**MS Scope and Sequence**

**Course Overview: 8th Grade Mathematics**

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| **Teacher: Brandon Forde | Year: 20/21** | |
| **Course Enduring Understandings:**  *What do you want students to understand? What inferences should they be able to make?*  *Source: Massachusetts Curriculum Framework for Mathematics*    Students will understand how to:   * In a real-world situation, the rate of change, or unit rate, is represented by the slope of an equation. The initial value is represented by the y-intercept. * Equations and functions are used to model and solve real-world problems. Equations and functions can be represented on tables, graphs, and with verbal descriptions. * Transformations create congruent and similar shapes. * Scatter plots allow us to make inferences and predictions about a set of bivariate data by analyzing patterns and associations within the data. | **Course Essential Question(s):**  *What thought provoking questions foster learning and inquiry to get to the Enduring Understandings?*     * How are proportional relationships, lines, and linear equations related? * How can algebraic models be used to solve real-world problems? * How are angles, lines, and figures affected by various transformations? * How can graphing a set of bivariate data on a scatter plot allow us to see patterns and associations within the data? |
| **Course Mission Statement/North Star:**  *By the end of this course, students will independently use their learning to …*  *What kind of long-term independent accomplishments are desired?*  *Application of skill and content*  *The “Why are we doing this?”*    By the end of 8th grade, our students are able to…   * + Use linear equations to solve real world problems.   + Understand slope as the rate of change within the context of a problem.   + Use linear equations to compare two quantities in bivariate data.   + Translate between tabular and graphical representations of functions.   + Graph linear functions and use them to describe and compare relationships.   + Use Pythagorean’s Theorem to solve problems.   + Explain similarity and congruence between two-dimensional figures using knowledge of transformations.   + Work fluently in the coordinate plane and reason with relationships therein.   + Work productively with partners or groups to ensure that everyone gains understanding.   In addition, students will independently use their understanding of linear equations, systems of equations, proportional relationships, geometry, and statistics to solve complex real-world problems. Students will be able to apply the appropriate tools – such as drawing a models, using a simpler problem, and writing an equation – to strategically solve these problems and justify their answers, both orally and in writing. | |
| **What are your grade level SEL Skills?** | |
| **Final Assessment:**  *How will you assess independent student mastery of your course essential skills and questions? (Questions and Format)*    At APR, we acknowledge that schools in America are systematically racist institutions. In order to continue to develop and work towards being an anti-racist school, APR commits to deeper learning within the context of equitable practices of building knowledge, producing authentic work, and developing 21ist century skills in order to foster mastery, identity and creativity within our students ([Deeper Learning Guidance, DESE](https://drive.google.com/file/d/1YEQUBJf71eLyO8cuTHTNExEFEhCktKJg/view?usp=sharing)). Aligned to that commitment, the final assessment will focus around deeper learning tasks that focus on the 8th grade priority standards of 7.EE (Expressions and Equations) and 8.EE.C.7 (Solve linear equations in one variable). These clusters are part of the major work around equations in 7th and 8th grade, and the skills embedded in them are essential to students’ success in Algebra.  The task will include the following skills:   * Using the properties of operations to generate equivalent expressions. * Solving multi-step equations and inequalities using the properties of operations and inverse operations. * Solving multi-step real-life mathematical problems with positive and negative numbers using equations and inequalities. * Solving equations with one, no, and infinite solutions. * Using equations in a geometric context. | |

Please note, the following scope and sequence is an approximate number of weeks for each unit, because we do not currently have specific dates for the 2020-21 SY. There are intentionally several flex weeks, to account for unforeseen events, MCAS, and to build in more time for just in time scaffolds, deeper learning tasks, or review of current content.

