

Red Bank Charter School

Grade 8 Mathematics Curriculum

Recommended Pacing Guide	
Unit 1: Expressions and Equations	45 Days
Unit 2: Functions	35 Days
Unit 3: Geometry	45 Days
Unit 4: The Number System	35 Days
Unit 5: Statistics and Probability	20 Days

Suggested Accommodations For All Units
<p>English Language Learners:</p> <ul style="list-style-type: none">● Pair ELL student with student who speaks English and understands/ able to communicate with student's native language● Simplify content● Google Translator● Multi - language word wall● Provide extended time● Speak clearly and slowly, avoid slang and idiomatic expressions
<p>Special Education/504 Plans/Students with Disabilities:</p> <ul style="list-style-type: none">● Follow specific students accommodations and modifications as listed in individual student IEP or 504 plan
<p>Gifted and Talented:</p> <ul style="list-style-type: none">● Provide appropriate challenges for a wide ranging skills and development.● Participate in inquiry and project-based learning units of study.● Provide options, alternatives and choices to differentiate and broaden the curriculum
<p>Students at Risk of Failure:</p> <ul style="list-style-type: none">● Students Motivation<ul style="list-style-type: none">○ Interest○ Build confidence○ Independence○ Enjoyment
<p>Economically Disadvantaged:</p>

- Build a safe and nurturing atmosphere
- Providing needed academic resources (paper, pencils, computer time,)
- Be flexible with assignments

Culturally Diverse:

- Involve families in student learning
- Provide immediate praise and feedback
- Respect cultural traditions
- Provided students with necessary academic resources and materials
- Provide visuals

Unit 1: Expressions and Equations**Duration: 45 Days****Standards/Learning Targets****New Jersey Student Learning Focus Standards: Expressions and Equations Work with radicals and integer exponents.****NJSLS.MATH.CONTENT.8.EE.A.1**

- Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $32 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.

NJSLS.MATH.CONTENT.8.EE.A.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.

NJSLS.MATH.CONTENT.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 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.

NJSLS.MATH.CONTENT.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. Understand the connections between proportional relationships, lines, and linear equations.

NJSLS.MATH.CONTENT.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.

NJSLS.MATH.CONTENT.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 .
- Analyze and solve linear equations and pairs of simultaneous linear equations.

NJSLS.MATH.CONTENT.8.EE.C.7

- Solve linear equations in one variable.

NJSLS.MATH.CONTENT.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).

NJSLS.MATH.CONTENT.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.

NJSLS.MATH.CONTENT.8.EE.C.8

- Analyze and solve pairs of simultaneous linear equations.

NJSLS.MATH.CONTENT.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.

NJSLS.MATH.CONTENT.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.

NJSLS.MATH.CONTENT.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.

Primary Interdisciplinary Connections:**Literacy Connection**

- NJSLSA.6.2. Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.
- NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- NJSLSA.R4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

- NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

Science Connection

- MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.
- MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. [Clarification Statement: Emphasis is on using mathematical models, probability]
- MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave

Technology Standards:

- 8.1.8.A.1 Demonstrate knowledge of a real world problem using digital tools
- 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results
- 8.1.P.C.1 Collaborate with peers by participating in interactive digital games or activities

21st Century Themes/Career Readiness:

Career Ready Practices

- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them

Personal Financial Literacy

- 9.1.8.A.2 Relate how career choices, education choices, skills, entrepreneurship, and economic conditions affect income.
- 9.1.8.B.7 Construct a budget to save for long-term, short-term, and charitable goals.
- 9.1.8.D.1 Determine how saving contributes to financial well-being.

Career Awareness Exploration and Preparation

- 9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career

Career and Technical Education

- 9.3.12.BM.1 Utilize mathematical concepts, skills and problem solving to obtain necessary information for decision-making in business.
- 9.3.12.FN.1 Utilize mathematical concepts, skills and problem solving to obtain necessary information for decision making in the finance industry.

Evidence of Student Learning

Formative Tasks:

Alternative Assessments:

<ul style="list-style-type: none"> ● Teacher Observation ● Teacher Checklist ● Verbal question & answer ● Self-evaluation of performance and progress 	<ul style="list-style-type: none"> ● End of unit project
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Student participation ● Rubric score ● Performance Test 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Baseline SGO ● Mid-year SGO ● End of year SGO
<p>Knowledge & Skills</p>	
<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Change is fundamental to understanding functions. ● Numbers or objects that repeat in predictable ways can be described or generalized. ● An operation can be “undone” by its inverse. ● Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● How can change be described mathematically? ● How are patterns of change related to the behavior of functions? ● How do mathematical models/representations shape our understanding of mathematics?
<p>Core Instructional & Supplemental Materials</p>	
<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● STEAM Performance Tasks ● Activities ● Blackline Masters ● Virtual Manipulatives ● Interactive Explorations ● Digit Examples ● Skills Trainer ● Mini-Assessments ● STEAM videos ● Game Library ● Multi-language glossary ● Cross-Curricular Projects ● Graphic organizers ● Math Tool Paper ● Dry Erase Boards ● Smart Notebook ● Khan Academy ● IXL 	<p>Varied Levels of Text/Resources:</p> <ul style="list-style-type: none"> ● Big Ideas Math Modeling Real Life - Teacher Resources ● https://www.bigideasmath.com/BIM/login ● Big Ideas Math Manipulative Kit ● Student Edition ● Teaching Edition ● Family Letters ● Warm-Ups ● Extra Practice ● Reteach ● Enrichment and Extension ● Puzzle Time ● Prerequisite Skills Practice ● Pre and Post Course Assessments ● Course Benchmark Assessments ● Alternative Assessments ● Chapter Assessments

