**College Prep Math (CPM) Textbook to Curriculum Map Alignment for CC Grade 8**

**GRADE 8 – UNIT 1**

**Using Rational Numbers in Finding the Distance between Two Points and Properties of Integer Exponents and Square Root to Represent Solution to Equations**

Critical Area: Students will understand informally the rational and irrational numbers and use rational numbers approximation of irrational numbers. Students will use rational numbers to determine an unknown side in triangles. They apply the Pythagorean Theorem to find distances between points on the coordinate plane, to find lengths, and to analyze polygons. Students use radicals and integers when they apply the Pythagorean Theorem in real word.

| CLUSTER | COMMON CORE STATE STANDARDS | CA MATH CONNECTIONS | OTHER RESOURCES |
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| Understand and apply the Pythagorean Theorem. | **8.G.6** Explain a proof of the Pythagorean Theorem and its converse. | **8.G.6-** 9.2.2, 9.2.3, 9.2.7 | **8.G.6**<br>**Illustrative Mathematics**<br>Converse of the Pythagorean Theorem |
| | **8.G.7** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real world and mathematical problems in two and three dimensions. | **8.G.7-** 9.2.2, 9.2.5, 9.2.6 | **8.G.7**<br>**Illustrative Mathematics**<br>Glasses, Spiderbox, Running on the Football Field, Two Triangles' Area, Area of a Trapezoid, Points from Directions, Areas of Geometric Shapes with the Same Perimeter, Circle Sandwich<br><br>**Inside Mathematics (8.G.7)**<br>patterns in prague, rugs |
| | **8.G.8** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. | **8.G.8-** 9.2.5 | **8.G.8**<br>**Illustrative Mathematics**<br>Finding isosceles triangles,<br>Finding the distance between points<br><br>**Mathematics Assessment Project**<br>**FAL (8.G.6-8)**<br>The Pythagorean Theorem: Square Areas, Finding Shortest Routes: The Schoolyard Problem<br>**TASK**<br>Proofs Of The Pythagorean, Theorem?, |

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| | | | Hopewell Geometry, Temple Geometry Pythagorean Triples, Circles and Squares, Jane's TV |
| Know that there are numbers that are not rational, and approximate them by rational numbers. | **8.NS.1**. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. | **8.NS.1-** 9.2.4 | **8.NS.1**<br>**Illustrative Mathematics**<br>Converting Decimal Representations of Rational Numbers to Fraction Representations, Identifying Rational Numbers, Converting Repeating Decimals to Fractions, Repeating or Terminating? |
| | **8.NS.2**. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g. $\pi^2$). For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations. | **8.NS.2-** 9.2.4 | **8.NS.2**<br>**Illustrative Mathematics**<br>Comparing Rational and Irrational Numbers, Irrational Numbers on the Number Line, Placing a square root on the number line<br><br>**Inside Mathematics (8.NS.2)**<br>rugs, squares and circles<br><br>**Mathematics Assessment Project**<br>**FAL** (8.NS.1-2)<br>Repeating Decimals<br>**TASK** (8.NS.1-2)<br>Short Tasks - The Number System |
| Work with radicals and integer exponents. | **8.EE.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3}$ | **8.EE.1-** 8.2.1–8.2.3 | **8.EE.1**<br>**Illustrative Mathematics**<br>Extending the Definitions of Exponents, Variation 1, Raising to the zero and negative powers |

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| | **8.EE.2** Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where $p$ is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational<br><br>**8.EE.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.*<br><br>**8.EE.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. | **8.EE.2-** 9.2.3, 9.2.4, 10.1.1<br><br>**8.EE.3-** 8.2.1<br><br>**8.EE.4-** 8.2.4 | **Inside Mathematics (8.EE.1)**<br>tri-triangles<br><br>**8.EE.2**<br>**Inside Mathematics**<br>polly gone<br><br>**8.EE.3**<br>**Illustrative Mathematics**<br>Ant and Elephant, Orders of Magnitude<br><br>**8.EE.4**<br>**Illustrative Mathematics**<br>Giantburgers, Ants versus humans, Pennies to heaven, Choosing appropriate units<br><br>**Mathematics Assessment Project**<br>**FAL (8.EE.1-4)**<br>Applying Properties of Exponents, Generalizing Patterns: The Difference of Two Squares, Estimating Length Using Scientific Notation<br>**TASK (8.EE.1-4)**<br>"Ponzi" Pyramid Schemes, 100 People, A Million Dollars, How old are they? |