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| **Unit** | **Key Skills & Content**  **(Highlighted in yellow are the priority standards)** | **Approximate # of Weeks** | **Notes/Rationale for Adjustments**  **Suggested Mastery Assessments** |
| **Unit 0** | *Flex Week,* allow for teachers to create procedures and routines with students that will be for both remote and in person learning. | 1 week | N/A |
| [**Unit 1**](#kix.n4n50s34znoe)  **Number Sense** | * Square roots, perfect square, and cube root * Solve equations involving square and cube roots * Finite versus infinite decimals * Rational numbers versus irrational numbers | 3 weeks | * It is the only unit in 8th grade that does not have a priority standard. * SY 19-20 this unit only had 13 days, so there are some flex days in order to do a deeper learning task or review concepts. |
| [**Unit 2**](#kix.furc5cs3ny06)  **Radicals and Exponents** | * Properties of exponents * Negative exponents * Magnitude * Scientific notation * Operations with Scientific notation | 4 weeks  (3 weeks in 19-20 SY) | * Note that this unit is focused on 8th grade priority standards * Time added to ensure that the teacher has time to build foundational skills in working with exponents, radicals, and scientific notation.   Not enough time in previous years to build this skill. |
| [**Unit 3**](#kix.9ilbweg8ol9t)  **Solving Equations in One Variable** | * Write and solve linear equations * Solve equations with one, infinite, and no solution(s) | 3 weeks | * Note that this unit is focused on 8th grade priority standards * No changes from SY 19-20. * In 7th grade, students solve one step and two step equations with rational numbers, positive and negative numbers, etc. But just in time scaffolds will be needed for operations computation with positive and negative rational numbers. * Make sure that to interleave types of problems, linear equations can have fractions and decimal coefficients and can be solved by expanding expressions with distributive property and/or combining like terms. |
| [**Unit 4**](#kix.keynmojksqw1)  **Linear Relationships** | * Constant, rate, slope of equation, unit rate = slope * Rate of range, graph equations on the coordinate plane * Write linear equations from a graph or when given 2 points on the line, or the slope and a point on the line | 4 weeks  (3 weeks in 19-20 SY) | * Note that this unit is focused on 8th grade priority standards * Students build on their work from 6th grade with unit rates and work with proportional relationships in 7th grade. Students make connections between unit rate, rate of change, and slope. * Make sure that to interleave different representations, graphs, equations, tables, and verbal descriptions throughout the unit. * Adding one week to ensure that students have the foundational knowledge of linear equations, as the next two units (functions and systems of equations) heavily rely on the understanding/ mastery of this content * Suggested Mastery: Mixture of traditional assessment and deeper learning tasks (there are a lot of real world applications in this unit, so I suggest that you incorporate deeper learning throughout the unit as smaller chunked tasks when applicable). |
| [**Unit 5**](#kix.4wretbk3lkza)  **Functions** | * Define function, identify functions on a table * Write and graph linear functions, linear versus nonlinear functions | 4 weeks  (3 weeks in 19-20 SY) | * Note that this unit is focused on 8th grade priority standards * This unit is the student’s first introductions to functions as a rule that assigns to each input exactly one output. * In sixth and seventh grade, students studied rate and constant of proportionality in proportional relationships. They developed an understanding of how one quantity changes in relationship to another. Students will draw on that knowledge as they investigate how quantities are related in tables, equations, and graphs, and as they investigate linear vs. nonlinear relationships. * Throughout the unit, push students to explain their mathematical reasoning using precise mathematical vocabulary, which will further solidify student’s conceptual understanding of functions. Instead of focusing on just the application and computation of functions. * Suggested Mastery: Mixture of traditional assessment and deeper learning tasks (there are a lot of real world applications in this unit, so I suggest that you incorporate deeper learning throughout the unit as smaller chunked tasks when applicable). |
| [**Unit 6**](#kix.awhhfjp24aaq)  **Systems of Linear Equations** | * Solve system of equations graphically * Solve systems of equations using elimination or substitution * SOlve systems of equations with one, infinite, or no solutions | 4 weeks  (3 weeks in 19-20 SY) | * Note that this unit is focused on 8th grade priority standards * This standard has students solving simultaneous linear equations. It is explained by 8.EE.C.8 a -c, and it is best to consider a, b, and c together as they are not isolated skills. * Continuously interleaving solving systems of equations graphically, algebraically, and by inspection. Present opportunities to solve both mathematical and real-world problems. * Suggested Mastery: Mixture of traditional assessment and deeper learning tasks (there are a lot of real world applications in this unit, so I suggest that you incorporate deeper learning throughout the unit as smaller chunked tasks when applicable). |
| [**Unit 7**](#kix.5rp5qpl45ahb)  **Bivariate Data** | * Construct and interpret scatter plots * Line of best fit * Bivariate data * Positive and negative correlation | 3 weeks | * No changes to SY 19-20 * Where are they coming from? Prior to eighth grade, students explored how and why data is collected—by thinking about statistical questions, samples, populations, and various ways to analyze data representations. Students worked with line plots, histograms, and box plots, and they considered what the shape, center, and spread of these data sets said about the data itself. * Suggested Mastery: Deeper Learning Task |
| [**Unit 8**](#kix.1ltu0odiuhfe)  **Pythagorean Theorem and Volume** | * Pythagorean Theorem * Hypotenuse * Find the volume of rectangular prisms, cones, and spheres | 3 weeks | * Note that this unit is focused on 8th grade priority standards * During the 19-20 SY, this unit was three weeks but one of those weeks for ANet review. Use the additional week to fold in just in time scaffolds of square roots (unit 1) and to extend or review key concepts of this unit. * Suggested Mastery: Mixture of traditional assessment and deeper learning tasks (there are a lot of real world applications in this unit, so I suggest that you incorporate deeper learning throughout the unit as smaller chunked tasks when applicable). |
| [**Unit 9**](#cbnfldalctlx)  **Transformations and Angle Relationships** | * Translations, reflections, and rotations * Describe a sequence of rigid motions that maps one shape onto another * Dilations * Scale factor | 4 weeks | * No changes for 19-20 SY. * In 8th grade, students add rotations, reflections, and translation to their study of transformations from 7th grade dilations. 8.GA.1 introduces this concept, and take time to explore these transformations using a variety of models and manipulatives. * Aligns to math department vision: “Explain similarity and congruence between two-dimensional figures using knowledge of transformations.” * Suggest Mastery: Deeper Learning Task   + (19-20 SY) Interior Design Project |
| **Total:** | * **33 weeks for units 0 - 9** * **3 weeks for MCAS**    + 2 weeks for review, 1 week for taking the MCAS (math and ELA) * **2 weeks flex** | | |