Unit 2: Geometry

Duration: 45

Standards/Learning Targets

New Jersey Student Learning Focus Standards: Understand congruence and similarity using physical models, transparencies, or geometry software.

NJSLS.MATH.CONTENT.8.G.A.1

- Verify experimentally the properties of rotations, reflections, and translations: a.Lines are transformed to line segments of the same length. b.Angles are transformed to angles of the same measure. c.Parallel lines are transformed to parallel lines.

NJSLS.MATH.CONTENT.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.

NJSLS.MATH.CONTENT.8.G.A.3

- Describe the effect of dilations, translations, rotations, and reflections on two- dimensional figures using coordinates.

NJSLS.MATH.CONTENT.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.

NJSLS.MATH.CONTENT.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.
- Understand and apply the Pythagorean Theorem.

NJSLS.MATH.CONTENT.8.G.B.6

- Explain a proof of the Pythagorean Theorem and its converse.

NJSLS.MATH.CONTENT.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.

NJSLS.MATH.CONTENT.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.

NJSLS.MATH.CONTENT.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.

Primary Interdisciplinary Connections:

Literacy Connection

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Technology Standards:

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- 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results
- 8.1.P.C.1 Collaborate with peers by participating in interactive digital games or activities

21st Century Themes/Career Readiness:

Career Ready Practices

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Personal Financial Literacy

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Evidence of Student Learning

Formative Tasks:

- Teacher Observation
- Teacher Checklist
- Verbal question & answer
- Self-evaluation of performance and progress

Alternative Assessments:

- End of unit project

Summative Assessments:

- Student participation
- Rubric score
- Performance Test

Benchmark Assessments:

- Baseline SGO
- Mid-year SGO
- End of year SGO

Knowledge & Skills

Enduring Understandings:

- Two- and three-dimensional objects can be described, classified, and analyzed by their attributes.
- Objects in a plane or in space can be oriented in an infinite number of ways while maintaining its size or shape.
- Object's location on a plane or in space can be described quantitatively.
- Linear measure, area, and volume are fundamentally different but may be related to one another in ways that permit calculation of one given the other.

Essential Questions:

- Why do we compare contrast and classify objects?
- How do decomposing and recomposing shapes help us build our understanding of mathematics?
- How can transformations be described mathematically?

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- STEAM Performance Tasks
- Activities
- Blackline Masters
- Virtual Manipulatives
- Interactive Explorations
- Digit Examples
- Skills Trainer
- Mini-Assessments
- STEAM videos
- Game Library
- Multi-language glossary
- Cross-Curricular Projects
- Graphic organizers
- Math Tool Paper
- Dry Erase Boards
- Smart Notebook
- Khan Academy
- IXL

Varied Levels of Text/Resources:

- Big Ideas Math Modeling Real Life - Teacher Resources
- <https://www.bigideasmath.com/BIM/login>
- Big Ideas Math Manipulative Kit
- Student Edition
- Teaching Edition
- Family Letters
- Warm-Ups
- Extra Practice
- Reteach
- Enrichment and Extension
- Puzzle Time
- Prerequisite Skills Practice
- Pre and Post Course Assessments
- Course Benchmark Assessments
- Alternative Assessments
- Chapter Assessments

Unit 3: Functions**Duration: 35 Days****Standards/Learning Targets****New Jersey Student Learning Focus Standards: Define, evaluate, and compare functions.****NJSLS.MATH.CONTENT.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

NJSLS.MATH.CONTENT.8.F.A.2

- Compare properties (e.g.,rate of change,intercepts,domain and range) 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.

NJSLS.MATH.CONTENT.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 $A = S^2$ 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.
- Use functions to model relationships between quantities.

NJSLS.MATH.CONTENT.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.

NJSLS.MATH.CONTENT.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.

Primary Interdisciplinary Connections:**Literacy Connection**

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- MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

Technology Standards:

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Evidence of Student Learning

Formative Tasks:

- Teacher Observation
- Teacher Checklist
- Verbal question & answer
- Self-evaluation of performance and progress

Alternative Assessments:

- End of unit project

Summative Assessments:

- Student participation
- Rubric score
- Performance Test

Benchmark Assessments:

- Baseline SGO
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Knowledge & Skills

Enduring Understandings:

- Change is fundamental to understanding functions.
- Numbers or objects that repeat in predictable ways can be described or generalized.
- An operation can be “undone” by its inverse.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.