## Understanding of the connections between Proportional Relationships and Linear Equations Involving Bivariate Data and Solution of Simultaneous Equations

Students understand the connections between proportional relationships and linear equations involving bivariate data. Students will analyze and solve linear equations and pairs of simultaneous linear equations. Students use similar triangles to explain why the slope is the same between two distinct points on a non- vertical line in the coordinate plane as well as derive the equation of a line.

| CLUSTER | COMMON CORE STATE STANDARDS | CA MATH 8 CONNECTIONS | OTHER RESOURCES |
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| Understand the connections between proportional relationships, lines and linear equations. | **8.EE.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-timeequation to determine which of two moving objects has greater speed.* | **8.EE.5-** 1.2.1, 7.2.5, 7.2.4 | **8.EE.5**<br>**Illustrative Mathematics**<br>8.EE Coffee by the Pound, 8.EE Peaches and Plums, 8.EE Who Has the Best Job?, 8.EE Comparing Speeds in Graphs and Equations, 8.EE Sore Throats, Variation 2, 8.EE Stuffing Envelopes |
| | **8.EE.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.EE.6-** 4.1.4, 7.2.1–7.2.5 | **8.EE.6**<br>**Illustrative Mathematics**<br>8.EE Slopes Between Points on a Line<br><br>**Mathematics Assessment Project**<br>FAL (8.EE.5-6)<br>Lines and Linear Equations,<br>Lines, Slopes and Linear Equations<br>TASK (8.EE.1-4)<br>Bike Ride, Journey, Shelves |
| Investigate patterns of association in bivariate data. | **8.SP.3** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.* | **8.SP.3-** 7.3.1, 7.3.2 | **8.SP.3**<br>**Illustrative Mathematics**<br>US Airports, Assessment Variation<br><br>**Mathematics Assessment Project**<br>**FAL (8.SP.3)**<br>Testing a New Product<br>**TASK**<br>Sugar Prices, Birds' Eggs, |

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| Analyze and solve linear equations and pairs of simultaneous linear equations | **8.EE.7** Solve linear equations in one variable.<br>a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where $a$ and $b$ are different numbers).<br>b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.<br><br>**8.EE.8** Analyze and solve pairs of simultaneous linear equations.<br>a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.<br>b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.*<br>c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.* | **8.EE.7-** 7.3.4, 8.3.1<br><br>**8.EE.8a-** 5.2.1<br><br>**8.EE.8b-** 5.2.3, 5. | Scatter Diagram, Bird's Eggs<br>**8.EE.7**<br>**Illustrative Mathematics**<br>8.EE The Sign of Solutions,<br>8.EE Coupon versus discount,<br>8.EE Solving Equations, 8.EE Sammy's Chipmunk and Squirrel Observations<br><br>**Inside Mathematics (8.EE.5, 7)**<br>squares and circles<br><br>**8.EE.8**<br>**Illustrative Mathematics**<br>8.EE How Many Solutions?,<br>8.EE Fixing the Furnace, 8.EE Cell Phone Plans, 8.EE Kimi and Jordan,<br>8.EE Folding a Square into Thirds,<br>8.EE The Intersection of Two Lines<br>8.EE.8.c The Intersection of Two Lines<br><br>**Inside Mathematics (8.EE.8)**<br>picking apples<br><br>**Mathematics Assessment Project**<br>FAL (8.EE.7-8)<br>Classifying Solutions to Systems of Equations, Solving Real-Life Problems: Baseball Jerseys, Solving Linear Equations in One Variable, Repeating Decimals, Building and Solving Equations 1<br>TASK (8.EE.7-8)<br>Multiple Solutions, Buying Chips and Candy, Hot Under The Collar |

