	

1&2	3 Analyze and Solve Percent Problems	CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems. M07.A-R.1.1.6 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.	Quizzes, Test, Open-Ended Questions, Khan Academy	3-1: Analyze Percents of Numbers	Understand that equivalent rates can be used to find percents. Analyze percents of numbers in a real-world context.	
				3-2: Connect Percent and Proportion	Construct a percent proportion. Use a percent proportion to find an unknown part, whole, or percent.	
				3-3: Represent and Use the Percent Equation	Understand the relationship between proportional reasoning and percent. Interpret the results of a percent equation in a real-life scenario.	
				3-4: Solve Percent Change and Percent Error Problems	Solve real-world problems involving percent change and percent error. Understand the percent equation and the different ways it can be used.	percent change, percent error
				3-5: Solve Markup and Markdown Problems	Understand and calculate markups and markdowns. Relate percent change to percent markup and percent markdown.	markup, markdown, percent markup, percent markdown
				3-6: Solve Simple Interest Problems	Identify the parts of interest problems and how the values are related. Understand what simple interest is and how it is calculated.	interest rate, principal, simple interest

2	4 Generate Equivalent Expressions	<p>CC.2.2.7.B.1 Apply properties of operations to generate equivalent expressions.</p> <p>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 <math>\frac{1}{2} \cdot (x + 6)</math> is equivalent to <math>\frac{1}{2} \cdot x + 3</math>. Example 2: The expression <math>5.3 - y + 4.2</math> is equivalent to <math>9.5 - y</math> (or <math>-y + 9.5</math>). Example 3: The expression <math>4w - 10</math> is equivalent to <math>2(2w - 5)</math>.</p>	Quizzes, Test, Open-Ended Questions, Khan Academy	4-1: Write and Evaluate Algebraic Expressions	Understand how variables are used to represent unknown values in problems.	
				4-2: Generate Equivalent Expressions	Recognize when two expressions are equivalent. Use properties of operations to write equivalent expressions.	
				4-3: Simplify Expressions	Combine like integer and rational terms.	
				4-4: Expand Expressions	Use the Distributive Property to expand expressions.	
				4-5: Factor Expressions	Understand expanding an expression is the reverse of factoring. Identify the GCF of algebraic terms in expressions.	
				4-6: Add Expressions	Use properties of operations to add expressions. Model addition of expressions in real-life applications.	
				4-7: Subtract Expressions	Use properties of operations to subtract expressions. Model subtraction of expressions in real-life applications.	
				4-8: Analyze Equivalent Expressions	Write equivalent expressions to show how quantities are related in real-life applications.	

2	5 Solve Problems Using Equations and Inequalities	<p>CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.</p> <p>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 <math>\frac{1}{10}</math> of her salary an hour, or \$2.50, for a new salary of \$27.50 an hour (or <math>1.1 \times \\$25 = \\$27.50</math>).</p> <p>M07.B-E.2.2.1 Solve word problems leading to equations of the form <math>px + q = r</math> and <math>p(x + q) = r</math>, where <math>p</math>, <math>q</math>, and <math>r</math> are specific rational numbers. Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?</p> <p>M07.B-E.2.2.2 Solve word problems leading to inequalities of the form <math>px + q &gt; r</math> or <math>px + q &lt; r</math>, where <math>p</math>, <math>q</math>, and <math>r</math> 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.</p> <p>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 <math>9\frac{3}{4}</math> inches long in the center of a door that is <math>27\frac{1}{2}</math> 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.</p>	Quizzes, Test, Open-Ended Questions, Khan Academy	5-1: Write Two-Step Equations	Analyze word problems to write two-step equations. Understand the relationship between the terms of the equation and the values they represent.	
				5-2: Solve Two-Step Equations	Use models to solve two-step equations. Compare algebraic and arithmetic solutions.	isolate the variable
				5-3: Solve Equations Using the Distributive Property	Solve equations using the Distributive Property.	
				5-4: Solve Inequalities Using Addition or Subtraction	Graph the solution of inequalities on a number line. Solve inequalities using the Addition and Subtraction Properties of Inequality.	
				5-5: Solve Inequalities Using Multiplication or Division	Write inequalities and solve them using Multiplication and Division Properties of Inequality. Graph the solutions of an inequality on a number line.	
				5-6: Solve Two-Step Inequalities	Write and solve a two-step inequality to solve a problem. Solve an inequality by multiplying or dividing by a negative rational number.	
				5-7: Solve Multi-Step Inequalities	Explore the relationship between two-step inequalities and multi-step inequalities. Apply the Distributive Property to simplify and solve multi-step inequalities.	