Essential Questions:

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- Cross-Curricular Projects
- Graphic organizers

Varied Levels of Text/Resources:

- Big Ideas Math Modeling Real Life - Teacher Resources
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- Big Ideas Math Manipulative Kit
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- Prerequisite Skills Practice
- Pre and Post Course Assessments
- Course Benchmark Assessments
- Alternative Assessments
- Chapter Assessments

Unit 4: The Number System**Duration: 35 Days****Standards/Learning Targets****New Jersey Student Learning Focus Standards: Know that there are numbers that are not rational, and approximate them by rational numbers.****NJSLS.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.

NJSLS.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., π^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.

Primary Interdisciplinary Connections:**Literacy Connection**

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Alternative Assessments:

- End of unit project

Summative Assessments:

- Student participation
- Rubric score
- Performance Test

Benchmark Assessments:

- Baseline SGO
- Mid-year SGO
- End of year SGO

Knowledge & Skills

Enduring Understandings:

- Numbers can be represented in multiple ways.

Essential Questions:

- What makes an estimate reasonable?

- The same operations can be applied in problem situations that seem quite different from another.
- Being able to compute fluently means making smart choices about which tools to use and when to use them.
- Knowing the reasonableness of an answer comes from using good number sense and estimation strategies.

- What makes an answer exact?
- What makes a strategy both effective and efficient?
- What makes a solution optimal?

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- STEAM Performance Tasks
- Activities
- Blackline Masters
- Virtual Manipulatives
- Interactive Explorations
- Digit Examples
- Skills Trainer
- Mini-Assessments
- STEAM videos
- Game Library
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Unit 5: Statistics and Probability**Duration: 20 Days****Standards/Learning Targets****New Jersey Student Learning Focus Standards: Investigate patterns of association in bivariate data.****NJSLS.MATH.CONTENT.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.

NJSLS.MATH.CONTENT.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.

NJSLS.MATH.CONTENT.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.

NJSLS.MATH.CONTENT.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?

Primary Interdisciplinary Connections:**Literacy Connection**

- NJLSA.6.2. Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.
- NJLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- NJLSA.R4. Interpret words and phrases as they are used in a text, including determining

technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

- NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

Science Connection

- MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.
- MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. [Clarification Statement: Emphasis is on using mathematical models, probability]
- MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

Technology Standards:

- 8.1.8.A.1 Demonstrate knowledge of a real world problem using digital tools
- 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results
- 8.1.P.C.1 Collaborate with peers by participating in interactive digital games or activities

21st Century Themes/Career Readiness:

Career Ready Practices

- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them

Personal Financial Literacy

- 9.1.8.A.2 Relate how career choices, education choices, skills, entrepreneurship, and economic conditions affect income.
- 9.1.8.B.7 Construct a budget to save for long-term, short-term, and charitable goals.
- 9.1.8.D.1 Determine how saving contributes to financial well-being.

Career Awareness Exploration and Preparation

- 9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career

Career and Technical Education

- 9.3.12.BM.1 Utilize mathematical concepts, skills and problem solving to obtain necessary information for decision-making in business.
- 9.3.12.FN.1 Utilize mathematical concepts, skills and problem solving to obtain necessary information for decision making in the finance industry.

Evidence of Student Learning

<p>Formative Tasks:</p> <ul style="list-style-type: none"> ● Teacher Observation ● Teacher Checklist ● Verbal question & answer ● Self-evaluation of performance and progress 	<p>Alternative Assessments:</p> <ul style="list-style-type: none"> ● End of unit project
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Student participation ● Rubric score ● Performance Test 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Baseline SGO ● Mid-year SGO ● End of year SGO
<p>Knowledge & Skills</p>	
<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● The question to be answered determines the data to be collected and how best to collect it. ● Basic statistical techniques can be used to analyze data in the workplace. ● The probability of an event can be used to predict the probability of future events. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● What is average? ● What makes a data representation useful? ● How does my sample affect confidence in my prediction? ● What is fair?
<p>Core Instructional & Supplemental Materials</p>	
<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● STEAM Performance Tasks ● Activities ● Blackline Masters Virtual ● Manipulatives Interactive ● Explorations Digit ● Examples ● Skills Trainer ● Mini-Assessments ● STEAM videos ● Game Library ● Multi-language glossary ● Cross-Curricular Projects ● Graphic organizers ● Math Tool Paper ● Dry Erase Boards ● Smart Notebook ● Khan Academy ● IXL 	<p>Varied Levels of Text/Resources:</p> <ul style="list-style-type: none"> ● Big Ideas Math Modeling Real Life - Teacher Resources ● https://www.bigideasmath.com/BIM/login ● Big Ideas Math Manipulative Kit ● Student Edition ● Teaching Edition ● Family Letters ● Warm-Ups ● Extra Practice ● Reteach ● Enrichment and Extension ● Puzzle Time ● Prerequisite Skills Practice ● Pre and Post Course Assessments ● Course Benchmark Assessments ● Alternative Assessments ● Chapter Assessments