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| **Unit 1: Number Sense** | **3 weeks** |
| **Meaning** | |
| **Enduring Understandings:**  *What do you want students to understand? What inferences should they be able to make?*  Students will understand:   * A rational number is a number that can be expressed as a/b, where a and b are integers and b does not equal zero. * The decimal expansion of a rational number can be used to convert that rational number into a fraction; division can be used to convert fractions into decimals. * Squaring and taking the square root of a number are inverse operations, just as cubing and taking the cube root of a number are inverse operations, which can be used to solve linear equations. * We can perfect squares to estimate the value of a non-perfect square number. | **Essential Question(s):***What thought provoking questions foster learning and inquiry to get to the Enduring Understandings?*   * How do you know if a number is rational? * What strategies do you have to turn a decimal into a fraction, and vice versa? * How are square roots and squaring a numbers related to each other? How are cube roots and cubing a number related to each other? * How can we use estimation to solve problems involving roots and cubes? |
| **Acquisition** | |
| **Content Standards:** *(CCSS, State, national, AP)* **Know that there are numbers that are not rational, and approximate them by rational numbers.** [**8.NS.A.1**](http://www.corestandards.org/Math/Content/8/NS/A/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.A.2**](http://www.corestandards.org/Math/Content/8/NS/A/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., π2). For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.  [**8.EE.A.2**](http://www.corestandards.org/Math/Content/8/EE/A/2/)**:** Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. | **Skill Standards:** *(Thinking Skills, Group work skills, content-area habits, Social Emotional Skills, study skills, etc.)*   * **SEMP 2. Reason Abstractly and Quantitatively**   Students are reasoning as they explain how to get more precise approximations of irrational numbers.   * **SEMP 6. Attend to precision**   Students are using rational approximations of irrational numbers to compare and locate irrational numbers on a number line.   * **SEMP 8. Look for and express regularity in repeated reasoning.**   Students explain how to get more precise rational approximations of irrational numbers |
| **Notes / Texts**  Aligned to MATCH Fishtank Unit 7 Topic A, Lessons 1-5 and Topic C, Lesson 13  Aligned to EngageNY Module 7, Topics A and B, Lessons 1 – 14 | |