2&3	6 Use Sampling to Draw Inferences About Populations	<p>CC.2.4.7.B.1 Draw inferences about populations based on random sampling concepts.</p> <p>CC.2.4.7.B.2 Draw informal comparative inferences about two populations.</p> <p>M07.D-S.1.1.1 Determine whether a sample is a random sample given a real-world situation.</p> <p>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.</p> <p>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 words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourthgrade science book.</p>	Quizzes, Test, Open-Ended Questions, Khan Academy	6-1: Populations and Samples	Distinguish between a population and a sample. Establish whether a sample is representative of a population. Generate random samples.	random sample, representative sample
				6-2: Draw Inferences from Data	Make qualitative inferences from a sample data set. Make quantitative inferences from a sample data set. Make estimates about a population based on a sample data set, and assess whether the inferences are valid.	valid inference
				6-3: Make Comparative Inferences About Populations	Use box plots to compare and make inferences about populations. Use the median and IQR of datasets to informally compare and make inferences about two populations.	
				6-4: Make More Comparative Inferences About Populations	Use the mode, range, mean, and mean absolute deviation to compare populations.	

3	7 Probability	<p>CC.2.4.7.B.3 Investigate chance processes and develop, use, and evaluate probability models.</p> <p>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 <math>\frac{1}{2}</math> indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event).</p> <p>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.</p> <p>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 number cube?</p> <p>M07.D-S.3.2.3 Find probabilities of independent compound events using organized lists, tables, tree diagrams, and simulation.</p>	Quizzes, Test, Open-Ended Questions, Khan Academy	7-1: Understand Likelihood and Probability	Use probability to describe the likelihood that an event will occur. Relate probability to mathematical fairness.	outcomes, probability
				7-2: Understand Theoretical Probability	Understand theoretical probability and how it can be used. Use theoretical probability to predict an outcome.	event, theoretical probability
				7-3: Understand Experimental Probability	Compare theoretical and experimental probability. Use experimental probability to make predictions. Explain differences between theoretical and experimental probability.	experimental probability, relative frequency
				7-4: Use Probability Models	Develop a probability model. Use a probability model to evaluate a situation. Use a probability model to make an estimate.	sample space, probability
				7-5: Determine Outcomes of Compound Events	Use a tree diagram, a table, or an organized list to represent the sample space for a compound event.	compound event
				7-6: Find Probability of Compound Events	Organize information about a compound event on a table, a tree diagram, or an organized list. Find the probability of a compound event.	
				7-7: Simulate Compound Events	Use different tools to simulate a compound event. Model a real-world situation involving a compound event and predict its outcome using a simulation.	simulation



3&4	8 Solve Problems Involving Geometry	<p>CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.</p> <p>CC.2.3.7.A.2 Visualize and represent geometric figures and describe the relationships between them.</p> <p>M07.C-G.1.1.1 Solve problems involving scale drawings of geometric figures, including finding length and area.</p> <p>M07.C-G.1.1.2 Identify or describe the properties of all types of triangles based on angle and side measures.</p> <p>M07.C-G.1.1.3 Use and apply the triangle inequality theorem.</p> <p>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 pyramids.</p> <p>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.</p> <p>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).</p> <p>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.</p> <p>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.</p>	Quizzes, Test, Open-Ended Questions, Khan Academy	8-1: Solve Problems Involving Scale Drawings	Use a scale drawing as a representation of actual lengths and area.	scale drawing
				8-2: Draw Geometric Figures	Sketch quadrilaterals with given conditions. Name and classify quadrilaterals according to their properties.	
				8-3: Draw Triangles with Given Conditions	Construct triangles with given conditions. Conclude whether or not a triangle is formed and what type of triangle it is.	
				8-4: Solve Problems Using Angle Relationships	Calculate the measures of angles by using angle relationships.	adjacent angles, complementary angles, supplementary angles, vertical angles
				8-5: Solve Problems Involving Circumference of a Circle	Calculate the circumference, radius, or diameter of circle. Recognize the relationship between the circumference and the diameter of a circle and pi.	
				8-6: Solve Problems Involving Area of a Circle	Find the area of a circle. Use the area to find the radius and diameter. Solve problems involving the area of a circle.	
				8-7: Describe Cross Sections	Describe cross sections of right rectangular prisms and pyramids. Solve problems involving cross sections.	
				8-8: Solve Problems Involving Surface Area	Find the surface area of two-dimensional composite shapes. Find the surface area of three-dimensional composite shapes.	
				8-9: Solve Problems Involving Volume	Calculate the volume of various three-dimensional figures. Solve problems involving the volume of three-dimensional figures.	

