College Prep Math (CPM) Textbook to Curriculum Map Alignment for CC Grade 7

GRADE 7 – UNIT 1

Developing Understanding and Application of Proportional Relationships

Critical Area: Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.

CLUSTERS	COMMON CORE STATE STANDARDS	CPM CONNECTIONS	ADDITIONAL RESOURCES
Analyze proportional relationships and use them to solve real-world and mathematical problems.	**7.RP1.** 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.1:** 4.2.3 & 4.2.4	**7.RP.1** **Illustrative Mathematics** Track Practice , Molly's Run , Cooking with the Whole Cup , Molly's Run, Assessment Variation **Mathematics Assessment Project** Developing a Sense of Scale FAL (7.G.1)
	7.RP.2. Recognize and represent proportional relationships between quantities.	**7.RP.2**	**7.RP.2** **Illustrative Mathematics**
	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.	**a.** 4.2.1 to 4.2.4	Music Companies, Variation 1 Art Class, Variation 2, , Buying Coffee , Robot Races , Sore Throats, Vari 1 , Robot Races, Assessment Variation , Art Class, Assessment Variation , Buying Bananas, Assessment Version Walk-a-thon 2 , Proportionality
	b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	**b.** 4.2.3 & 4.2.4	
	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.*	**c**. 4.2.3 & 4.2.4	**Mathematics Assessment Project** Proportion and Non-proportion Situations FAL E05: Ice Cream (TASK)
	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.	**d.** 4.2.2 to 4.2.4	**Illuminations NCTM** Exploring the Golden Ratio

	7.RP.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.*	**7.RP.3:** 5.1.1, 5.1.2, 7.1.1 to 7.1.8, 7.2.1 & 7.2.2	**7.RP.3** **Illustrative Mathematics** Music Companies, Var 2 , Selling Computers , Tax & Tip Friends Meeting on Bikes , Comparing Years , Chess Club, Finding a 10% increase , Buying Protein Bars and Mags Measuring the area of a circle Two-School Dance , The Price of Bread , How Fast is Usain Bolt? Lincoln's math problem **Mathematics Assessment Project** Modeling: A Race FAL **Inside Mathematics** **(7.RP.1-3)** lawn mowing , mixing paints , photographs
Draw, construct, and describe geometrical figures and describe the relationships between them.	**7.G.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.1:** 4.1.1, 4.1.2, & 9.3.2	

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GRADE 7 – UNIT 2

The Number System: Operations to Add, Subtract, Multiply and Divide Rational Numbers

Critical Area 2A: Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.

CLUSTERS	COMMON CORE STATE STANDARDS	CPM CONNECTIONS	ADDITIONAL RESOURCES
Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	**7.NS.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.2** Apply and extend previous understanding 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	**7.NS.1** **a.** 2.2.2, 2.2.3 & 2.2.4 **b.** 2.2.2, 2.2.3 & 2.2.4 **c.** 3.2.1, 3.2.2 & 3.2.4 **d.** 2.2.2, 2.2.6, 3.1.1, & 3.3.3 **7.NS.2** **a.** 2.2.4, 2.2.6, 3.2.3, & 3.2.4 **b.** 3.2.3 & 3.3.1	**7.NS.1:** **Illustrative Mathematics** Comparing Freezing Points , Operations on the number line , Distances on the Number Line 2 , Rounding and Subtracting , Distances Between Houses , Differences and Distances , Differences of Integers **Mathematics Assessment Project** A11: Division (TASK) E03: A Day Out (TASK) E11: Taxi Cabs (TASK) **7.NS.2:** **Illustrative Mathematics** Distributive Property of Multiplication, Equivalent fractions approach to non-repeating decimals , Repeating decimal as approximation , Decimal Expansions of Fraction (NS2.d)

	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. d. Convert a rational number to a decimal using long division; know that the decimal from of a rational number terminates in 0s or eventually repeats. **7.NS.3** Solve real-world and mathematical problems involving the four operations with rational numbers.	**c.** 3.2.3 to 3.3.3 **d.** 2.1.2 and 2.1.2 **7.NS.3:** 3.2.5, 3.3.1 to 3.3.3, 7.1.3 & 7.1.4	**Inside Mathematics** cat food (7.NS.2, 7.RP1-3) **7.NS.3:** **Illustrative Mathematics** Sharing Prize Money **Inside Mathematics** cereal (7.NS.2-3, 7.RP1-3) **Mathematics Assessment Project** Using Positive and Negative Numbers in Context FAL (7.NS.1 and 3) Increasing and Decreasing Quantities by a Percent FAL (7.RP)

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GRADE 7 UNIT 3
Understand Expressions and Equations

Description of Critical Area 2B: Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers division including expanding linear expressions with rational coefficient, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems.