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| **Unit 2: Radicals and Exponents** | **4 weeks** |
| **Meaning** | |
| **Enduring Understandings:**  *What do you want students to understand? What inferences should they be able to make?*  Students will understand:   * The properties of exponents summarize the structure and patterns that are inherent in exponential expressions. They are rooted in the conceptual meaning of exponents and provide a summary of how to efficiently work with exponential expressions. * Scientific notation is a useful tool to conceptualize, communicate about, and operate with very large and very small numbers. * The properties of exponents can be applied to numbers written in scientific notation to support efficient computation and comparison. * Looking for structure and patterns in expressions can provide insight into how to manipulate and work with complex expressions, as well as lead to generalizations and properties. * We perform operations with numbers written in scientific notation by converting them to standard form, or by leaving them in scientific notation and using the laws of exponents. | **Essential Question(s):**  *What thought provoking questions foster learning and inquiry to get to the Enduring Understandings?*   * Why do we use scientific notation? * How do the laws of exponents apply to performing operations with number expressed in scientific notation |
| **Acquisition** | |
| **Content Standards: *(CCSS, State, national, AP)*** **Work with radicals and integer exponents.** **8.EE.A.1:** Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3-5 = 3-3 = 1/33 = 1/27.  **8.EE.A.3:** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 times 108 and the population of the world as 7 times 109, and determine that the world population is more than 20 times larger.  **8.EE.A.4:** Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology | **Skill Standards:** *(Thinking Skills, Group work skills, content-area habits, Social Emotional Skills, study skills, etc.)*   * **SFMP 2. Reason abstractly and quantitatively**   Students use reasoning to express how many times larger (or smaller) one number is than another when both are expressed in sciencitic notation.   * **SFMP 5. Use appropriate tools strategically**   Students learn to read scientific notation as expressed by technology   * **SFMP 6. Attend to precision**   Students compute with integers exponents and numbers in scientific notation accurately.  Source: The Common Core Mathematics Companion: Standards Decoded (Miles, Williams) |
| **Notes / Texts**  Aligned to MATCH Fishtank Unit 1, Lessons 1-15  Aligned to EngageNY Module 1, Topic A and B, Lessons 1-13 | |

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| **Unit 3: Solving Equations in One Variable** | **3 weeks** |
| **Meaning** | |
| **Enduring Understandings:**  *What do you want students to understand? What inferences should they be able to make?*  Students will understand:   * Number properties are uses to create equivalent expressions or equations in order to solve a problem. * Inverse operations (reverse PEMDAS) are used to solve equations. * Variables represents unknown quantities, and solving for the variable means finding the value of that unknown quantity that makes the equation true. * Linear equations and systems of equations can have one, no, or infinite solutions. * The solution to a linear equation is the value that satisfies the equation. | **Essential Question(s):**  *What thought provoking questions foster learning and inquiry to get to the Enduring Understandings?*   * How can expressions be manipulated to create equivalent representations? * How can we use numbers and symbols to represent mathematical ideas? * How are real-life problems represented with variables and constructed into equations and inequalities to be solved? * Can an equation have more than one solution? |
| **Acquisition** | |
| **Content Standards: *(CCSS, State, national, AP)***  **Analyze and solve linear equations and pairs of simultaneous linear equations.**  **8.EE.C.7:** Solve linear equations in one variable.   * **8.EE.C.7.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). * **8.EE.C.7.B:** Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. | **Skill Standards:** *(Thinking Skills, Group work skills, content-area habits, Social Emotional Skills, study skills, etc.)*   * **SFMP 1. Make sense of problems and persevere in solving them.**   Students solve problems with linear equations.   * **SFMP 2. Reason abstractly and quantitatively**   Students analyze linear equations.   * **SFMP 6. Attend to precision**   Students model real world problems with linear equations  Source: The Common Core Mathematics Companion: Standards Decoded (Miles, Williams) |
| **Notes/ Texts:**  Aligned to MATCH Fishtank Unit 2, Lessons 1-10 (Lessons 11 and 12 extend to inequalities)  Aligned to EngageNY:   * Module 4, Topic A, Lessons 1 – 9 | |