**College Prep Math (CPM) Textbook to Curriculum Map Alignment for CC Grade 8**
**GRADE 8 – UNIT 3**

## Function to Model Relationships between Quantities

Students grasp the concept of a function as a rule that assigns to each input exactly one output. They understand that functions describe situations where one quantity determines another. They can translate among representations and partial representations of functions (noting that tabular and graphical representations may be partial representations), and they describe how aspects of the function are reflected in the different representations.

| CLUSTER | COMMON CORE STATE STANDARDS | CA MATH 8 CONNECTIONS | OTHER RESOURCES |
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| Define, evaluate and compare functions. MP 2,4, and 7 | **8.F.1.** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. | **8.F.1-** 3.1.2–3.1.6, 8.3.1 | **8.F.1**<br>**Illustrative Mathematics**<br>8.F Introducing Functions, F-IF The Customers, 8.F Foxes and Rabbits, 8.F US Garbage, Version 1, 8.F Function Rules, 8.F Introducing Functions<br><br>**Inside Mathematics (8.SP.1)**<br>house prices, party |
| | **8.F.2** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.* | **8.F.2-** 3.1.2–3.1.6, 4.1.1–4.1.7 | **8.F.2**<br>**Illustrative Mathematics**<br>8.F Battery Charging |
| | **8.F.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.3-** 3.1.2–3.1.6, 7.2.1, 8.1.1, 8.3.1 | **8.F.3**<br>**Illustrative Mathematics**<br>8.F Introduction to Linear Functions<br><br>**Mathematics Assessment Project**<br>**FAL** (8.F.1-3)<br>Generalizing Patterns: The Difference of Two Squares, Modeling: Buying Cars<br>**TASK** (8.F.1-3)<br>Short Tasks - Functions, Linear Graphs |

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| Use functions to model relationships between quantities. MP 1, 2, and, 4 | **8.F.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.4-** 3.1.2–3.1.7, 4.1.1–4.1.7 | **8.F.4**<br>**Illustrative Mathematics**<br>8-F Modeling with a Linear Function, 8.F Heart Rate Monitoring, 8.G Downhill, 8.F Video Streaming, 8.F High School Graduation, 8.F Chicken and Steak, Variation 1, 8.F Baseball Cards, 8.F Chicken and Steak, Variation 2, 8.F Distance across the channel, 8.F Delivering the Mail, Assessment Variation |
| | **8.F.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. | **8.F.5-** 8.3.1 | **8.F.5**<br>**Illustrative Mathematics**<br>8.F Tides, 8.F Distance<br>8.F Bike Race,<br>8.F Riding by the Library<br><br>**Mathematics Assessment Project**<br>**FAL** (8.F.4-5)<br>Interpreting Distance–Time Graphs, Modeling Situations With Linear Equations, Lines and Linear Equations, Generalizing Patterns: The Difference of Two Squares<br>**TASK** (8.F.4-5)<br>Baseball Jerseys, Meal Out, Linear Graphs |
| Investigate patterns of association in bivariate data. MP 1, 4, 5, 6, and 7 | **8.SP.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 | **8.SP.1-** 7.1.2, 7.1.3 | **8.SP.1**<br>**Illustrative Mathematics**<br>8-SP.1 Texting and Grades I,<br>8.SP.1 Hand span and height<br><br>**Inside Mathematics (8.SP.1)** |