CLUSTERS	COMMON CORE STATE STANDARDS	CPM CONNECTIONS	ADDITIONAL RESOURCES
Use properties of operations to generate equivalent expressions	**7.EE.1**. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients	**7.EE.1:** 4.3.1 to 4.3.3	**7.EE.1:** **Illustrative Mathematics** Miles to Kilometers Equivalent Expressions? Writing Expressions **Mathematics Assessment Project** A12: Fencing (TASK)
	7.EE.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.2:** 7.1.2 to 7.1.2 & 7.1.6	**7.EE.2:** **Illustrative Mathematics** Ticket to Ride **Inside Mathematics** the wheel shop
Solve real-life and mathematical problems using numerical and algebraic expressions and equations	**7.EE.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*	**7.EE.3:** 5.3.2 to 5.3.5, 6.2.3 to 6.2.5 & 7.1.7	**7.EE.3:** **Illustrative Mathematics** Shrinking Discounted Books Anna in D.C. (+7.RP) Who is the better batter?

	the center of a door that is 27 ½ 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.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?* b. 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. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*	**7.EE.4** **a.** 6.2.3 to 6.2.5, 7.1.7 & 7.1.7 **b.** 6.1.4	**7.EE.4:** **Illustrative Mathematics** Guess My Number Fishing Adventures 2 Gotham City Taxis (+7.RP, EE.3) Bookstore Account Sports Equipment Set **Inside Mathematics** toy trains (7.EE.3-4) **Mathematics Assessment Project** Steps to Solving Equations FAL Modeling: Hot or Cold FAL
Solve real-life and mathematical problems involving angle measure, area, surface area, and volume	**7.G.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.5:** 8.3.2	

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Developing Understanding of Geometry, Statistics and Probability

Students continue their work with area from Grade 6, solving problems Involving the area and circumference of a circle and surface area of three-dimensional objects. Students reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with relationships between angles formed by Intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross-sections. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Students build on their work with single data distributions to compare two data distributions and address questions about differences between population. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

CLUSTERS	COMMON CORE STATE STANDARDS	CPM CONNECTIONS	ADDITIONAL RESOURCES
Draw, construct, and describe geometrical figures and describe the relationships between them.	**7.G.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.1:** 4.1.1. 4.1.2 & 9.3.2	**7.G.1:** **Illustrative Mathematics** Floor Plan Map distance Approximating the area of a circle Circumference of a Circle
	7.G.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.2:** 8.3.3 & 8.3.4	
	7.G.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.*3.1 Describe how two or more objects are related in space (e.g., skew lines, the possible ways three planes might intersect).***	**7.G.3:** 9.2.2	**7.G.3:** **Illustrative Mathematics** Cube Ninjas! **Mathematics Assessment Project** **7.G.1-3** Describing Quadrilaterals FAL
Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	**7.G.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.4:** 8.3.3, 9.1.1 to 9.1.3	**7.G.4:** **Illustrative Mathematics** Eight Circles Designs Stained Glass Approximating the area of a circle Circumference of a Circle

	7.G.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.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.	**7.G.5:** 8.3.2 **7.G.6:** 9.1.3, 9.2.3, & 9.2.4	**7.G.6:** **Illustrative Mathematics** 7.RP and 7.G Sand Under the Swing Set **Mathematics Assessment Project** **7.G.4-6** The Area of a Circle FAL, Using Dimensions: Designing a Sports Bag FAL, Estimations and Approximations: The Money Munchers FAL, Maximizing Area: Gold Rush FAL, Drawing to Scale: Designing a Garden FAL
Statistics and Probability **Use random sampling to draw inferences about a population.**	**7.SP.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.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.1:** 8.2.1 & 8.2.2 **7.SP.2:** 8.2.2	**7.SP.1:** **Illustrative Mathematics** 7-SP1 Mr. Briggs's Class Likes Math **7.SP.2:** **Illustrative Mathematics** 7.SP.2 – Valentine Marbles **Mathematics Assessment Project** Estimating: Counting Trees FAL (7.SP.1-2, 7.G.4-6,7.RP.1-3)

Draw informal comparative inferences about two populations.	**7.SP.3**. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.* **7.SP.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.3:** 8.1.1 & 8.1.2 **7.SP.4:** 8.2.2	**7.SP.3-4:** **Illustrative Mathematics** 7.SP.3,4 – Offensive Linemen 7.SP.3,4 – College Athletes **Mathematics Assessment Project** **7.SP.3-4** Comparing Data FAL
Investigate chance processes and develop, use, and evaluate probability models.	**7.SP.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.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.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.	**7.SP.5:** 1.2.1 **7.SP.6:** 1.2.1, 1.2.2, & 5.2.3 **7.SP.7:**	**7.SP.6-7:** **Illustrative Mathematics** 7.SP6 Tossing Cylinders 7.SP.6 Heads or Tails 7.SP.7a How Many Buttons? 7.SP6-7 Rolling Dice

	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.*	**a.** 1.2.3 & 5.2.1	
	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?*	**b.** 1.2.2 & 5.2.2.	
	7.SP.8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.	**7.SP.8:**	**7.SP.8:** **Illustrative Mathematics** 7.SP8 Waiting Times 7.SP8 Rolling Twice 7.SP8 Red, Green, or Blue?
	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.	**a.** 1.2.7, 1.2.8, 5.2.5 to 5.2.6	
	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.	**b.** 5.2.4 & 5.2.6	**Mathematics Assessment Project** **7.SP.5-8** Evaluating Statements About Probability FAL, Probability Games FAL
	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?*	**c.** 5.2.2	