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| **Unit 4: Linear Equations** | **4 weeks** |
| **Meaning** | |
| **Enduring Understandings:**  *What do you want students to understand? What inferences should they be able to make?*  Students will understand:   * Linear relationships can be represented with a graph, a table, an equation, and a verbal description. * The slope of a graph can be interpreted as the unit rate, or rate of change. | **Essential Question(s):**  *What thought provoking questions foster learning and inquiry to get to the Enduring Understandings?*   * How can linear relationships be represented in different ways? * What does the slope of a linear relationship mean in the context of a problem? |
| **Acquisition** | |
| **Content Standards: *(CCSS, State, national, AP)*** **8.EE.B Understand the connections between proportional relationships, lines, and linear equations.** **8.EE.B.5:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.  **8.EE.B.6:** Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b. | **Skill Standards:** *(Thinking Skills, Group work skills, content-area habits, Social Emotional Skills, study skills, etc.)*   * **SFMP 2. Reason abstractly and quantitatively.**   Students compare two proportional relationships represented in different forms   * **SFMP 6. Attend to precision**   Students give explanations that are precise and use appropriate vocabulary.   * **SFMP 7. Look for and make use of structure**   Students see a pattern that results in the general form of a linear equation.  Source: The Common Core Mathematics Companion: Standards Decoded (Miles, Williams) |
| **Notes / Texts** | |

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| **Unit 5: Functions** | **4 weeks** |
| **Meaning** | |
| **Enduring Understandings:**  *What do you want students to understand? What inferences should they be able to make?*  Students will understand:   * Inverse operations (reverse PEMDAS) are used to solve equations. * Variables represents unknown quantities, and solving for the variable means finding the value of that unknown quantity that makes the equation true. * Equations and inequalities are powerful tools that can be used to model and solve real-world situations with unknown quantities. * Equations can be solved by reasoning about the arithmetic needed to uncover the value of the unknown. Equations can also be solved algebraically by using properties of operations and equality. * Inequalities have infinite solutions, which can be represented graphically on a number line. In context, these solutions are sometimes constrained by what makes sense for the situation; for example, if solving for the maximum number of people who can fit onto a boat, the solution set would be limited to positive integers. | **Essential Question(s):**  *What thought provoking questions foster learning and inquiry to get to the Enduring Understandings?*   * How can expressions be manipulated to create equivalent representations? * How can we use numbers and symbols to represent mathematical ideas? * How are real-life problems represented with variables and constructed into equations and inequalities to be solved? |
| **Acquisition** | |
| **Content Standards: *(CCSS, State, national, AP)*** **Define, evaluate, and compare functions.** **8.F.A.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.1  **8.F.A.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.A.3:** Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s2giving 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. **Use functions to model relationships between quantities.** **8.F.B.4:** Construct a function to model a linear relationship between two quantities. Determine the rate of change  and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.  **8.F.B.5:** Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.  1 Function notation is not required for Grade 8. | **Skill Standards:** *(Thinking Skills, Group work skills, content-area habits, Social Emotional Skills, study skills, etc.)*   * **SFMP 2. Reason abstractly and quantitatively.**   Students determine if a relationship is a function.   * **SFMP 4. Model with Mathematics**   Students represent linear functions in algebraic, graphical, numerical, and verbal forms.  Students construct a function to model a linear relationship between two quantities.   * **SFMP 5. Appropriate tools strategically**   Students use technological tools to explore and deepen their understanding of functions   * **SFMP 7. Look for and make use of structure**   Students apply general mathematical rules such as y = mx + b as the equation for a linear function.  Students make use of the qualitative features (structure) found in a verbal description of a function and sketch that function. |
| **Notes / Texts**   * Aligned to MATCH Fishtank Unit 4, Lessons 1-12 * Aligned to EngageNY:   + Module 5, Topic A, Lessons 1 – 8   + Module 6, Topic A, Lessons 1 – 5 | |