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| | **8.SP.2** Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. | **8.SP.2-** 7.1.3, 7.3.2 | house prices<br><br>**8.SP.2**<br>**Illustrative Mathematics**<br>8.SP Birds' Eggs, 8.SP Animal Brains,<br>8.SP Laptop Battery Charge<br><br>**Inside Mathematics (8.SP.2)**<br>scatter diagram |
| | **8.SP.3** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.* | **8.SP.3-** 7.3.1, 7.3.2 | **8.SP.3**<br>**Illustrative Mathematics**<br>8.SP US Airports, Assessment Variation |
| | **8.SP.4** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?* | **8.SP.4-** 7.3.3 | **8.SP.4**<br>**Illustrative Mathematics**<br>8-SP.4 What's Your Favorite Subject?,<br>8.SP.4 Music and Sports<br><br>**Mathematics Assessment Project**<br>**FAL** (8.SP.1-4)<br>Testing a New Product<br>**TASK** (8.SP.1-4)<br>Short Tasks – Statistics and Probability, Sugar Prices, Birds' Eggs, Scatter Diagram, Bird's Eggs |

**College Prep Math (CPM) Textbook to Curriculum Map Alignment for CC Grade 8**
**GRADE 8 – UNIT 4**

**Pythagorean Theorem and its Converse, Congruence and Similarity and Problem Solving Involving Volume of Cylinders, Cones and Spheres**

Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students understand the statement of the Pythagorean Theorem and its converse, and can explain why the Pythagorean Theorem holds, for example, by decomposing a square in two different ways. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

| CLUSTER | COMMON CORE STATE STANDARDS | CA MATH 8 CONNECTIONS | OTHER RESOURCES |
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| Understand congruence and similarity using physical models, transparencies, or geometry software. | **8.G.1** Verify experimentally the properties of rotations, reflections, and translations:<br>a. Lines are taken to lines, and line segments to line segments of the same length.<br>b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. | **8.G.1a-** 6.1.1–6.1.3, 6.2.3<br>**8.G.1b-** 6.1.1–6.1.3, 6.2.3 | **8.G.1**<br>**Illustrative Mathematics**<br>8.G Reflecting a rectangle over a diagonal, 8.G Is this a rectangle? 8.G Partitioning a hexagon, 8.G Same Size, Same Shape?, 8.G A scaled curve, 7.G Scaling angles and polygons, 8.G Origami Silver Rectangle |
| | **8.G.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.2-** 6.1.2–6.1.3, 6.2.3–6.2.4 | **8.G.2**<br>**Illustrative Mathematics**<br>8.G Congruent Segments, 8.G Congruent Rectangles, 8.G Congruent Triangles, 8.G Triangle congruence with coordinates, 8.G Cutting a rectangle into two congruent triangles, 8.G Circle Sandwich |
| | **8.G.3** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. | **8.G.3-** 6.1.2–6.1.3, 6.2.1–6.2.2 | **8.G.3**<br>**Illustrative Mathematics**<br>Reflecting reflections, Triangle congruence with coordinates, Point Reflection, Effects of Dilations on Length, Area, Angles |

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| | **8.G.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.4-** 6.1.2–6.1.3, 6.2.2–6.2.4 | **8.G.4**<br>**Illustrative Mathematics**<br>8.G.A.4 Are They Similar?,<br>8.G Creating Similar Triangles,<br>8.G, 8.EE Different Areas?<br><br>**Inside Mathematics (8.G.3-4)**<br>aaron's designs<br><br>**Mathematics Assessment Project**<br>**FAL** (8.G.1-5)<br>Representing and Combining Transformations, Finding Shortest Routes: The Schoolyard Problem, Identifying Similar Triangles<br>**TASK** (8.G.1-5)<br>Short Tasks – Geometry, Aaron's Designs |
| | **8.G.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.* | **8.G.5-** 9.1.1–9.1.4 | |
| Solve real-world and mathematical problems involving volume of cylinders, cones and spheres. | **8.G.9** Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. | **8.G.9-** 10.1.2–10. | **8.G.9**<br>**Illustrative Mathematics**<br>8.G Comparing Snow Cones,<br>8.G Glasses, 8.G Flower Vases,<br>8.G Shipping Rolled Oats<br><br>**Mathematics Assessment Project**<br>**FAL** (8.G.9)<br>Modeling: Making Matchsticks,<br>Estimating and Sampling: Jellybeans<br>**TASK (8.G.9)**<br>Glasses, Temple Geometry, Matchsticks |