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| **Unit 6: Systems of Equations** | **4 weeks** |
| **Meaning** | |
| **Enduring Understandings:**  *What do you want students to understand? What inferences should they be able to make?*  Students will understand:   * Systems of equations can be solved using the elimination method, substitution method, or with a graph. * Systems of equations can have one, no, or infinite solutions. * The solution to a system of equations is an ordered pair that satisfies both equations. | **Essential Question(s):**  *What thought provoking questions foster learning and inquiry to get to the Enduring Understandings?*   * How are real-life problems represented with variables and constructed into a system of equations to be solved? * Can a system of equations have more than one solution? |
| **Acquisition** | |
| **Content Standards: *(CCSS, State, national, AP)*** **Analyze and solve linear equations and pairs of simultaneous linear equations.** **8.EE.C.8:** Analyze and solve pairs of simultaneous linear equations.   * **8.EE.C.8.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. * **8.EE.C.8.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*. * **8.EE.C.8.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*. | **Skill Standards:** *(Thinking Skills, Group work skills, content-area habits, Social Emotional Skills, study skills, etc.)*  Standards for Mathematical Practice:   * **SFMP 1. : Make sense of problems and persevere in solving them.**   Students solve problems with systems of linear equations.   * **SFMP 2. Reason abstractly and quantitatively.**   Students analyze linear equations and systems of linear equations.   * **SFMP 4. Model with mathematics.**   Students model real-world problems with systems of equations.  Source: The Common Core Mathematics Companion: Standards Decoded (Miles, Williams) |
| **Notes / Texts**   * Aligned to MATCH Fishtank Unit 6, Lessons 1-11 * Aligned to EngageNY:   + Module 4, Topic D, Lessons 24 – 30 | |

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| **Unit 7: Bivariate Data** | **3 weeks** |
| **Meaning** | |
| **Enduring Understandings:**  *What do you want students to understand? What inferences should they be able to make?*   * A scatter plot of bivariate data shows clusters, outliers, positive/negative associations, and linear/nonlinear associations within the data. * The line of best fit can be used to make predictions about bivariate data displayed on a graph. | **Essential Question(s):**  *What thought provoking questions foster learning and inquiry to get to the Enduring Understandings?*   * How can graphing a set of bivariate data on a scatter plot allow us to see patterns and associations within the data? * How can a linear equation be used to make predictions about bivariate data? |
| **Acquisition** | |
| **Content Standards: *(CCSS, State, national, AP)***  . **Investigate patterns of association in bivariate data.** **8.SP.A.1:** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.  **8.SP.A.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.A.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.A.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? | **Skill Standards:** *(Thinking Skills, Group work skills, content-area habits, Social Emotional Skills, study skills, etc.)*   * **SFMP 1. Make sense of problems and persevere in solving them.**   Students solve problems using a linear model in the context of bivariate data.   * **SFMP 2. Reason abstractly and quantitatively.**   Students informally assess a line of best fit to data.  Students compare statistical measures on two populations.   * **SFMP 4. Model with Mathematics**   Students use linear models to solve problems.   * **SFMP 6. Attend to precision**   Students solve problems efficiently, accurately, and with the degree of precision appropriate for the context of the problem.   * **SFMP 7. Look for and make use of structure.**   Students look for structure in world problems to find linear patterns.   * **SFMP 8. Look for and express regularity in repeated reasoning**   Students understand the broader application of patterns in bivariate data and see the structure in similar situations.  Source: The Common Core Mathematics Companion: Standards Decoded (Miles, Williams) |
| **Notes / Texts**   * Aligned to MATCH Fishtank Unit 8, Lessons 1-9 * Aligned to EngageNY Module 6, Topics B, C, and D, Lessons 6 – 13 | |

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| **Unit 8: Pythagorean Theorem and Volume** | **3 weeks** |
| **Meaning** | |
| **Enduring Understandings:**  *What do you want students to understand? What inferences should they be able to make?*   * If a triangle is a right triangle, then the sum of the squares of the legs equals to square of the hypotenuse. * We can use the vertical and horizontal distance between two points on a coordinate plane and the Pythagorean Theorem to find the distance between two points. * Volume is a measure of the amount of space inside a figure. | **Essential Question(s):**  *What thought provoking questions foster learning and inquiry to get to the Enduring Understandings?*   * How can we prove the Pythagorean Theorem? * What conditions need to be met in order to prove a triangle is a right triangle? * How can we use the Pythagorean Theorem to find the distance between two points on a coordinate plane? * How can volume be used to solve real-world problems? |
| **Acquisition** | |
| **Content Standards: *(CCSS, State, national, AP)*** **Understand and apply the Pythagorean Theorem.** **8.G.B.6:** Explain a proof of the Pythagorean Theorem and its converse.  **8.G.B.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.B.8:** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. **Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.** **8.G.C.9:** Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. | **Skill Standards:** *(Thinking Skills, Group work skills, content-area habits, Social Emotional Skills, study skills, etc.)*   * **SFMP 3. Construct viable arguments and crit**   Students model an informal proof to understand the Pythagorean Theorem.   * **SFMP 4. Model with Mathematics**   Students use modeling to understand the meaning of Pythagorean Theorem.   * **SFMP 6. Attend to precision.**   Students their their results to all computation   * **SFMP 7. Look for and make use of structure**   Students look for patterns in right triangles to help solve problems.  Source: The Common Core Mathematics Companion: Standards Decoded (Miles, Williams) |
| **Notes / Texts**   * Aligned to MATCH Fishtank Unit 7 Topics B and C, Lessons 6-12 and 14-16 * Aligned to EngageNY:   + Module 2, Topic D, Lessons 15-16   + Module 3, Topic C, Lessons 13-14   + Module 6, Topic Cs and D, Lessons 15-23   + Module 7, Topic C, Lessons 15-18 * Aligned to EngageNY Module 5, Topic B, Lessons 9 – 11 | |

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| **Unit 9: Transformation and Angle Relationships** | **4 weeks** |
| **Meaning** | |
| **Enduring Understandings:**  *What do you want students to understand? What inferences should they be able to make?*   * Dilation creates similar shapes be changing the size of the shape; rotations, reflections, and translations create congruent shapes by changing the orientation, but not the size, of the shape. * Congruent shapes have equal angles and side lengths; similar shapes have equal angles, but not equal side lengths. * When parallel lines are cut by a transversal, alternate interior angles, alternate exterior angles, vertical angles, and corresponding angles are created. These angle relationships can be used to find the value of missing angles. | **Essential Question(s):**  *What thought provoking questions foster learning and inquiry to get to the Enduring Understandings?*   * How is a dilation of a figure different from a translation, reflection, or rotation of a figure? * How is congruence similar to, and different from, similarity? * Why are corresponding angles congruent? |
| **Acquisition** | |
| **Content Standards: *(CCSS, State, national, AP)***  **Understand congruence and similarity using physical models, transparencies, or geometry software.**  **8.G.A.1:** Verify experimentally the properties of rotations, reflections, and translations:   * **8.G.A.1.A:** Lines are taken to lines, and line segments to line segments of the same length. * **8.G.A.1.B:** Angles are taken to angles of the same measure. * **8.G.A.1.C:** Parallel lines are taken to parallel lines.   **8.G.A.2:** Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.  **8.G.A.3:** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.  **8.G.A.4:** Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.  **8.G.A.5**: Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so*. | **Skill Standards:** *(Thinking Skills, Group work skills, content-area habits, Social Emotional Skills, study skills, etc.)*   * **SFMP 3. Construct viable arguments and crit**   Students use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when the parallel lines are cut by transversal, and the angle-angle criterion for similarity of triangles. .   * **SFMP 4. Model with Mathematics**   Students model on the coordinate plane to explore congruent and similar figures   * **SFMP 6. Attend to precision.**   Students are careful to bring lines to lines and angles to appropropriate angles in transformations.   * **SFMP 7. Look for and make use of structure**   Students attend to the structures of the figures as they transform them.  Source: The Common Core Mathematics Companion: Standards Decoded (Miles, Williams) |
| **Notes / Texts**   * Aligned to MATCH Fishtank Unit 7 Topics B and C, Lessons 6-12 and 14-16 * Aligned to EngageNY:   + Module 2, Topic D, Lessons 15-16   + Module 3, Topic C, Lessons 13-14   + Module 6, Topic Cs and D, Lessons 15-23   + Module 7, Topic C, Lessons 15-18 * Aligned to EngageNY Module 5, Topic B, Lessons 9 – 11 | |